JALLC Analysis

Handbook

Your guide to effective analysis

The NATO Joint Analysis and Lessons Learned Centre Analysis Handbook

First Edition, dated October 2024

"Intuitive versus analytical? That's a foolish choice. It's foolish, just like trying to choose between being realistic or idealistic. You need both in life."

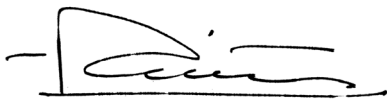— Mae Jemison, American engineer, physician, and NASA astronaut

FOREWORD

"It is with great pleasure that I introduce the Joint Analysis and Lessons Learned Centre's JALLC Analysis Handbook. This new version of the handbook reflects the broad knowledge-base and experience accumulated since the last edition of the handbook was published. It is also representative of the way JALLC continues to evolve to analyse some of NATO's most complex problems and ensure that the resulting products continue to meet the JALLC's and NATO's high standards for analytical excellence.

In NATO, analysis is defined as "The study of a whole by examining its parts and their interactions": a concept that remains central to all JALLC Analysis, which contributes to strengthening NATO's organizational learning.

This handbook delineates the concepts, fundamentals, methods, and techniques required to conduct evidence-based, thorough analysis, of complex NATO-wide topics that are key to NATO's continuous improvement and transformation. This handbook is, therefore, not only an indispensable resource for analysts, whether military or civilian, working at the JALLC, but also for those operating within NATO or member nations.

Among the complexities of modern warfare, this handbook serves as a compendium of knowledge as well as a beacon of guidance for those engaged in the critical work of analysis. It offers insights and methodologies tailored to address the analysis of present and new challenges faced by NATO and its Allies."

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INTRODUCTION

1.1 WELCOME TO THE JALLC ANALYSIS HANDBOOK

The Joint Analysis and Lessons Learned Centre (JALLC) Analysis Handbook describes the concepts, fundamentals, methods, and techniques that provide a baseline understanding for conducting a range of JALLC analysis projects/tasks. It has been produced to assist JALLC analysts to understand what is expected of them in their role at the JALLC, as well as to guide staff in other organizations with conducting analysis related to Lessons Learned (LL), especially within NATO or national military entities.

A number of *How to …* guides are provided in support of this handbook. The *How to …* guides provide more detailed guidance on selected design, planning, data collection, and analysis-related activities, and include useful templates, sample texts, examples, and hints/tips to avoid common mistakes. They can be accessed on the JALLC website.[1]

1.2 HOW TO USE THIS HANDBOOK

This first chapter serves two purposes: first, to explain what the handbook is and what JALLC analysis is, and second (starting at sections 1.6 and 1.7), to describe the fundamental concepts that underpin JALLC analysis.

Each chapter following this first chapter describes different sets of activities in the lifespan of an analysis project/task.[2] However, those reading this handbook should not assume that the sets of activities occur only once or always occur only in the order in which they are presented in this handbook. Readers will find words like *iterative* and *concurrent* used quite frequently throughout this handbook to remind them, and reinforce their understanding, that analysis is not a linear process. Instead, each chapter is designed to offer the reader (and in particular, the new analyst) a sufficient amount of information to act as a handrail that accompanies them throughout the course of a JALLC project/task. The chapters in this handbook follow the logical progression of an analysis project/task; however, due to the non-linear nature of analysis, it is advisable to do two things:

- First, read the handbook once, from cover to cover, to become familiar with the terminology, concepts, and methods.
- Second, read each applicable chapter at the beginning of the relevant part of an analysis task/project. This will provide more substantive support to the set of activities that are the current focus within a given project/task.

After all, how do you eat an elephant?[3]

1.3 JALLC ANALYSIS AND LESSONS

The JALLC is NATO's centre for both lessons learned and related analysis—because, after all, lessons cannot be effectively identified or learned without some level of analysis. The

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[1] www.jallc.nato.int; date last accessed 11 July 2024.

[2] Some JALLC analysts will observe that this handbook roughly follows the sequence of activities in the JALLC Project Approach (JPA) (Reference 1), which is the management tool for JALLC projects/tasks.

[3] Famously, Desmond Tutu once asked this question, the response to which is *"one bite at a time"*. Although conducting a JALLC analysis task/project may seem daunting, overwhelming, or even impossible, it can be accomplished by gradually taking on a little bit at a time.

analysis that the JALLC undertakes and its relation to LL can be understood by first considering the definition of analysis in NATO:

> *"The study of the whole by examining its parts and their interactions."*[4]

Based on this definition, a variety of different activities that take place in NATO and military organizations—e.g. assessment, audit, evaluation—can be considered as types of analysis. JALLC analysis is one of these activities. What sets JALLC analysis apart from the other analysis activities is its focus on enabling learning from experience, either in the context of the NATO LL Process or in a wider context, for example in support of implementing and improving NATO capabilities or advising strategic-level decision making.

Lessons are *"records of knowledge gained from experience that can be reused in the future"*[5]. In NATO, lessons are formally generated as individual items that result from NATO Command Structure (NCS) and NATO Force Structure (NFS) HQs running the LL Process,[6] and are then submitted to and managed in the NATO Lessons Learned Portal (NLLP).[7] However, lessons are also often found in a variety of official documentation, such as doctrines, standards, handbooks, reports, and training materials (and increasingly in other media such as videos), and documents uploaded to the NLLP library area. Lessons generated outside the NATO LL Process are usually not presented in a formal lessons-reporting format.[8]

The analysis that the JALLC conducts considers both lessons generated by the NATO LL Process and lessons generated and reported in other contexts, going beyond the NATO LL Process.

1.4 ANALYSIS ACTIVITIES THROUGHOUT A PROJECT

JALLC analysis is conceptually divided into six sets of activities, as depicted in Figure 1.

Clarify the Requirement | Design the Analysis | Collect and Analyse | Develop Findings | Draft the Report | Improve the Draft

Figure 1: Sets of Activities in JALLC Analysis

Every analyst or team that is assigned a new analysis project/task starts with a low level of understanding of the analysis topic and a low level of confidence in their own knowledge. The JALLC does not have a Subject Matter Expert (SME) for every potential analysis topic in NATO, so JALLC analysis teams use these different research and analysis activities to build their understanding and confidence of the analysis topic, from day one to the day the final product is published. Figure 2 depicts this relationship, where the *x*-axis shows the activities in a JALLC analysis project/task over time, and the *y*-axis shows the analysts' and teams' increasing understanding and confidence of the analysis topic.

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[4] NATO Terminology Database at https://nso.nato.int/natoterm/content/nato/pages/home.html?lg=en, record 18517, last accessed 11 September 2024. Note that the NATO Terminology Database has four definitions of *analysis*, two of which are NATO agreed. Of those two terms, the definition of *analysis* used in this context is the one that has general applicability, whereas the other definition is specific to analysis in the context of intelligence.

[5] There is no definition of *lessons* in NATO. The definition used in this handbook is adapted from several definitions found in academic and research papers relating to Lessons Learned.

[6] The NATO LL Process can be understood in more detail by reading the NATO LL Handbook (Reference 2). The NATO LL Process, at the time of writing this handbook, is depicted in Annex B.

[7] nllp.jallc.nato.int, date last accessed 11 July 2024.

[8] The formal lesson-reporting format in NATO is Observation Discussion Conclusion and Recommendation (ODCR), also explained in the NATO LL Handbook (Reference 2).
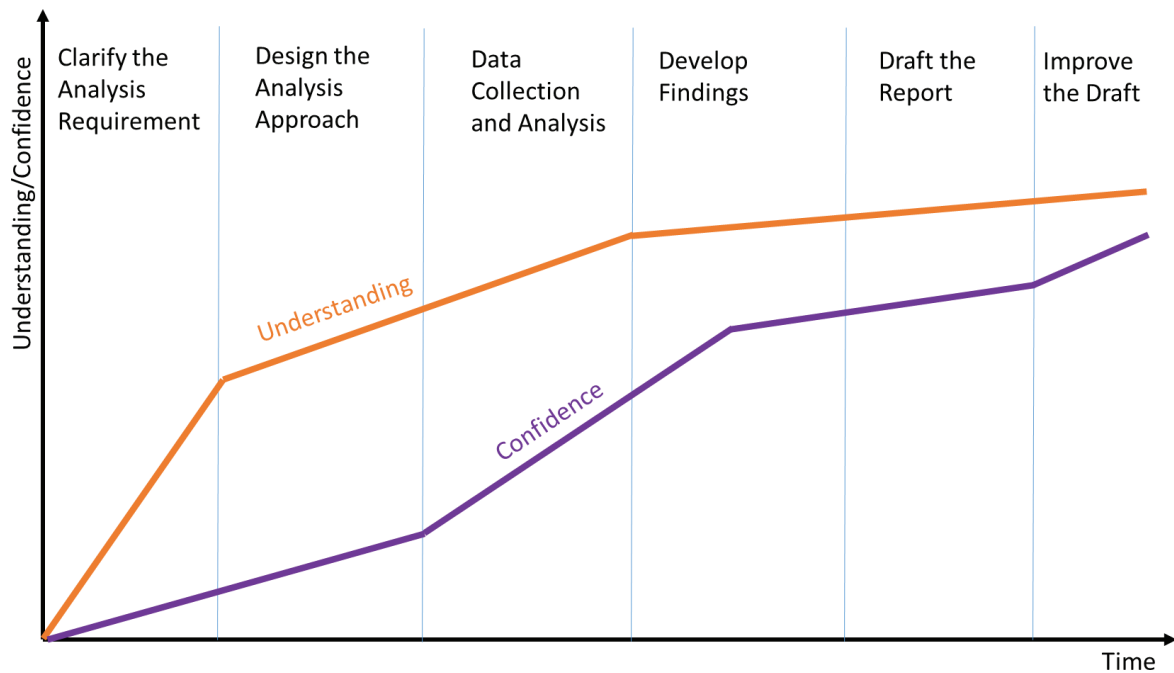
Figure 2: Building Understanding and Confidence Throughout an Analysis Project/Task

Each of these six sets of activities requires different types of thinking (see next section) and answers different questions. The sets of activities that a JALLC analysis is divided into in this handbook are widely agreed as the activities in any analysis, although they may sometimes have different names and/or be grouped differently by different entities. Table 1 lays out the activities that are described in each chapter of the handbook, the questions the analysis activities address, and the outcome(s) they generate.

Table 1: Activities in JALLC analysis, and the questions and outcomes they generate

Chapter	Activities	Questions addressed	Outcome(s)
2	Clarifying the analysis requirement (AR)	Are we clear on what we are being asked to do?	Refined AR and initial analysis approach
3	Designing the analysis approach	How should we conduct this analysis?	Analysis design
4	Collecting and structuring data	What have we observed about the system? (1st order, directly from data, 2nd order, via data analysis)	Variety of data, from multiple sources
	Analysing data		Analysis results, diagrams, descriptive statistics, narratives

(continued)

Table 1 (continued)

Chapter	Activities	Questions addressed	Outcome(s)
5	Exploring	What parts of our analysis results appear relevant to the AR? What analysis results appear to be related?	Additional data, additional results, initial findings and conclusions
	Interpreting	What might our observations/results mean? What might be the root causes? What might be the impacts? How might everything relate to everything else?	
	Investigating	What gaps are there in our reasoning? What are we a bit unsure about? What else do we need to find out to complete our understanding?	
6	Drafting a report	What messages do we need to communicate? What is the best way to deliver them?	Draft report (in different stages of development)
	Developing recommendations	What might we need to do? Will this resolve the issue?	
7	Self review	Does this report fulfil the requirement? Are all the arguments presented logically sound and supported by sufficient and relevant evidence?	Final report

Because the ideas, activities, and methods in this handbook are commonly found as standard practice in government, academia, and industry, analysts can find out further information on the topics in this handbook online.

1.5 TYPES OF JALLC ANALYSIS

The JALLC conducts analysis across a broad spectrum of topics with varying levels of complexity, making it impossible to identify a definitive number or exact definitions of types of JALLC analysis. However, we can generally characterize the topics JALLC teams analyse by documents, events/ activities, or systems. Table 2 provides some examples of what the analysis might look like for these topics under different levels of complexity. Note that the table is not exhaustive.

Table 2: Examples of what JALLC analysis can look like for different topics with different levels of complexity

	Low complexity	Medium complexity	High complexity
Analysis of documents	Statistical analysis of document contents, based on metadata or simple keyword identification. Summarizing document contents (human- or computer-generated).	Analysing document contents using sophisticated and tailored language models and tools. Summarizing a large and/or diverse set of documents into new themes, and identifying issues and lessons.	Analysing documents to develop new findings through inference of cause and effect and investigating further to validate contents.
Analysis of event/ activity (e.g. exercises, operations)	Conducting After Action Review (AAR), workshops, direct observations, or interviews and reporting raw outcomes without further research or validation.	Developing initial set of observations or lessons identified (LI) shortly after the event/activity and correlating those observations/LI with other evidence to a limited extent (i.e. no in-depth analysis to validate potential causes/effects).	Conducting directed data collection and analysis looking in-depth at specific challenging or novel aspects of the exercise/ activity, or covering a whole large activity (e.g. lessons from five years of an operation).
Analysis of complex systems	Running workshops, focus groups, or other facilitated sessions to quickly generate ideas to define the problem(s) within the system, and report the outcomes without further research or validation.	Starting with a clearly defined problem and analysing specific parts of a complex system to explain cause/effect relationships relating to the defined problem.	Analysing the problem to define it within the context of the system, then analysing specific parts of the system to explain cause/effect relationships relating to the defined problem.

This handbook is written to support the most complex type of JALLC analysis but can be used to support the less complex types. In order to help the reader to understand how the different analysis activities in this handbook can be applied (if at all) in different types of JALLC analysis, Annexes D, E, and F provide worked examples of three different types of JALLC analysis with varying levels of complexity.

1.6 Fundamentals of JALLC Analysis

In order to better understand JALLC analysis and what is expected of a JALLC analyst, it is necessary to understand a few key concepts, including:

- the complexity of problems that JALLC analysis looks at, as mentioned above;
- the approaches needed to deal with these complex problems, and the role of objectivity and subjectivity therein;
- the role of human judgement, cognitive biases, and what makes a good analyst in the JALLC context;
- the types of thinking that are required in JALLC analysis; and

- the quality assurance mechanisms in place to provide the team, the leadership, and the customer[9] with confidence that the analytical process has been conducted in a robust manner and that the findings are credible and based on evidence.

1.6.1 Analysing Complex Problems

Every JALLC analysis starts from the recognition of a knowledge deficit specific to needing to learn from what happened in the past in order to inform what to do in the future. This analysis involves putting the experiences from the past into a new context, an endeavour that is inherently complex because of the skills and thinking required to recontextualize information in this way.

The problems that JALLC is asked to analyse may lie somewhere between the highest level of complexity and the lowest.[10] More often than not, JALLC analysis will be dealing with medium- to high-complexity problems. This happens because:

- NATO is a complex organization—it has many different parts serving different purposes, with different funding and governance models, and the relations between these parts are often not well-defined or are constantly evolving.

- NATO's activities are (often) complex—they involve multiple parts of the organization working together to achieve a common goal, and include different national militaries and non-NATO entities, often in new and unique operational contexts.

- NATO has many diverse stakeholders—with staff from over 30 different nations, all military services, civilians, and a range of other diverse groups in the workforce with diverse specializations and interests, there are often many legitimate, different, and perhaps even contradictory perspectives that must be considered.

In problems with high complexity, both objectivity and subjectivity play an important role. Very often, just analysing the (objective) *facts*, i.e. official data and what is in approved/agreed documentation, will not provide an adequate explanation of the problem or justification for any proposed solutions. The more complex the problem, the more likely there will be several different and equally valid (subjective) opinions regarding the problem itself and what should be done about it. The JALLC analyst's task is to combine the subjective with the objective to derive the best possible explanation of the problem and the best possible solution(s) for it.

It is important to recognize that subjectivity is particularly significant in JALLC analysis, where the relevant data is often based on people's experiences and perspectives. This means considering multiple (often, conflicting) perspectives of many different stakeholders, which inherently adds complexity to the analysis. The JALLC analysis approach to managing this complexity aims to consider all the subjective data together in the problem space by treating it methodically, using structured methods and techniques, in order to try to make sense of all these different perspectives.

Although this handbook does not cover every method and technique, it will describe those most commonly used at JALLC. Additional resources for these methods and techniques, and others, can be found online when researching common analysis fields such as *systems analysis/studies, soft operational analysis,*[11] *judgement-based operational analysis, programme analysis,* and *qualitative research.*

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[9] The main customers for JALLC analysis are the NCS HQs (mainly the two Strategic Commands, Joint Force Commands, and Single Service Commands), the NFS HQs, the Military Committee and its working groups, and NATO HQ International Staff (IS) and International Military Staff (IMS) divisions.

[10] The NATO Guide for Judgement Based Operational Analysis (OA) (Reference 3) describes three types of problem with varying levels of complexity, where the more complex a problem becomes, the more the analysis must rely on human judgement.

[11] NATO practitioners have determined that approaches (i.e. theories, methods, techniques, models) within OA that are predominantly based on human judgement are an increasingly critical capability needed to support defence decision making. The field of judgement-based methodologies and

1.6.2 Systems Approach to Analysis

An effective approach to working with complex problems is a systems[12] approach to the analysis. This means explicitly defining the parts of the problem and their relationships. Doing so is not always straightforward because these parts and relationships are often quite abstract, e.g. they deal with tasks, concepts, domains, causes and effects, vertical and horizontal communication, or supported/supporting relationships. A systems approach to analysis can help JALLC analysts become more comfortable working with lack of clarity and uncertainty, by doing three things:

- systematically examining everything;
- identifying what is known and can be agreed upon; and
- describing what is unknown or disputed.

This systems approach is taught over the course of semesters in university and graduate programmes, and it is not expected that new analysts will immediately be able to use such an approach. However, by understanding the basic concepts—i.e. there are many inter-related parts in the system and, in order to understand them, they must be looked at in a systematic and organized way—new analysts already have the most important tool they need to do JALLC analysis.

1.6.3 Human Judgement, Good Analysts, and Mitigating Biases

A systems approach to analysis is not an exact science because it relies heavily on human judgement. Judgement is very sensitive to new information, meaning analysts need to keep an open mind and be prepared to continuously update, review, and revise their ideas as they make new discoveries during the course of their analysis. Being open minded in this way is not always a natural inclination for every analyst, and it often comes with more experience in dealing with complex problems and systems.

Regardless of the background or experience of the analysts in a team, there are two traits that are essential to making an analyst *a good* analyst in the context of JALLC analysis: curiosity and scepticism. Curiosity means an analyst tries to understand not just the words on a page or the words of a person. They look beyond words to understand the bigger context. Scepticism means an analyst doesn't take information at face value. They take a piece of information and dig deeper to challenge it, validate it, and/or add context. Being curious and sceptical means asking **a lot** of questions. Good analysts ask questions of other analysts, stakeholders, the customer, SMEs, and of course, the Internet.

Nevertheless, even with a curious and sceptical mindset, all humans are fallible and their thinking can be unconsciously affected by cognitive biases. Cognitive biases are inclinations—either consciously realized or completely unknown to a person—to present or be pre-disposed towards a particular perspective. This is often accompanied by an intentional or unintentional refusal to reflect upon the possible merits of alternative points of view. They can reduce the objectivity of the analysis. The problem is, everyone has them. The good news is, there are ways to recognize, avoid, and/or mitigate them. In general, the more analysts share their ideas with others, the more confidence they can have in the validity of their analysis. In JALLC analysis specifically, a key activity to support overcoming cognitive biases involves the use of analytical and communications expertise found in the Quality Assurance (QA) staff. Additionally, the use of structured

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methods within OA is usually known as "soft" OA. It has a significantly more qualitative and subjective nature than the traditional, "hard" OA methodologies, which tend to be significantly more quantitative and objective. (Reference 3)

[12] *"System—A group or set of related or associated things perceived or thought of as a unity or complex whole."* Oxford English Dictionary, 12th Edition (Reference 4)

thinking techniques, such as those found in the NATO Alternative Analysis[13] (AltA) Handbook (Reference 5) can help.

1.6.4 Types of Thinking

In 1910, philosopher and educator John Dewey, in his book How We Think, proposed that in order to learn from experience, thinking has to come into play (Reference 6). He was the first to write about the importance of critical thinking: a concept that is now widely accepted as an essential life skill. Critical thinking is the objective analysis and evaluation of an issue in order to form a judgement. It enables a person to determine the authenticity, accuracy, worth, validity, or value of something. But critical thinking alone won't be enough to complete a JALLC analysis, as developing new knowledge and reframing old knowledge in the context of new situations also requires creative thinking. Creative thinking is the ability to push past established thoughts, theories, rules, and procedures. It enables a person to conceive new and innovative ideas by looking at them from a different perspective.

Many people think of creative thinking as something only artists do, but Edward de Bono, in his book Serious Creativity, presented a compelling case for the need for creativity in all human endeavours, even serious ones, as well as outlining techniques to enable even people who think they are not creative to be creative (Reference 7). Throughout an analysis project, analysts will need to frequently switch between critical and creative thinking. This is especially true for the more complex types of JALLC analysis.

A more recent model of thinking that is also helpful to remember when embarking on JALLC analysis is that proposed by behavioural economist Daniel Kahneman in his book Thinking, Fast and Slow. He proposed that we have two modes of thinking, which he referred to as System 1 and System 2:

- System 1 thinking is the brain's fast, automatic, unconscious, and emotional response to situations and stimuli. This can be in the form of absent-mindedly reading text on a billboard or knowing how to tie your shoelaces.

- System 2 thinking is the slow, effortful, and logical mode in which our brains operate when solving more complicated problems. For example, System 2 thinking is used when looking for a friend in a crowd or parking your vehicle in a small space.

Kahneman's research demonstrated that humans mostly use System 1 thinking, but that complex problems require us to deliberately apply System 2 thinking (Reference 8). This is useful to remember as there will be many points during any JALLC analysis where System 2 thinking is required. As System 2 thinking is hard work, analysts will need to make a conscious effort to break out of their System 1 thinking at these points.

All types of thinking are necessary in JALLC analysis. In truth, everyone will naturally be more inclined toward certain types of thinking (and consequently, some activities) than others. This is normal, but this also doesn't mean that an individual cannot *do* all types of thinking. There are numerous resources that can support analysts in actively using different types of thinking. For example, the NATO AltA Handbook includes a number of analysis techniques that encourage and support thinking through problems in a manner that is structured, creative, diagnostic, and/or with a view to challenge. Additionally, specific staff in the JALLC can be consulted, as described in the following section.

1.6.5 The Role of Quality Assurance

An excellent-quality JALLC analysis product does not happen by accident: it is the product of careful application of well-thought-out and appropriate research and analysis methods. Like any other professional research or analysis organization, the JALLC uses specific activities to assure the quality of JALLC analysis. These QA activities occur throughout a project/task

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[13] Alternative Analysis is the deliberate application of independent critical thought and alternative perspective to improve decision making.

and help assure that the analysis remains valid, sound, heading in the right direction, and aligns with analytical standards; and that the final product is communicated in a way that aligns with editorial standards.

QA activities typically encompass direction and support for developing and reviewing different analysis products throughout the life of a project, meaning QA of JALLC analysis applies to more than just the quality of the final product. It also applies to the quality of the thinking, the analysis design and planning, the conduct of the data collection and analysis, and the interpretation and communication of results, all of which contribute substantially to the quality of the final product.

Everyone has role to play in QA, but some have more QA responsibilities than others. The analysis team is responsible for revising, updating, and correcting their own work until the required quality is reached. Reinforcing the immediate analysis team are other staff with more specific QA responsibilities, assuring the JALLC command group that JALLC quality standards[14] are consistently applied, no matter which analysis team is doing the work. These staff have these responsibilities because of their experience, their expertise, and their assigned role in the organization. In many organizations, these roles are often called Technical Leads, Technical Directors, Communications Analysts, among many others. In the JALLC, the primary QA staff consists of the principal analyst, the senior analyst, and the editor.

1.7 JALLC Analysis Teams, Skills, and Training

The JALLC usually uses teams to conduct its analysis. The JALLC analysis teams are formed from military and civilian analysts, one of whom will be the designated project manager. The analysis teams will have a mixture of experience and expertise among the members, and it is important that the team have some awareness of their strengths and their challenges. Regardless of the experiences, strengths, or challenges, in JALLC, the analysis teams are always provided with appropriate training.

1.7.1 Team Composition

In JALLC analysis teams, the military analysts bring knowledge and experience of how military staff functions and decision-making work. The civilian analysts bring knowledge and experience of research methods and analysis, and a well-developed analytical mindset. Taken together, this allows JALLC analysis teams to take the results of well-thought-out analysis and place them in the appropriate military context for decision makers, making JALLC analysis more robust and relevant to NATO military audiences.

One of the military analysts will (usually) be designated as the project manager in order to take advantage of their prior experience of leadership and managing processes, timing, and delivery. This role brings additional responsibility for delegating tasks and coordinating the analysis within the JALLC.

Civilian analysts may also have the skills and experience to be good project managers, but it is usually more important for them to focus their time and energy on the analysis content and conduct, which may not be an area where the military analysts have prior experience. The civilian analyst is therefore responsible for breaking up the analysis into discrete, achievable tasks that can be undertaken by the various team members, and supporting all team members to complete their tasks. In this way, the civilian analyst acts as a mentor to the staff with less analysis experience, and is responsible for ensuring that all team members are able to contribute effectively to the analysis.

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[14] JALLC quality standards can be found in relevant Standing Operating Procedures (SOP) and guides (References 1 and 9).

Irrespective of the specialist role that is either designated or naturally emerges for team members, everyone on a JALLC analysis team is an analyst first. This means their first responsibility is to ensure that a high-quality and timely analysis product is produced.

1.7.2 Team Skills and Challenges

There are, of course, some inherent challenges with working in teams. Often, these challenges arise due to the different backgrounds and experiences of military and civilian analysts or from not understanding roles and responsibilities in the same way. But each person has something they can contribute to the team and, instead of focusing on the challenges, analysts should seek to understand the relative strengths of each team member and how those can be used for team success.

It is nearly impossible to design a team with every strength necessary for a perfect project. In reality, the JALLC seeks a combination of strengths in managing, thinking, analysing, and communicating. The table below lists (some) skills in this respect, which are key to the success of an analysis team.

Table 3: Some managing, thinking/analysing, and communicating strengths for a successful team

Managing	Thinking/analysing	Communicating
• Coordinating the team to work collaboratively on analysis and drafting; • providing answers and making decisions, even when unsure; • translating the analysis design into templates and well-defined tasks to be shared among the team; • engaging with military stakeholders; • organizing data collection in military units, exercises and operations; • filling templates and performing well-defined tasks reliably and accurately; • deciding when to move forward, even under uncertainty; and • focusing on delivering the analysis products on time.	• Asking questions, all the time, even when the answer is (supposedly) known; • dealing with the grey areas, where there is no clear right or wrong; • developing a feasible and applicable analysis design; • judging what went right and what went wrong; • setting up and using specialist analysis tools; • finding patterns in large amounts of seemingly unrelated information/data; • understanding and dealing with military and NATO culture, structures, functions, and jargon; • designing and facilitating focus groups and workshops; • challenging the logic of findings, recommendations, and conclusions; and • judging the military relevance of data and findings to the analysis.	• Developing high-level messages to convey detailed analysis results; • developing the most appropriate structure for capturing the findings; • understanding and writing for the appropriate target audience; • communicating analysis to military audiences in a simple and effective manner; and • identifying clear routes of exploitation of the results, findings, and/or final product.

In reality, the skills listed in Table 3 will overlap among analysts in a team and some will be missing in the team. All JALLC analysts are encouraged to consider the listed skills as an entire team. Having awareness of where the strengths exist in a team can go a long way to helping a team manage the challenges that arise when some of these skills do not exist in a team.

In addition to the skills above, several frameworks exist for identifying competencies for learning and working in team environments. Annex C includes considerations regarding some competencies that are important for JALLC analysts, including how the competencies can aid an analyst in thinking through the different analysis activities that are described in this handbook.

1.7.3 Analyst Training

Many resources exist that can help newcomers to find out more about analysis tools and techniques and their application in the military. The JALLC recommends that all of its analysts complete the following NATO training:

- **JALLC Analyst Training Modules**: JALLC internal training that covers the content in this handbook and the *How to …* guides*.

- **JALLC Analytical Writing Course**: JALLC internal training that covers the content of Chapters 6 and 7 of this handbook in more detail, from a communications perspective.

- **NATO Alternative Analysis Course**: Facilitation skills and structured thinking techniques training that covers content in the NATO Alternative Analysis Handbook (Reference 5).

- **NATO Lessons Learned Online Course**: Joint Advanced Distributed Learning (JADL) course ADL-138, which covers basic NATO LL-specific concepts and terminology.

- **NATO Lessons Learned Staff Officer Course**: NATO LL Process training that covers content in the NATO LL Handbook (Reference 2), including how to implement the Analysis Phase of the NATO LL Process.

In addition to these recommended courses, analysts will inevitably find themselves working on a project that may require skills in specific areas and knowledge on existing tools. Fortunately, numerous online courses exist related to, for example, project management, specific data analysis techniques, specific data-collection methods, and Microsoft applications (e.g. Excel, Power BI).

2
CLARIFYING THE ANALYSIS REQUIREMENT

The first activities that occur in relation to any analysis project/task occur *before* the analysis commences. These activities are not part of the analysis project/task itself but are essential for its success. Figure 3 shows where this set of activities is in relation to the other activities. Clarifying the Analysis Requirement (AR) needs to be led by an experienced analyst who can develop an initial approach to the analysis that is feasible and focused on meeting the need, and anticipate where lack of clarity may lead to problems later in the analysis.

Clarify the Requirement	Design the Analysis	Collect and Analyse	Develop Findings	Draft the Report	Improve the Draft

Figure 3: Sets of Activities in JALLC Analysis

In JALLC analysis, these activities begin when the JALLC receives an AR proposal from a customer.[15] More often than not, that AR needs some clarification. The analysts in the team need to answer several questions, including:

- What is the *real* intent behind the requirement?
- What does the customer hope to achieve with JALLC analysis?
- What is its applicability to wider NATO?
- What is the initial scope of the analysis?
- What information already exists with respect to the topic?
- Does JALLC have the appropriate/available resources to conduct the analysis?

In order to answer these questions, the analyst must begin to build their understanding of the analysis topic through two activities: conducting initial research and engaging the customer. These activities will allow the analysis team to refine the analysis requirement and scope, think about the initial analysis approach, and consider the business case. The results of all this initial research, refinement, and thinking need to be documented.

2.1 CONDUCTING INITIAL RESEARCH

Initial research is the starting point for any analysis project or task. Analysts and teams should always start by finding out as much as they can about the topic to be analysed. The main aims of initial research are to inform the analyst's overall understanding of the topic; to ensure that there are no flawed assumptions or misunderstandings on the topic that may affect the project/task; and to make sure that no one else is planning, or has completed, any other work that might invalidate the need for JALLC analysis.

In JALLC analysis, initial research should always include a few key sources of information:

- The NATO website (www.nato.int). Searching relevant keywords will show what is available on the topic in the unclassified domain and this will provide some context to the analysis.

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[15] The process for receiving analysis requirements is described in Bi-SC Directive 080–091 (Reference 10).

- The NLLP NATO Unclassified (NU)[16] and NATO Secret (NS)[17] versions. Keyword searches will yield not only observations on the topic, but also potential Points of Contact (POC), i.e. the people who submitted the observations.

- Official NATO publications and terminology. These include policies, concepts, plans, doctrines, and directives, among many others. Reviewing these will help build the analyst's topic-specific vocabulary and basic understanding of organizations, tools, and processes in NATO associated with the topic.

- JALLC Reports. The JALLC has been producing analysis reports on various topics in NATO since 2002. Understanding what has previously been said about a topic can help the analysis team understand the evolution of it to the present date.

Finally, analysts should talk to people who have topic and institutional knowledge to find out more about the topic of analysis. There are people all over NATO, including in NCS, NFS, the Centres of Excellence (COE), NATO HQ, and the JALLC itself who have knowledge of many different topics and activities. Note that talking to people at this point does not require formal data-collection methods. It can be as simple as making a phone call to a staff officer asking for the right POC in their HQ.

Initial research must be carried out in a systematic manner in order to avoid overlooking large amounts of potentially critical data or information. Keep a list of the documents found and what they contain, and the people spoken to and what they said. Having this information available forms the first part of the data collection and will be helpful later in the project/task.

As well as answering the analysts' questions, the initial research will reveal a number of new questions that cannot be quickly answered just by looking in documents and talking to people. The analysis team should keep track of these questions and identify any which require answers or clarification from the customer or customer representative (rep).

> **Start Managing Information from Day One!**
>
> One of the most common things analysts say they would do differently next time, or the single piece of advice they would always give to other analysts, is to actively manage the project/task information from the very beginning and to keep on top of information management throughout the project/task to avoid headaches and delays at the end. It's good practice to start keeping track of documents that will become references in the final product. Additionally, analysts should keep track of individual excerpts and quotes from relevant documents. These excerpts and quotes will inevitably form part of the data set later on. Both references and relevant quotes are often easily tracked in a simple table or Excel file.

2.2 ENGAGING WITH THE CUSTOMER

In JALLC analysis, the **customer** is the senior leader who has endorsed the need for the analysis support from the JALLC. The **customer rep** is a staff-level representative of the customer, who usually works in the chain of command of the customer, or ideally directly for the customer. In JALLC analysis, most of the interaction with the customer is achieved through the customer rep. When the analysts engage with the customer rep for the first time in the initial customer rep meeting, it should be with the aim of understanding why the customer has asked for the analysis and what they intend to use it for when it is finished.

When the analysis team feels they have a solid understanding of the AR, it is essential that a face-to-face interaction occurs with the customer. This interaction is to ensure that the customer is fully bought in to the project and has an understanding of what will be delivered, and gives an opportunity for the analysis team to receive valuable senior-level direction and guidance. After these initial interactions, keeping the customer (and other stakeholders)

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[16] nllp.jallc.nato.int on the internet, date last accessed 11 July 2024.

[17] nllp.jallc.nato.int from an NS workstation, date last accessed 11 July 2024.

engaged throughout the analysis is essential for the success of the analysis, i.e. for the analysis to be accepted and the recommendations implemented.

2.3 REFINING THE ANALYSIS REQUIREMENT, SCOPE, AND OTHER CONSIDERATIONS

An initial AR will have already been proposed by the customer/customer rep in order to initiate the JALLC analysis. However, after the analysts have conducted their initial research and had the initial customer rep meeting, it is time to further develop the AR to ensure it aligns with all the new information that has been obtained. The amount of time dedicated to refining the AR varies depending on factors such as the understanding of the analysts in the team, the understanding of the customer rep, and the amount of information about the topic that is already known, among others. Refining the AR is the first analysis activity, and sets the stage for every single analysis activity that follows, which will be reviewed against how well and how completely those activities contribute to meeting the AR. As such, teams will often find themselves spending more time than expected on this part of the analysis in order to *get it right*.

There are generally two parts to an AR:

- The **focus** part of the AR answers the *what*.
- The **intent** part of the AR answers the *why*.

> **AR Examples**
>
> Analyse the **generation of the Euro-Atlantic Partnership Work Programme (EAPWP)** (focus) in order to **enable the stakeholders to optimize the work plan's utility against NATO's Partnership for Peace (PfP) Policy Partners' objectives, and the current operational environment** (intent).
>
> Develop **an evidence-based understanding of how NATO has prepared for, planned, and executed Technical Exploitation (TE) activities in NATO missions and operations, and how TE results, including Battlefield Evidence (BE), were exploited and disseminated** (focus), in order to **support the institutionalization of TE and development of TE capabilities** (intent).

Refining the AR should be a collaborative activity such that an agreed understanding of the intent, the terminology, and the objectives of the statement is reached. In JALLC analysis, the AR is refined iteratively in one or more workshop-type meetings. This work should be supported by continuous initial research to check the developing AR statement makes sense. When the AR statement is mature, customer rep feedback on the AR statement should be requested and incorporated in order to reach a final draft of the AR statement. For examples of how analysis teams might refine AR statements in different types of JALLC analysis, see Annexes D, E, and F.

During development of the AR, it is important to understand whether there are particular elements of the topic that the customer definitely wants to be included in the scope of the analysis, as well as if there are specific elements that should be avoided, i.e. limitations. As an example of scope, the customer may list organizations that should definitely be included in the data collection, specific exercises/operations to focus on, or give a time frame of interest for the analysis. As an example of a limitation, the customer may direct the JALLC analysis team to avoid collecting or analysing anything of a political nature during the analysis.

Refining the scope and understanding any limitations will help the analysts begin to think about their approach to the analysis, including initial data requirements, travel requirements for data collection, and even potential analysis methods. All of this initial thinking is essential and will be developed further in the activities associated with designing the analysis.

2.4 Considering the Target Audience

Finally, the analysts must consider who the target audience is for the analysis product as this can affect the scope, limitations, and characteristics of the final product. Obviously the product needs to satisfy the customer's immediate requirement, but analysis products are knowledge products that should also cater for a wider target audience. This includes, in the near term, stakeholders who may be involved in implementing recommendations in the analysis report and, in the future, staff who may need the knowledge captured in the report to learn about past experiences so that NATO doesn't repeat the same mistakes. An additional consideration in defining the final product is the security classification of the final product and distribution/publication limitations which will impact how the customer can use it.

2.5 Business Case

The JALLC follows the PRINCE2[18] approach to managing its analysis projects, and a key element of that project management approach is the business case. The business case provides solid justification for undertaking any project.

In JALLC analysis, the principal analyst or senior analyst will initially evaluate the business case based on the results of the initial research conducted so far, the discussions with the customer rep, and the discussions about the initial analysis approach that will have occurred during the AR statement development meetings.[19] The business case is then re-evaluated throughout the project/task to check that nothing has changed—in JALLC or in the external environment—that might invalidate the need for analysis.

The business case is evaluated across five dimensions: benefit, suitability, data, customer, and resources. Each dimension is assessed as *green*—good to go, *amber*—proceed with caution, or *red*—stop the project/task. A *red* on any dimension means the analysis project should probably not go ahead, or should be stopped midway through, because to go ahead with an analysis project/task under these conditions involves a very high risk that the analysis project/task will be unsuccessful, i.e. it will not deliver enough benefit to NATO to justify the JALLC resources that were allocated to it.

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[18] PRINCE = PRojects IN Controlled Environments.

[19] The initial business case evaluation for small analysis projects/tasks can sometimes be skipped or done quickly and intuitively based only on the principal analyst/senior analyst's prior knowledge and experience.

3
DESIGNING THE ANALYSIS APPROACH

Once the AR and scope have been refined, the analysis team will start designing their analysis approach. By designing the approach and planning the analysis before jumping straight into data collection, the analysis team can better optimize the time they have to collect and analyse data during the rest of the analysis, ensuring they have a clear concept of how to use that data to meet the AR. In JALLC analysis, these activities are characterized by intensive engagement with the senior analyst in order to ensure that the research and analysis design adheres to common analysis standards and best practices. Figure 4 shows where this set of activities is in relation to the other activities.

| Clarify the Requirement | Design the Analysis | Collect and Analyse | Develop Findings | Draft the Report | Improve the Draft |

Figure 4: Sets of Activities in JALLC Analysis

Activities the analysis team will undertake include:

- doing the additional research and analytical thinking required to break down the AR into Analysis Objectives (AO);

- defining the data-collection requirements and methods within the context of the AOs;

- articulating how the anticipated collected data will be analysed to yield results that will help meet the AOs;

- thinking through to the end about how the results of the data collection and analysis will be used to develop findings, conclusions, and recommendations in the final product; and

- planning how to practically implement the analysis within the time and resources available.

The following sections describe the analysis activities involved in designing the analysis approach. Note that these activities all inform each other such that earlier activities will need to be revisited based on the thinking coming out of later activities.

The results of these activities must be written down so that they can be used as a baseline for the analysis team to verify whether their thinking remains valid in light of what they learn from the data collection, analysis, and investigation activities. This baseline can be called many things, including an Analysis Plan, an Analysis Design, or a Project Plan.

3.1 CONDUCTING DOCUMENT RESEARCH

Analysis can be done without interviews, surveys, etc. but it cannot be done without documents. Document research is the foundation stone of all subsequent research and analysis, whether that be interviews, focus groups, or surveys, etc. Additionally, it plays a role in every single part of the analysis project/task. For example, document research is done when the analyst needs to validate some thinking during data analysis, triangulate evidence for analysis results, uncover new avenues of data collection, and add context to findings in the final product.

Document research often takes the form of a literature review—a research method that involves surveying the literature in a systematic manner to build a general image of the analysis topic. A literature review should be one of the first research activities undertaken in any analysis. In some analysis, literature review alone is enough to fulfil the analysis

requirement. In JALLC analysis, some of the work to contribute to the literature review will have already started with the initial research undertaken to clarify the analysis requirement (see Chapter 2).

> **How Much Literature Is Enough?**
>
> When starting the literature review, there is no rule regarding the *quantity* of documents that analysts should read and review before moving on to the next steps. This depends on the topic itself and how much has been produced in different parts of NATO and in the public domain regarding the topic. However, there will come a point when the quantity of documents that the analyst is discovering as *relevant* to the analysis topic becomes less and less. This is a signal to the analyst that they've probably read enough at this stage to be able to continue with designing and planning the analysis.

The documents the analysis team found during their initial research is the first place to look in the literature review. However, this time the analysis team will be looking for different things in the documents, and they will also need to identify more documents than were used for the initial research. Previously the focus was on understanding why the customer asked for the analysis, i.e. what purpose the analysis should serve. But now the focus should be on identifying what the documents contain that can be useful later in the analysis, and building a more thorough understanding of the topic. The analysis team will also need to refer to more documents than were used for the initial research.

The literature review should be well underway *before* the analysis team moves on to the analysis design and planning activities, but this does not mean the literature review must be *complete* before starting the analysis design and planning. In fact, the analysts will always need to continue to add to and extend the literature review as they progress with the analysis design and planning activities.

A few of the key things that the analysis team should be looking to find out from the preliminary literature review are: definitions of key terms, a topic chronology, and the relevant system elements and their interactions.

3.1.1 Key Terms

When staff in NATO talk or write about a topic, they will often use different terms to refer to what is essentially the same thing, or conversely they may use similar words to refer to things that are not the same at all. It is important that the analysis team recognizes this as early as possible and agrees on a single common way that they will use key terms, ideally based on official definitions,[20] throughout their analysis. Otherwise different team members, internal JALLC stakeholders, and other NATO staff may unknowingly be working with different understandings of key terms, which can cause misunderstandings and, in the worst case, invalidate findings, conclusions, and recommendations.

3.1.2 Topic Chronology (Timeline)

A critical part of understanding an analysis topic is knowing the history of relevant decisions that led NATO to reach the current situation. Sometimes to an outsider, the current situation may seem to be suboptimal or nonsensical, but tracking back through the decisions that led to it sheds light on why it looks the way it does. The decisions made were often logical and sensible at the time and in the context in which they were made. Knowing the history of how NATO ended up where it is today can stop the analysis team from wasting time pursuing solutions that have already been tried before but failed, and help them to appreciate when the root cause of a finding tracks back to a specific historical decision that may need to be revisited. The topic chronology can be as simple as a bulleted list of key events and decisions, in chronological order, or it can be a visual representation

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[20] Official definitions in NATO are found in the NATO Terminology Database.

of events and decisions. Note that, often, the chronology (all or parts of it) will be used later when writing the background part of the final product.

3.1.3 System Elements

Another part of building understanding of the topic is to view it as a system.[21] Doing so allows the analysts to break the system down into individual elements and consider how they relate to each other (see examples in Annexes D, E, and F). Finding out about the system from documentation while designing the analysis is essential to ensure that the analysis focuses on the right part of the problem. It also ensures that, as the analysis progresses, the interpretation and investigation of analysis results takes into account the wider system context.

A good way to build understanding of the system elements is by collaboratively building a diagram of the system based on the information found in the documents reviewed during the literature review. Trying to draw the system will often reveal missing elements/ relationships or inconsistencies, which can help the analysis team to plan their data collection and analysis to focus on the most problematic, or less well-understood, areas of the topic.

3.2 DESIGNING THE ANALYSIS

The analysis design *"refers to the overall strategy utilized to carry out [analysis] that defines a succinct and logical plan to tackle [the] established [AR] through the collection, interpretation, analysis, and discussion of data."*[22] To build an analysis design, JALLC analysis teams develop AOs that divide the analysis up into logically connected, manageable pieces and a methodology that specifies the data-collection and analysis methods that will be used to meet the AOs.

The analysis design is developed iteratively because each element of the analysis needs to be integrated with the others and cannot be considered in isolation. For example, in order to understand data collection requirements, there needs to be a clear AO to start from, as well as an understanding of how the data collected will be analysed afterwards. The senior analyst will help the analysis team to ensure that all of the elements of their analysis design align with each other and that, as a whole, the analysis design will allow the analysis team to successfully fulfil the AR.

For examples of different activities that teams might employ to design different types of analysis, see Annexes D, E, and F.

3.2.1 Analysis Objectives

The AOs are used to break the AR into more individual, manageable pieces that focus the analysis team on specific analysis activities, that, when combined, can satisfy the entire AR. Developing a set of draft AOs is the first step the analysis team takes to design the analysis.

There is no one, single correct way to break down one AR into different AOs, but there are incorrect ways. Incorrect ways result in AOs that do not follow the mutually exclusive, collectively exhaustive (MECE) principle. The MECE principle is used to group data into categories (e.g. AOs) according to two rules:

1. Mutually Exclusive—each individual AO achieves a unique objective.

2. Collectively Exhaustive—the AOs, taken together, cover everything needed to satisfy the AR.

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[21] This is part of the systems approach to analysing complex issues as discussed in Chapter 1.

[22] Adapted from: https://en.wikipedia.org/wiki/Research_design; last accessed 28 February 2024.

If the set of AOs follows the MECE principle, then the analysts in the team can have reasonable confidence that it is a good set of AOs.

How an analysis team decides to break down the AOs will depend on the way their thinking about the topic has developed, the data collection and analysis methods/techniques that are most feasible and appropriate for the analysis, and the relative abilities of the analysts in the team to take on different parts of the analysis. It takes extensive knowledge and experience of research design to make these judgements, and the senior analyst should be consulted for advice on what will work best for any specific analysis team and AR.

The following are some common examples of how the AR could be split into AOs (this list is not exhaustive):

- By the type of **research method**, for example, conduct quantitative[23] research and qualitative[24] research, and then merge the results in a mixed-method type of research design.

- By the **system elements** of the topic, for example, if the topic relates to an exercise series, the analysis team may create one AO relating to each exercise in the series in a case-study type of research design.

- By the **logical phases** that the analysis will go through, for example, first define a baseline model, then map real life to that baseline model, then identify gaps/issues, then investigate the root causes of the gaps/issues, then find solutions, in an analytical type of research design.

Some common types of AOs that JALLC analysis teams tend to use include (this list is not exhaustive):

- **Exploratory:** the objective is to explore and ascertain the nature of phenomena that are not clearly defined and have not previously been subject to much research. Useful to create a framework/baseline for the rest of the analysis in case official NATO documentation lacks a suitable frame of reference/baseline, e.g. explore the evolution of a concept in NATO.

- **Descriptive:** the objective is to describe the details of a phenomenon that is understood in theory, but which is not well-described or quantified in real life. Useful to measure the extent to which something problematic is occurring, e.g. describe NATO's doctrinal interpretation of the concept.

- **Comparative:** the objective is to compare the details of a phenomenon in one set of conditions with the details of the same phenomenon in different conditions. Useful to understand how generalizable findings are and what conditions are associated with different phenomena, e.g. compare the way the concept was implemented in directives by different HQs.

- **Explanatory:** the objective is to explain the nature of relationships between variables as a way of understanding why certain phenomena work in the way that they do. Useful to identify and investigate cause and effect relationships, e.g. explain why the implementation of the concept varies across HQs.

- **Case Study:** the objective is to study the case of a specific example of a phenomenon. Useful to demonstrate and better understand the types of situations where the phenomena arise, e.g. study the case of implementation of the concept in the next major exercise.

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[23] Relating to quantities, i.e. counted or measured on a numeric scale, e.g. there are three balls.

[24] Relating to qualities, i.e. described or understood in a non-quantifiable way, e.g. the balls are bouncy and red.

For more complex JALLC analyses, analysis teams typically define between two and five AOs. Sometimes it will also be necessary to break down complex AOs into a number of sub-AOs to better guide the analysis and allocate resources.

As the AOs are being developed, keep in mind the iterative nature of this part of the project/ task. It will not be clear whether a set of draft AOs is achievable until the process of thinking through the different data collection requirements and analysis methods/techniques associated with the draft AOs is completed. The AOs may also need to be revised based on new knowledge that emerges from the ongoing literature review or practical considerations that arise as the analysis design and planning progresses.

3.2.2 Methodology

The methodology is how the analysis team will approach the data collection and analysis to satisfy each of the AOs. The three key elements of the methodology are:

- **Data collection methods** are used to collect data/information for the analysis from appropriate sources, in a form that is relevant and appropriate to use in the analysis.

- **Analysis methods/techniques** are used to reveal new insights from the data. There are many ways to pull apart, reorder, and reconstruct the data collected. Using different analysis methods/techniques yields different results and makes it possible to see the data in different ways and potentially identify different patterns, trends, or anomalies that will be used as a starting point to develop findings.

- **Analysis results** may take the form of interim written products, diagrams, or charts that may later be used as evidence to support findings, conclusions, and/or recommendations that fulfil the AR.

Choosing the data-collection methods and the analysis methods/techniques is not a one-for-one relationship, i.e. one particular data collection method doesn't necessarily dictate a particular analysis method/technique. However, the type and nature of data that a specific data collection method provides must be suitable as input to the intended analysis method/ technique and vice versa. In JALLC analysis, much of the data and information that analysts will be working with comes from people's experiences and perspectives. This means that the nature and type of data in JALLC analysis is often a large amount of unstructured (usually qualitative) data, and it is the analysts' imperative to design ways to structure the data that will allow for a systematic approach to analysing it.

A particularly challenging part of the thinking at this point is to consider how the analysis results from individual data collection and analysis activities can be combined with the analysis results from other data collection and analysis activities to fully satisfy the AOs, and ultimately the AR. The senior analyst will be key in advising the analysis team on how it should all fit together.

> **Think Backwards!**
>
> To satisfy each AO, it often helps to think backwards from the AOs and ask: (1) What do the analysis results need to reveal? (2) What analysis methods/techniques can be used to reach the type of analysis results that are needed? (3) What data is required for those analysis methods/techniques? (4) What data collection methods can be used to meet these data requirements?

Some information to help choose among the various data-collection methods is presented in Table 4. The JALLC commonly uses one or more of the following data collection methods: interviews, focus groups, workshops, observation, surveys/questionnaires, and desk research. Note that nearly all JALLC analysis will involve desk research, usually with the addition of one or two other methods.

Data collection method	Data collected	Caveats	How can it be used?
Interviews[25] **Focus groups Workshops**	Testimonial evidence, expert judgement, personal opinions, viewpoints.	Requires good understanding of the interviewees and focus group participants to mitigate bias or inaccuracies.	Helps the analyst to understand why, not just what happened. Adds context in support of findings and other data. Depending on who's involved, provides credibility to the study.
Observation[26]	Analyst-observed information.	Must be thoroughly documented; can be biased due to analyst's own knowledge or experience.	Analyst witnesses what happened and makes their own interpretation. Records relevant details in the moment that may not be remembered accurately later. Provides credibility to the study because the analysts were present when the experience was gained.
Surveys/ questionnaires	Self-reported information.	Usefulness/ generalizability of results is dependent on response rate/ willingness to participate.	Reveals interesting results for further investigation. Calculated statistics (as long as enough of the right people responded) and summaries of qualitative returns can increase the validity of findings. Useful for capturing SME input and measuring opinions or trends among a group.
Desk research	Literature, statistics, databases.	Previously reported information needs supporting evidence from other/updated sources.	Provides good background/ context/theories on which to base the analysis. Useful to check facts. Reported statistics can be convincing support for findings. Official databases and statistics add credibility and numbers to support qualitative statements.

Some information to help choose among different data analysis methods/techniques is presented in Table 5. Note that this table is not comprehensive and there are many suitable analysis methods/techniques that have not been included. The civilian analyst and senior analyst will inform the analysis team if there are suitable analysis methods/techniques not

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[25] The JALLC has developed a Guide for Preparing, Conducting, and Managing Interviews. It can be found online at https://www.jallc.nato.int/; date last accessed 11 July 2024.

[26] Observation as a data-collection method involves the analyst observing the situation first-hand, and is not the same as collecting observations in the ODCR format from staff across an HQ in the NLLP. Collecting observations in the NLLP is classified as using the survey data-collection method.

contained in this table that they should be using. As with data-collection methods, JALLC analysis will often rely on using more than one data analysis method/technique.

Table 5: Data analysis methods/techniques planning considerations

Analysis method/ technique	Data required	Caveats	How can it be used?
Content/ thematic analysis	Qualitative data, usually text, audio, pictures, or video with descriptive content.	Highly dependent on the analyst's interpretation. Can be biased.	To identify recurring themes, shared/differing perspectives, or group similar data for further analysis with other methods.
Narrative analysis	Qualitative data, usually text.	Relies on a large data set to ensure validity of resulting narrative.	To clarify and interpret core narratives from a larger group of experiences/perspectives. To supplement content/ thematic analysis.
Process mapping	Description of process steps, data regarding how the process has been running.	Relies on judgement to develop and map inconsistent descriptions onto a common model. Some processes are too complex to map meaningfully.	To find evidence of problems with a process, such as gaps or inconsistencies in its description or implementation.
Comparative analysis	At least two different versions of datasets.	Versions are not always directly comparable in original form and need to be mapped to a common conceptual model to compare.	To identify similarities and differences in different contexts, e.g. changes over time, exercises versus operations, one HQ versus another.
Actor mapping	Description of roles, responsibilities, and relationships between staff, entities, and organizations.	Versions in plans and official documentation are often incomplete or inaccurate.	To identify gaps, lack of clarity, or inconsistencies.
Timelines/ chronologies	Description of events, key players, key dates, impacts.	Information regarding dates can be dispersed and/or contradictory.	To identify key decisions/ decision points and subsequent actual/ potential impacts.
Venn diagram	Description of what belongs to which category or concept.	Difficult to represent conflicting points of view on one diagram and to compare multiple across multiple diagrams.	To identify different perspectives on complex relationships. To generate clear visual description of categories or concepts.

(*continued*)

Table 5 (continued)

Analysis method/ technique	Data required	Caveats	How can it be used?
Network analysis/ information exchange diagram	Description of nodes and links, e.g. a computer network, a social network, an email exchange network, etc.	Difficult to see what's going on; advanced statistical methods and special tools may need to be applied.	To identify where nodes may be overloaded or underutilized.
Parsing	Text in natural language.	Easy to focus too much on the grammatical structure and exactitudes of the words used without learning anything meaningful.	To find problems or inconsistencies in the language used, for example, in doctrine and terminology.
Descriptive statistics	Structured numerical data.	Statistics can be misleading. Must be done systematically and carefully using consistent data definitions and properly prepared data.	To reveal trends or patterns over time or in content that may not otherwise be visible. To measure the extent to which something is occurring.
Inferential statistics	Structured numerical data and hypotheses to test, models.	Requires specialist skills and software.	To verify whether surprising basic statistics results are really significant. To build models to simulate or predict behaviour under certain circumstances. To find correlations.
Alternative analysis techniques/ red teaming	SME input.	Results appear to be robust but are highly sensitive to which SMEs are involved.	To challenge results. To take a systematic and structured approach to including SME input in the analysis.

There are a few practical tips that analysis teams should keep in mind when thinking through and writing down the methodology for achieving each AO:

- First, describing data collection for each AO is not as simple as listing the methods to use (e.g. observation and interviews). Some additional thinking must occur, such as what specific things the analysis team is looking for and at what events they might observe those things. It should also describe the ways in which the data collected will be systematically collected and stored. Additional considerations may be important, such as the systems where information is and potential constraints to access (e.g. security, technology).

- Second, describing the analysis that will be undertaken does not require perfect accuracy in naming specific analysis methods. Instead, analysts should just describe

in practical terms the systematic steps that need to be taken. This description is more useful than knowing the exact names of all analytical methods.

- Third, it is important to think through and identify different interactions with other AOs, because this demonstrates that the analyst(s) has thought through and accounted for how each of the data-collection and analysis methods may affect others. Doing so may reveal a gap in thinking about the data collection or analysis for previous AOs.

For an example of how analysis teams can design the methodology for specific AOs, see Annexes D, E, and F.

3.3 PLANNING THE ANALYSIS

Analysis planning involves the analysis team thinking through the practical time and resource considerations associated with the choice of analysis design. Ideally, the activities required by the analysis design can be feasibly achieved within the time and resources available, and any identified risks can be managed. But if not, the analysis team may need to go back and adjust the analysis design to make it a bit less ambitious and a bit more realistic.

3.3.1 Tasks and Schedule

All the conceptual thinking that went into the analysis design needs to be translated into specific tasks that can be shared out and completed by the different members of the analysis team. For example, if an analysis team plans to conduct interviews, then tasks such as developing interview guides, conducting the interviews, and writing up interview transcripts must be factored in to the analysis schedule, along with ensuring the team has enough resources to do them.

Thinking through the analysis tasks and making a schedule always requires more time than the analysts expect because it requires them to understand all the different moving parts and the best way to sequence them so that they fit together nicely. Although it is impossible to predict all potential eventualities, the senior analyst can help the team judge what is an appropriate amount of time for different tasks. For an example of planning out discrete tasks associated with the analysis, see Annexes D, E, and F.

There are a couple of common areas that teams do not always plan for appropriately. The first is data collection, where teams often don't factor in tasks that tend to require a lot of time, such as writing up interview transcripts, preparing for travel, conducting follow-up interviews, and having to go back to fill in gaps in research, etc. For example, if one of the data-collection tasks is to travel to a Joint Force Command (JFC) HQ to observe an exercise and conduct interviews, then the analysts need to consider all the tasks implied therein. These tasks might include:

- finding POCs to manage administrative issues like getting desks/computers for the analysts and ensuring the analysts have the right documents/access/clearance to get into the HQ;
- reaching out to potential interviewees prior to the exercise to find out if there is a specific time during the exercise that they would be available to talk;
- developing initial lists of interview questions for the interviewees;
- reviewing the exercise schedule and documentation to determine which events the analysts will observe;
- developing lists of "what to look for" when observing certain events; and
- booking hotels, flights, cars, etc.

Each task takes time and will need to be incorporated into the schedule, along with all the associated tasks for other data collection activities and, of course, for the subsequent analysis activities.

The other area is drafting the report. Analysis teams commonly underestimate the time needed to draft the report, including various reviews and revisions. In many university settings, one might hear a general rule that *"the first 80% of the report takes half of the time, and the last 20% takes the other half"*, or something similar. Although the JALLC is not a university, the quality standards the JALLC aims to achieve with its analysis reports requires a rigorous drafting and revision process that resembles something closer to that of academia than a standard military staffing process. JALLC analysis teams should think about and plan for that level of effort in the drafting process from the earliest stages of planning the analysis. More on report drafting and revision can be found in Chapters 6 and 7.

3.3.2 Data-Collection Tools and Templates

In addition to the practical planning of tasks and schedules, some additional preparation for data collection is needed. This entails thinking through in more detail exactly what data will need to be collected and preparing for how the collection will be performed, not just in terms of selecting a data-collection method, but the details of how that method will be applied. A very important part of data-collection planning is preparing the tools and templates that will be used for the data collection. This helps the analysis team think through not only what data they need, but also how they will prepare their data and information for analysis. Table 6 gives some examples of common tools and templates used by JALLC analysis teams.

Table 6: Examples of tools and templates

Tool/template	Use	Rationale
Data-collection matrix	To plan the analysis design in more specific detail, including particular questions that need to be answered and details of data-collection activities (e.g. specific people to ask, specific activities to observe) that will be undertaken to find the answers.	Helps to understand the size of the data-collection task. Makes planning the required time for data collection more accurate and makes it easier to identify gaps in the data collection.
Interview template[29]	To plan specific questions for interviewees and record the notes in a structured manner.	Makes it easier to identify and extract consistent data/information across interviews.
Survey tool	To plan the specific questions that will be asked and how responses will be collected and stored.	Provides an automated way to collect survey responses.
ODCR (or other schema) template	To check data collected by which part of the ODCR (or other schema) it informs.	Helps a team to ensure data collection is adequate to support development of all parts of the ODCR (or other schema).
Excel worksheet	To provide structure to data collected from sources in a consistent and logical manner, e.g. using a column to tag/categorize data extracts by DOTMLPF-I, PMESII,[30] or other categorization system.	Allows collected data to be sorted, filtered, and counted. Prepares data for statistics or charting during data analysis.

(continued)

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[27] The JALLC has developed a Guide for Preparing, Conducting, and Managing Interviews. It can be found online at https://www.jallc.nato.int/; date last accessed 11 July 2024.

[28] DOTMLPF-I = Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, Interoperability. PMESII = Political, Military, Economic, Social, Infrastructure, and Information.

Table 6 (continued)

Tool/template	Use	Rationale
Qualitative Data Analysis (QDA) project	To organize many documentary sources and mark them up for reuse later.	Allows multiple users to mark-up documents at the same time. Provides automatic summaries of extracts.
SharePoint list	To store data in a way that is widely accessible across a network.	Allows multiple users to contribute to structured data collection from different network locations.
Case-study template	To plan the specific elements/information to be collected to build a case study or multiple case studies in a structured manner.	Makes it easier to collect information consistently and comprehensively across multiple data sources, avoiding information gaps later in the project/task.

Whenever possible, it is recommended that analysis teams plan to use the same software application to organize data as they intend to use to analyse the data. This saves a lot of time and effort associated with (often manually) transferring data between different applications.

3.3.3 Risk Assessment

The final step in analysis planning, which will usually result in revisiting earlier work, is the risk assessment. The risk assessment in JALLC analysis is run using the standard PRINCE2 approach for risk assessment. That is:

- review the plan;
- brainstorm all possible risks;
- assess their probability and impact;
- decide on an appropriate risk management approach for each risk and mitigation measures; and then
- adjust the plan to manage risks with high probability and/or impact.

For example, when reviewing the analysis plan, a risk may be identified associated with the number of survey responses. If it is assessed that the number of responses to this survey is critical to the success of the analysis design and the probability of getting a low response rate to this survey is high, this risk has high impact and high probability. To mitigate this risk, the analysis team may decide to supplement the survey data collection with a number of structured interviews of key personnel to ensure that they guarantee collecting the minimum data required for the analysis. This may add a week to the analysis schedule, but it's better to plan for this now than to only realize it needs doing halfway through execution.

3.4 DOCUMENTING THE ANALYSIS APPROACH

Documenting the analysis design and plan is key to ensuring that the analysis team has thought through everything they can before embarking on the next activities of the project. A suitable plan/design document will set the course of the analysis, map out the steps and the ways of achieving them, and will identify the time needed to fulfil them. This plan is used to ensure the analysis team is on track, that they will meet analytical standards with the proposed data-collection and analysis methods, and be able, at the end, to answer the needs of the customer. In this sense, the analysis plan is the most important document the analysis team will produce until the final product. It should be referred to regularly and updated as necessary throughout the analysis project/task. For example, if anything changes from the initial scope and limitations that were agreed with the customer pre-analysis, then either the

analysis design/analysis planning needs to be revisited, or the customer needs to be informed that the JALLC needs to change the scope and limitations of the analysis, due to unavoidable constraints that were identified during analysis preparation.

As a final reminder, the work that goes into designing and planning the analysis is incredibly iterative in nature. The different elements that must be considered and articulated all have complex interactions that must be taken into account. Due to the amount of judgement and complexity involved in this process, the senior analyst should be frequently involved in advising the analysis team throughout the entire process.

4

DATA COLLECTION AND ANALYSIS

Now it's time to start the data collection and analysis that was laid out in the analysis design. The analysis team must be aware that data collection and analysis activities are not sequential: they will run concurrently and iteratively. Although the start of these activities will focus on planned data collection, the work to analyse that data and to start developing findings (the next set of activities in the next chapter) will start before data collection finishes. Then additional data collection that could not have been identified during the design and planning typically needs to take place in order to ensure that the analysis team has a robust set of analysis results with which to start developing their findings. Figure 5 shows where this set of activities is in relation to the other activities.

| Clarify the Requirement | Design the Analysis | Collect and Analyse | Develop Findings | Draft the Report | Improve the Draft |

Figure 5: Sets of Activities in JALLC Analysis

4.1 DATA COLLECTION

Data collection starts with implementing the data-collection plan, but will become a bit more ad hoc in order to fill any remaining data gaps that arise as the analysis progresses. All data that is collected should be stored together in one place in an organized manner. This applies to all types of data, not just official documents. For example, interview transcripts, observation records, and survey datasets, etc. should be included too. It is good practice to build a master index of all data sources (e.g. in a spreadsheet) where extra information about each data source is recorded in order to:

- know what's been collected, and what still needs to be collected;

- enable the whole analysis team to retrieve original source data easily at a later date; and

- support building citations for the final product.

4.1.1 Active vs. Passive Data Collection

In JALLC analysis, the combination of both active and passive data collection methods serves to strengthen the analysis dataset as a whole. Active data collection is collecting data through methods that require the analyst to *ask* for the data, for example from interviews, surveys, or focus groups. Passive data collection is collecting data that already exists and doesn't need to be "asked for", for example from document research or online databases. This handbook has already discussed document research (see sections 2.1 and 3.1). There are a number of additional considerations that must be taken into account when conducting active data collection. These considerations include:

- **Interviews**: Remember that the analyst is there to objectively collect and record the perspective of the interviewee. Successful interviews are those that have been well-prepared for and are well-managed by the interviewer/analyst in order to keep them conversational and relaxed. For more detailed information on how to prepare for and conduct interviews, see the JALLC guide to interviewing at www.jallc.nato.int.

- **Observation**: Most commonly, observations are used to collect data at exercises. Again, the key is to prepare well before the exercise, identify what specific things the analysts will look for, what battle rhythm events to attend, who to speak with, etc. An

exercise is a unique event. It won't occur in the same way again, so it is imperative that the analysis team arrive at the event with a clear, organized data-collection plan.

- **Surveys/questionnaires**: A number of best practices in survey design and employment are available. However, a couple of key things to remember: test any survey before sending it out, meaning, at a minimum, run it by a senior analyst first, and at a maximum, gather a group of third-party individuals to test the survey in order to identify issues like whether the survey is too long, if any of the questions are unclear, and whether the media supporting the survey is accessible and suitable. Addressing such issues before sending the survey out increases the likelihood and quality of responses.

- **Focus groups/workshops**: Again, preparation is key and, similar to interviews, the approach to participants in focus groups should be objective and unbiased. This is an opportunity to collect valuable data, not to confirm the analysis team's own ideas. The analysts should be prepared to systematically collect the output of the focus groups/ workshops. It is easy to get caught up in observing a great discussion and forget to record valuable data.

The methods described above are effective for collecting large amounts of primary source data, i.e. data that is gathered directly from the source by the analyst—an important component of data collection in JALLC analysis. This primary source data is key to ensuring that the analysis uses quality data when the requirement is to learn from own (i.e. NATO) experiences. However, note that when the requirement is to learn from others' experiences, the collection of primary source data is more difficult. However, the methods in this handbook for extracting, structuring, and analysing the data—whether primary or secondary source— are designed to help ensure quality is accounted for.

4.1.2 Extracting and Structuring Data for Analysis

As discussed in previous chapters, there is an imperative to understand the nature of the data being collected for the analysis—that is, large amounts of unstructured data. Extracting and structuring the data serves two purposes: (1) to reduce the amount of data that the analyst is dealing with to only that relevant for the analysis; (2) to enable the analyst (or analysis tool) to work with the data in a systematic way.

> **Do Not Separate Data by Source**
>
> Analysts should avoid the urge to extract and structure their various data sources separately (e.g. all interview transcripts structured and coded in one place, and all document research structured and coded in another place), unless a specific AO calls for it. Doing so greatly limits the analyst's ability to find trends, patterns, and anomalies in the data set as a whole and often results in the analysts having to go back later to redo parts of the analysis.

Structuring the data for analysis involves transferring the data from the original sources (e.g. an official document, an interview transcript, etc.) into one or more structured data tables/ templates.[29] The process used to fill the data tables/templates[30] from the various data sources can be manual, e.g. copying relevant quotes, sentences, or paragraphs from documents or transcripts; semi-automatic, e.g. manually coding content in a content analysis tool, and then automatically exporting the coded content; or automatic, e.g. exporting data from a database or online survey tool using a query, or using a web crawler to extract data from websites.

One of the simplest methods is to use an Excel file to structure a large amount of text-based data, but this is only one way of structuring the data and it can be a very labour-intensive

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[29] When using quantitative analysis methods on the data, e.g. descriptive statistics, this will always be a distinct step in the analysis, but for some qualitative analysis methods, e.g. content analysis, this will occur as an integral part of applying the analysis method.

[30] Some of which should have been developed, at least as initial versions, during the preparation.

method. Other methods, like using content analysis/QDA software, can save time and potentially avoid human errors that come from manual transfer from one tool to another. However, both methods (among others) are valid and are a matter of analyst preference. For examples of how analysis teams can structure their data for different types of analysis, see Annexes D, E, and F.

4.2 ANALYSIS

Analysing data involves working with the data in a way that will lead to new or different insights and understanding.

There are many different ways to analyse data depending on the type of data collected, and the AOs, but analysis methods are typically best understood by distinguishing between qualitative and quantitative methods. Building on Table 5 in Chapter 3, the following sections describe some of the most likely qualitative and quantitative methods of analysis that analysts may undertake in JALLC analysis, including what analysis results the methods are likely to yield and any pitfalls to watch out for. The combination of both types of methods in a mixed-method approach can lend even more robustness and credibility to the analysis.

4.2.1 Qualitative Analysis[31]

Qualitative analysis is a process aimed at reducing and making sense of qualitative information—very often from multiple sources—in order to deduce relevant themes and patterns. Given that qualitative data can range from survey and focus group responses to narrative assessments written by third parties, the range of qualitative data analysis methods is also extensive.

A common perception is that qualitative analysis is not as credible or reliable as quantitative analysis; however, this is a myth. Qualitative analysis is no less rigorous—it is just designed to answer different questions. For example, qualitative methods are often used to find out *why* change took place or *how* it happened, rather than simply observing that it has happened. Qualitative analysis methods can also capture different points of view and can be used when very little is known about a situation.

Table 5 in the previous chapter lists several qualitative (and quantitative) analysis methods, but there are a few key methods that are used most often in JALLC analysis and also require some practice and training. The following descriptions are intended to aid analysts in building a basic understanding of what is involved in these common analysis methods.

- **Content/thematic analysis.** Most qualitative analysis involves some form of content analysis. This can be a simple textual analysis such as identifying the instances where particular words are used in certain reports. More often, a form of thematic analysis is used. Thematic analysis covers a number of techniques and approaches, and is usually supported by a form of "coding" of the text(s) to be analysed. Coding is the process of labelling text as "belonging to" or representing some type of phenomenon (e.g. a concept, belief, action, theme, cultural practice, or relationship). Once coded, the text can be seen as a collection of different elements, each of which belongs to one or more code groupings. Content analysis may therefore highlight overarching themes from one or more texts, and also reveal similarities and differences, trends, and unusual elements between texts.

- **Narrative analysis** refers to the construction of coherent narratives of the changes occurring for an individual, a command, part of the system, etc. Narrative analysis focuses on particular cases and results in the production of quotes, anecdotes,

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[31] Adapted from NATO Operations Assessment Handbook, v4 (Reference 11).

testimonials, case studies, or stories of change. Often, narrative analysis is used to supplement thematic/content analysis as described above.[32]

- **Process mapping** is used to visually map out processes and workflows, and can be helpful in supporting analysts to clarify and describe a complex process that may be written in several different documents and involves several different people. This method can be particularly useful to describe processes that involve inputs and outputs from multiple levels of command and multiple entities, and provides a tool for analysts to support findings and conclusions related to gaps or shortfalls in a process.

- **Actor mapping** is used to visually depict key organizations and/or individuals that make up a system. It includes both those who make up the system and those whose actions influence the system. This method should usually be initiated at the beginning of an analysis so that it can be built upon as the analysis progresses and the analysts' understanding increases. This method can greatly support other data-collection activities such as identifying key people for interviews and developing questions for them.

- **Timelines/chronologies** aid analysis by allowing for visualization of key events, sequences, and results. Having a visual display of qualitative data in one of these forms rather than keeping the information in an extended piece of text can help analysts make connections between events, find or justify explanations, and draw conclusions.

- **Qualitative analysis and anecdotes.** Anecdotes are short, interesting, or amusing stories about a real person or event.[33] They are an important part of qualitative data collection and they serve a specific purpose. However, it is important to distinguish qualitative analysis from anecdotal reporting. The notion of anecdotal evidence is often used when trying to capture and describe the impacts of the issue that is being analysed. Anecdotal evidence can be effective when combined with other forms of evidence derived from structured, systematic qualitative analysis.

There are risks of relying on anecdotal reporting. It is less likely to be taken seriously and contains many inherent biases that will not be useful for evidence-based analysis. While telling stories can be useful, be aware that an individual story or anecdote cannot be generalized.

Analysts must ensure that the information that is collected is treated methodically, fairly, and comprehensively, and that they do not just seek out the anecdotes that seem to tell the most exciting story. A good standard to follow in this respect is that a single opinion, story, or comment (no matter who it is from) is an 'anecdote'; whereas three or more anecdotes analysed systematically can be considered qualitative analysis based on triangulated data.

4.2.2 Verifying the Qualitative Analysis

When working with subjective data, there is almost always some level of judgement involved with deciding what data to extract from sources and how to structure and/or analyse it. It is common for different analysts to make different judgements regarding what should and shouldn't be included in the data tables/templates, and these differences can profoundly impact the analysis results. So how can an analyst be sure that their initial judgement is the most appropriate? This question underscores the importance of having all the analysts on a team review the entire data set, regardless of who analysed which pieces of data. In doing so, they should cross-check each other's work to identify and resolve any differences that could affect the analysis results.

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[32] The main difference between content/thematic analysis and narrative analysis is that thematic/content analysis allows one to find common themes between cases, but narrative analysis looks at the differences in cases and describes the dynamic of individual narratives in their unique contexts.

[33] Concise Oxford English Dictionary (Reference 4)

Analysis teams need to develop a systematic approach to verify the process used to fill the data tables/templates is consistently and correctly applied, and to validate that the final content of the filled data tables/templates is error-free, complete, and consistent. In many cases, this systematic approach may be as simple as having a team discussion to make a final group decision on a piece of data, or changing the piece of data to divide it into more pieces of data, or to add context to it such that it more appropriately aligns with the coding system the analysis team has established.

4.2.3 Quantitative Analysis[34]

Although JALLC analysis typically involves qualitative data, such data can still be used to conduct statistical analysis. Statistical analysis helps transform quantitative *and* qualitative data into useful information to describe the state of the different variables or elements of the analysis and make inferences about the relationships among them.

Statistical analysis has two main purposes. The first is descriptive, involving statistical techniques to present quantitative and qualitative data in a concise and revealing format. The second use of statistical methods is for inference to test relationships among variables. The following section provides more information on descriptive statistical analysis as it is the most commonly used in JALLC analysis. Additional information regarding inferential statistical analysis which is not covered in this handbook can be found online and in relevant textbooks.

Descriptive Statistical Analysis

Descriptive statistics enable data to be summarized in a concise manner. Descriptive statistics include numerical counts or frequencies, percentages, measures of central tendency, and measures of variability.

- **Counts or frequencies** show how many times something occurred or how many occurrences fall into a particular category. Frequency tables can be used to present findings in a report or can be converted into a graph for visual presentation.

- **Percentages** express information as a proportion of a whole. Percentages are easy to interpret and are a good way to show relationships and comparisons between groups or counts of different absolute size.

- **Measures of central tendency** are used to characterize how the measured values are distributed for a specific metric. The most often used measures are the mean,[35] the mode,[36] and the median.[37] Which one to use depends on how your data is distributed, including whether there are extreme values (high or low), if your distribution is skewed or symmetric, or what is trying to be conveyed to decision-makers.

- **Correlations** help describe the relationship between pairs of variables through correlation coefficients. Correlation can be confused with causation; however, causal links cannot be determined from correlation alone and a deeper analysis is important.[38]

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[34] Adapted from NATO Operations Assessment Handbook, v4 (Reference 11)

[35] The mean is the average of all values.

[36] The mode is the most commonly occurring answer or value.

[37] The median is the middle value. It is the midpoint where half of the cases fall below and half fall above the value. The median helps in dividing a group of observations into upper and lower groupings.

[38] A common approach to correlation analysis is linear regression, which assumes a linear relationship between variables. One example would be using linear regression techniques to fit a straight trendline through a number of data points.

> **Graphical Analysis and Visualization**
>
> Data visualization is a powerful tool for both the analysis and communication of findings. Graphical analysis is a useful way to gain an instant appreciation of the distribution of data and to identify relationships in the data that may require further investigation and may otherwise be difficult to discern. An obvious example is plotting data on a map, but a range of other graphical techniques could also be used to present data in a visual format (e.g. column graphs, row graphs, dot graphs, and line graphs). Selecting the type of visualization to use will depend on the nature of the data. Different types of visualization may be better suited for data analysis and communication, respectively.

4.2.4 Mixed Methods and Triangulation

JALLC analysis can be strengthened when both quantitative and qualitative analysis methods are integrated. When used together, they can compensate for each other's weaknesses and provide greater value when used in a mixed method design, providing information and conclusions that are more coherent, reliable, and useful than those from single-method analysis.

Of particular relevance to JALLC analysis is triangulation. Triangulation involves transforming data from multiple sources into a logical and manageable structure that allows them to be compared in relation to one or more variables or analysis results. If quantitative analysis suggests an issue with a part of the system, and qualitative analysis backs that up, this leads to increased reliability and validity of the analysis overall. On the other hand, if quantitative analysis indicates an improvement but qualitative analysis shows an opposite development, there may be a need to go back and ask more questions to find out why there is an apparent discrepancy. It is key to note that triangulation also applies to more than just combining qualitative and quantitative data. It is particularly relevant when trying to ensure there is enough qualitative data to support findings and conclusions.

For examples of how analysis teams might analyse their data using quantitative, qualitative, and/or mixed-method approaches in different types of JALLC analysis, see Annexes D, E, and F.

4.2.5 Verifying the Analysis

Because of the subjective nature of much of the data that is used in JALLC analysis, there is almost always some level of judgement involved with the selection of codes/categories for each piece of data. So how can an analyst be sure that their initial judgement is the most appropriate? This question underscores the importance of having all the analysts on a team go through the entire data set. It is common for different analysts to make different judgements regarding what should and shouldn't be included in the data tables/templates, and these differences can profoundly impact the analysis results.

Analysis teams need to develop a systematic approach to verify the process used to fill the data tables/templates is consistently and correctly applied, and to validate that the final content of the filled data tables/templates is error-free, complete, and consistent. In many cases, this systematic approach may be as simple as having a team discussion to make a final group decision on a piece of data, or changing the piece of data to divide it into more pieces of data, or to add context to it such that it more appropriately aligns with the coding system the analysis team has established.

4.2.6 Analysis Results

Whether applying qualitative or quantitative (or mixed) methods, the analysis will yield results. Analysis results may take many different forms including:

- Written narratives that synthesize many different parts of the data into something more meaningful (e.g. synthesis of different interviewees' responses to the same question or summaries of data-collection events like workshops or focus groups).

- Diagrams, charts, or other graphs that depict relationships between variables or descriptive statistics that have been calculated from the data collected.

- Reports or summaries from QDA software or other tools used to conduct content analysis and provide an overview of the different coding/categorization of the data.

Many of these and other results may later be used as evidence to support findings, conclusions, and recommendations that fulfil the AR. As analysis results are being generated, the analysis team will intuitively start to take note of anything interesting[39] (e.g. patterns,[40] trends,[41] or anomalies[42]) in the results that may give them insight into meeting the AOs. This intuitive activity naturally leads into (and is further detailed in) the next set of activities in this handbook—developing findings.

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[39] *"Interest—A quality exciting curiosity or holding the attention."*—Concise Oxford English Dictionary, 12th Edition (Reference 4)

[40] *"Pattern—A regular form or sequence discernible in the way in which something happens or is done."*—Concise Oxford English Dictionary, 12th Edition (Reference 4)

[41] *"Trend—A general direction in which something is developing or changing*."—Concise Oxford English Dictionary, 12th Edition (Reference 4)

[42] *"Anomaly—Something that deviates from what is standard, normal, or expected."*—Concise Oxford English Dictionary, 12th Edition (Reference 4)

5
DEVELOPING FINDINGS AND RECOMMENDATIONS

Findings are logically reasoned and evidence-based explanations that give meaning to the analysis results in the context of the AR. Developing findings involves the following activities:

- Exploring the analysis results to discover interesting and relevant results such as trends, patterns, or anomalies and identifying results that may be logically related to each other.

- Interpreting analysis results to explain how they logically relate to each other and what they mean in the context of the AR and AOs.

- Investigating potential findings to ensure they are supported by sufficient and appropriate evidence.

Figure 6 shows where this set of activities is in relation to the other activities.

| Clarify the Requirement | Design the Analysis | Collect and Analyse | Develop Findings | Draft the Report | Improve the Draft |

Figure 6: Sets of Activities in JALLC Analysis

However, in practical terms, developing findings will run concurrently with the preceding and following activities, i.e. it will start while the analysis is generating analysis results and continue during drafting and improving the report. There are no hard-and-fast rules for when to start and stop developing findings: it will depend on the senior analyst and the analysis team's judgement to decide if they have enough analysis results to start, and mature enough findings to stop.

Developing findings activities are always required when observations, lessons, conclusions, and/or recommendations are needed to satisfy the AR. However, not all analysis requires the analysis team to develop analysis results into findings, e.g. if the AR is to conduct a survey and provide the results. These analyses can sometimes proceed directly from generating analysis results into drafting the report.

The following sections describe what is involved in exploration, interpretation, and investigation. Although these activities are presented sequentially, developing findings, particularly in the context of more complex JALLC analyses, can be one of the most "messy" parts of JALLC analysis and often involves multiple iterations and concurrent work on these activities. The analyst tries different explanations for the analysis results by supplementing what is known with their previously held knowledge and beliefs repeatedly until they become convinced that they have arrived at the simplest and most likely explanation of the analysis results. This type of reasoning is incredibly intuitive and requires creativity to imagine possible relationships that are not directly evident from the data and analysis results. The aim is to reach a set of findings that is well-reasoned and supported by sufficient and appropriate evidence.[43]

This chapter ends with a section on developing recommendations which, if they are required by the AR, also support the development of a mature set of findings.

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[43] The cognitive process that the analyst will go through in developing findings is based on the Ladder of Inference (Reference 12), a model that describes the process that humans use, usually without realizing it, to get from facts to a decision or action. It can be used to help analysts to avoid jumping to conclusions and ensure that facts and reality are selected and interpreted as objectively as possible.

5.1 EXPLORING ANALYSIS RESULTS

The analysis team needs to explore the analysis results in order to identify which analysis results might be used to develop potential findings. Deciding whether particular analysis results can be used is quite an intuitive activity but, in general, analysts should look for results that are interesting and relevant.

As a (non-exhaustive) guide, interesting results might lead an analyst to think:

- This is new to me.

- This is something the customer is interested in.

- There are quite a few bits of data/results on this topic.

Relevant results might lead an analyst to think:

- This contributes to meeting an AO.

- This contributes directly to the AR.

- The impact of this is/could be really big.

More specifically, when the analysis team are exploring analysis results, they will be looking for patterns, trends, and anomalies that appear interesting or relevant.

- Patterns—groups of analysis results that appear to follow a pattern defined in some discernible way, such as having a logical relationship, similarity (e.g. they occur at the same time, or relate to the same concept), or cause and effect, e.g. "staff did not use the tool", and "the tool was not working" may be related in a cause-and-effect relationship, or may be elements in a set of issues that all relate to the tool.

- Trends—similarities or differences in analysis results that may indicate the general direction in which something is developing, e.g. there were more complaints about the tool in this exercise than in the same exercise last year; the complaints about the tool are coming from all of the HQs involved in the exercise, not just one.

- Anomalies—ways in which the analysis results differ from what was standard, normal, or expected (e.g. where real-life implementation did not follow prescribed guidelines), e.g. the use of the tool is required by the directive but staff did not use it in the exercise.

It is worth noting that not all interesting analysis results will end up being part of findings. Some may be used later to provide context for the findings and others may not earn a place in the final product at all. Just because an analysis result reveals a new and surprising insight does not mean it should always be included in the final product. The interpretation and investigation activities described next are used to decide what should eventually go forward into the final product.

For examples of how analysis teams might explore their analysis results in different types of JALLC analysis, see Annexes D, E, and F.

5.2 INTERPRETING ANALYSIS RESULTS

Interpreting analysis results involves inferring relationships between them and beyond them in order to derive their meaning and put them in context to meet the AO and/or AR. While analysts are exploring the results, they will have already started to infer some relationships between and beyond results by looking for trends, patterns, and anomalies. During interpretation, those relationships are further tested, defined, described, and in some cases verified. Interpretation always involves a degree of judgement that must occur on the part of the analysis team to logically connect different ideas. In less complex analyses, interpreting analysis results may focus on selecting relevant information and grouping that information together in a way that satisfies the AO and/or AR. In more complex analyses, there is often

a need to explain cause-and-effect relationships in the context of a system that has many different elements.

5.2.1 Mapping the Elements of a Finding

A good tool to help analysts identify potential findings from analysis results is to map analysis results, patterns, trends, or anomalies to the elements of a finding. Findings always comprise the following three elements:[44,45]

- the **delta** or difference (Δ) between "what happened" and "what should have happened";

- the **effect** (what was the consequence of the delta?); and

- the **cause** (what caused the delta to occur?).

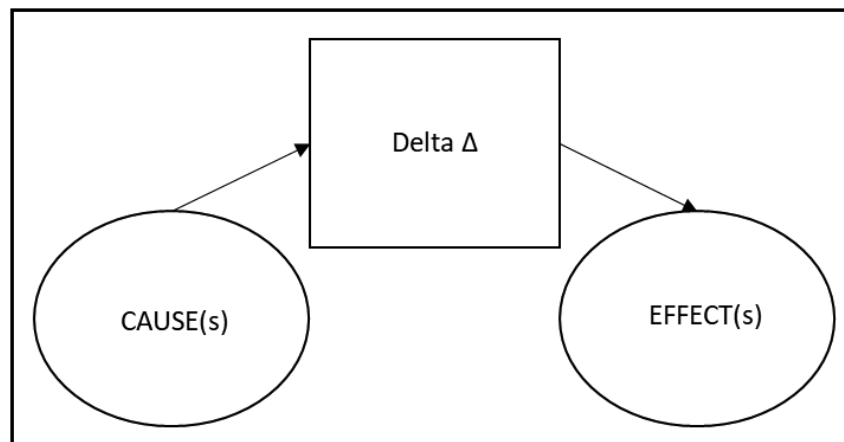The elements of a finding are shown as a visual map in Figure 7.

Figure 7: Map of the Elements of a Finding

This part of the analysis can feel very uncomfortable to the analyst because it is trying to simplify logical relationships by using just three elements from within a complex web of innumerable interactions. There is no single right answer. It is normal that different analysts, when presented with the same set of analysis results, may initially come up with different potential findings, and have different opinions regarding what the findings mean in the context of the AOs and AR.

> **It's a Process of Trial and Error**
>
> As an independent advisor to the analysis team, the senior analyst should be invited often to provide input during findings development. The senior analyst can also facilitate conversations among the analysis team to resolve any differences of opinion and help the analysis team to recognize and work through weaknesses in the reasoning or evidence.

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[44] In many auditing organizations, there are four elements of a finding: condition, criteria (the difference between condition and criteria is the delta in the JALLC model), cause, and effect (which are the same as in the JALLC model). Note that some organizations have a fifth element—recommendation, which is considered separately in the JALLC model.

[45] In a well-written formal lesson submitted to the NLLP, these sections of the ODCR format should all be covered: observation (what happened part of delta); discussion (What should have happened part of the delta, the effect, and the cause); and conclusion (sums up the cause-and-effect relationships in the finding). Note that what goes in the conclusion part of the ODCR format is not the same as the conclusions of a JALLC analysis report mentioned in the next chapter.

As analysis teams map their analysis results to the different elements of a finding, they often encounter the following situations that will prompt further investigation:

- **Not all elements of the finding(s) can be found in the current set of analysis results.** Discovering all three elements of a single finding in the analysis results is not typical. More often than not, a potential finding will start with only one single interesting analysis result mapped to one element of the finding. In these cases, the analyst will need to infer the missing parts of the finding based on prior knowledge and understanding of the system.

- **The different results could be mapped to findings in several different ways**, e.g. the delta in one potential finding is also the effect in another potential finding. The analysis team should be prepared to merge, split, add, and discard potential findings until a set of reasonably complete potential findings is reached. If the analysis team arrives at a set of potential findings with lots of missing elements or which reuses the same analysis results in multiple potential findings, this is usually a sign that there is a better way to interpret the analysis results.

Inferring Cause and Effect

One of the most difficult parts of developing findings is identifying the cause(s) and effect(s). In any complex organization, like NATO, there is very rarely only one thing causing a delta or only one effect of the delta. There are often many intertwined causal relationships occurring in the topic under analysis. The analysis team should not limit themselves to only considering one cause for one effect and one delta. Analysts must consider the full range of possible causes and the full range of possible effects, and then use the data, analysis results, and further investigation to understand which causes and effects are most likely and impactful, and therefore should be central to how the findings are developed.

Analysts and analysis teams should be aware of a particular cognitive bias that may affect how they see the causes and effects in their findings. Proportionality bias is where people tend to think big problems have big causes and equally big problems have a big impact, but research shows that this is often not the case. Just because a delta is big doesn't mean it had a big effect or that it was caused by a big problem. For example, if we observe a delta in knowledge among staff regarding a process, we may have the tendency to immediately attribute it to a simple training gap, but through a more systematic exploration of possible causes we may identify a lack of clarity exists in the doctrine or even in the policy, which impacts staff knowledge and, more importantly, operational effectiveness.

Another challenging aspect of inferring cause and effect is establishing the **root cause**. In complex analyses, where parts of the system are influenced by many other parts of the system, it is difficult to judge which of the causes is the most fundamental. The general principle for analysts to apply is to ask "why" until they think they have a reached a root cause that they can fix.

Root-cause analysis methods can be used to help the analyst with this challenging task. These methods allow analysts to look at the various potential causes and effects in different ways to produce different results and allow analysts to consider those results in the context of the broader system or in ways they had not considered before.[48] Examples of useful root cause analysis methods include:

- **Five Times Why.** This technique is used to get to the bottom of the root cause of the problem. It forces the analyst to delve deeper into the problem and find answers to the questions that are interrelated. It allows analysts to create a clearer picture and strategically identify the real cause(s) of the problem.

- **Bow-Tie Diagram.** This is a graphical depiction of pathways from the causes of an event to its various (potential and actual) effects. It is commonly used in the context of risk treatment planning, but it has many applications in systems studies.

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- **Ishikawa Diagram.** Also called a "Fishbone Diagram", it is a diagram that shows the potential causes of a specific event and can be used to identify potential factors contributing to an overall effect.

5.2.2 Confirming your Interpretations

Seeing if the findings have reached the most likely explanation(s) requires the analysts to continue to question their own thinking regarding whether the interpretation of the analysis results makes the most sense. That questioning will continue to occur as analysts iterate through the relationships between results. In general, the more iterations that occur, the more confidence the analysis team can have in their interpretations. Once the analysis team feels they can go through no more iterations for a finding or a set of findings, they then need to test the strength of those findings in terms of the evidence that supports them. It is not uncommon that potential findings developed from the bottom-up, using intuition and inference, may not stand up to further investigation, and the analysis team will need to rethink the relationships between the analysis results again.

For examples of how investigating and completing findings could look for different types of JALLC analysis, see Annexes D, E, and F.

5.3 FURTHER INVESTIGATION

The purpose of further investigation is to ensure the evidence provides a reasonable basis for the findings. This involves going back through the data and analysis results, and conducting additional data collection and analysis as needed to ensure that the elements of the finding, and the logical relations between those elements, are properly supported by evidence. This also involves checking that there is no line of reasoning or evidence that could invalidate the finding or that there is no simpler explanation.

5.3.1 Checking Evidence is Sufficient and Appropriate

Ensuring the evidence provides a reasonable basis for the findings requires some judgement. What one person sees as reasonable, another may not. To help analysts evaluate their evidence, they should apply two standards: sufficiency and appropriateness.[46]

- **Sufficiency** is a measure of the quantity of evidence used to support the findings. It must consider whether enough evidence has been obtained to persuade a knowledgeable person that the findings are reasonable.

- **Appropriateness** is the measure of the quality of evidence that encompasses its relevance, reliability, and validity in providing support for the findings.

As analysis teams check the evidence associated with each element of the potential findings, and the cause-and-effect inferences, they may find that they need to collect more data to ensure that the evidence is sufficient and appropriate. If sufficient and appropriate evidence cannot be found, they may have to weaken the wording of the certain finding to make it consistent with the strength of the evidence (e. g. change the word *will* to *may*). A potential finding that cannot be supported by sufficient and appropriate evidence is not sound and should be discarded.

> #### Remember the Delta has Two Parts
>
> Be sure to check the evidence for both the "what happened" and "what should have happened" parts of the delta. It is not enough to say that "*the staff didn't use the assessment tool*". The delta must include the specifics, stating that "*according to the directive (evidence), the staff must use the assessment tool during all exercises (what should have happened) but, during this exercise, interviewees noted (evidence) that the staff did not use the tool (what happened)*."

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[46] The standards of evidence are adapted from the Government Accountability Office's Generally Accepted Government Auditing Standards (GAGAS) (Reference 13).

For examples of how evidence can be investigated in terms of sufficiency and appropriateness in different types of JALLC analysis, see Annexes D, E, and F.

5.3.2 Avoiding Confirmation Bias

Confirmation bias is where an individual favours information that confirms their existing beliefs. This often comes up during the further investigation part of the analysis. This is where the analyst has their set of potential findings but needs to fill in some gaps, so they must go to find more evidence. In doing so, they must be careful to not just seek information that confirms their potential findings, but give equal weight to evidence/information that challenges their potential findings.

In order to assure that the findings are the most likely explanation, analysis teams need to deliberately consider alternative perspectives and lines of reasoning, and look for evidence that may invalidate the potential findings, or suggest that an alternative explanation is more likely. One technique that analysis teams can use to help do this deliberate consideration of alternatives is devil's advocate.[47]

5.4 DEVELOPING RECOMMENDATIONS

Mature findings identify the simplest and most likely causes and effects, and thus provide a clear indication of where action needs to be taken to remedy the issue or repeat the success. A preliminary recommendation may take the form of e.g. HQs need to ensure that staff follow the doctrine. However, knowing where to take action is not enough for a proper recommendation. Recommendations need to specify what action needs to be taken—i.e. they need to be actionable; e.g. HQs should increase training for staff on the doctrine and associated processes.

The process of developing recommendations can often highlight that although the set of findings seemed mature at the end of the further investigation, the cause(s) that they identify may not be the root cause. Often, an analysis team may lack some broader process/structure knowledge to make the most specific/appropriate (set of) recommendations, and this indicates that the finding needs to be revisited.

Another thing that can happen at this point is that the analysis team realizes that the same recommendation applies to multiple findings and this either means those findings should be merged, or at least presented together in the same part of the report, which may not have been obvious in previous parts of the analysis.

> **Call in Reinforcements**
>
> In JALLC analysis, the senior analyst has a key role to play in helping develop recommendations and, in doing so, helping the analysis team identify the weak points in their findings that may require them to do more work to develop the findings. It is best practice to hold a "Recommendations Workshop" where the senior analyst leads the team through developing, challenging, and refining recommendations, simultaneously identifying ways in which this affects how the findings may need to be adjusted.

Even when the root cause has been properly identified, there can be many possible ways to address it. The analysis team may need to reach out to SMEs to get suggestions and input on appropriate courses of action to address root causes. Often it will be appropriate to provide a selection of recommendations since the choice of which recommendation to proceed with may rely on factors outside of the scope of the analysis and therefore should be firmly left to the customer.

For examples of how analysis teams might think about their recommendations in different types of JALLC analysis, see Annexes D, E, and F.

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[47] As described in the NATO AltA Handbook (Reference 5).

5.5 When to Transition to Drafting

As the iterations of exploration, interpretation, and investigation proceed, the elements of any potential finding may still need to be split out into new potential findings, merged with other potential findings, or even discarded. However, eventually they will start to settle down into a reasonably stable, complete, evidence-based, and non-overlapping set.

The analysis team will likely feel confident in this set of findings because they have, through multiple iterations, inferred and investigated. However, the analysis team must understand that, until now, they have put their findings together using a very bottom-up approach. Now, in order to communicate the findings to the target audience, it is necessary that the analysts in the team flip their perspectives and start to look at the entire set of potential findings in the context of the AR, i.e. top-down. Switching from a bottom-up to a top-down perspective is probably the most challenging part of the entire analysis, but it is essential to assure that the findings are the most relevant to the AR and can be communicated effectively.

This change of perspective must be done when transitioning between developing findings and drafting, to avoid the analysis team drafting a report that follows everything they did and discovered during the analysis, instead of focusing on presenting meaningful findings that satisfy the AR. One of the ways analysts and teams can deliberately work to switch their thinking from bottom-up to top-down is to try to identify the messages of the report. This activity is described in the following chapter.

6
DRAFTING THE REPORT

At this point, it's time to get the findings written down in a narrative form which also includes writing recommendations, introductions, and conclusions to frame the findings in the most appropriate context. Drafting the analysis results and/or findings into a coherent story that meets the needs of the customer and speaks to a broader target audience is not as simple as being able to write well in English. It relies on ensuring that the ideas and messages that must be conveyed are coherent and clear before the writing begins.

The following sections aim to describe the key concepts and some tips, where relevant, for writing as a team, determining the structure and target audience for the product, and using some tools to effectively communicate the findings, recommendations, and other essential elements of the final product. Figure 8 shows where this set of activities is in relation to the other activities.

Clarify the Requirement 〉 Design the Analysis 〉 Collect and Analyse 〉 Develop Findings 〉 Draft the Report 〉 Improve the Draft

Figure 8: Sets of Activities in JALLC Analysis

6.1 TEAM WRITING: METHODS, CHALLENGES, AND BENEFITS

In drafting, the analysis teams are making their first attempt at writing down everything they want to say in a single document. However, everyone approaches writing a report in different ways so it is difficult to be too prescriptive about how to do this. Nevertheless, the following paragraphs offer some tips on how to approach drafting the report in a manner that will ensure the product reflects the analysis team's collective understanding.

> **The Analysis isn't Done Yet**
>
> Although the findings and supporting evidence should be well-developed at this point, analysts should be aware that analysis still occurs through the drafting process. The act of having to put the ideas down in narrative form often reveals gaps in knowledge or context that will warrant additional research and additional thinking.

First and foremost, drafting the report is a team effort. It is not a burden just for one team member to shoulder. After all, the entire analysis team has studied and analysed the topic for weeks or months, and every team member will have valid ideas to contribute to the draft. A couple of methods are most common:

1. Divide the writing amongst team members by chapter, by AO, or by finding. There is often a natural division where certain team members will take *ownership* of certain parts of the report. It is often best to follow this natural instinct.

2. Have a team discussion or workshop before drafting begins to establish and agree a framework for the final product and the main messages and points for each part of that framework. Then divide drafting responsibilities within the framework.

In both methods, there is a division of labour amongst the analysis team; however, this division of labour does not mean that each team member is only responsible for their part of the report. Instead, every member of the analysis team is equally responsible for the quality of all parts of the report. Herein lies the biggest benefit of team writing: each team member has their own built-in *sounding board* within the team. So, share work often and early. Sharing work with teammates allows them to provide their perspective and help identify any weak points or whether evidence may be missing. Additionally, sharing sections of draft

reports as soon as they're written (often before they've been self-reviewed) with the senior analyst is a key activity that also helps ensure that the report is heading in the right direction.

6.2 ORGANIZING YOUR IDEAS: THE MESSAGE(S), REPORT STRUCTURE, AND TARGET AUDIENCE

The activities the analysis team has gone through at this point to collect data, analyse it, generate results, and then explore, interpret, and investigate those results to develop findings will often leave the team feeling as though they already have their ideas organized (into findings, recommendations, evidence, etc.). The analysis team may feel they are ready to just *write it down,* but writing down the analysis results and/or findings is more than just a reporting exercise and requires some additional work to ensure that the results and findings actually have an impact.

To have impact, a JALLC analysis report needs to convince the customer (and other stakeholders) that action needs to be taken. To be convincing, it is necessary to present more than just results and findings: the analysis report needs to tell the *story* around the results and findings. In this context, a *story* is a Coherent, Comprehensive, Concise, Correct, and Clear (the Five Cs) presentation of What the results and findings are, Which methods were used to generate the results and findings, Why they are relevant, for Whom, and What/When action needs to be taken. These are the Cs and Ws of a story in a JALLC analysis report.

Generally speaking, a story starts at the *beginning* with a main idea that is then developed in the *middle*, which sets out most of the Ws. At the *end*, the conclusions from the story are drawn (and recommendations may be made). The beginning–middle–end framework of a story is a common concept in education, and it dictates a more top-down approach to thinking about and communicating the results and findings than the bottom-up approach that was applied to develop the results and findings in the previous chapters. The switch between thinking about the findings and results in a bottom-up way to a top-down way is not easy, but it is necessary before drafting begins in earnest.

In order to avoid this bottom-up presentation of results, it's best practice to organize all the ideas before trying to write down the story. Organizing the ideas starts with identifying the *message(s)* that will make up the framework of the story and who the *target audience* is. Identifying these elements will allow the analysis team to more easily determine how to *structure* the story so that it conveys the messages to the target audience in a convincing way. By organizing the ideas before starting to write, the analysis team will have a road map on how to draft a report that achieves the five Cs and is not, instead, several separate essays compiled in a single product.

The following sections describe methods and tools to help organize ideas. Note that these are just a sample, and many different other methods and tools can be found online; however, the JALLC uses the Pyramid Principle (as described below) as a tried-and-tested, successful method to aid any analyst and writer to start organizing their ideas.

6.2.1 The Pyramid Principle—Structure through Logic

The Pyramid Principle[48] is a method for logic in thinking and writing that can support the analysis team to organize their ideas generally, and specifically help identify and organize the messages and plan the report structure to communicate clearly their thinking to their target audience. It is a powerful tool when it comes to helping the human brain organize ideas and information in a logical way. It encourages a way to visually group and prioritize those ideas and information. To apply the principle, there are three key things to remember:

1. Start with the answer first. In many military organizations, this is called the BLUF (or Bottom Line Up Front). This is done in order to optimize the time of the reader. It

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[48] Adapted from Barbara Minto's Pyramid Principle: Logic in Writing and Thinking, (Reference 14).

allows a reader to decide if the BLUF is interesting enough to continue reading through the evidence and reasoning.[49]

2. Logically group supporting ideas. Humans are naturally inclined to logically group related ideas when reading in order to remember them. In order to make the analysis report's findings, conclusions, and recommendations more effective and memorable, put logically similar supporting ideas together.

3. Logically order supporting ideas. The ideas that are brought together under each group must actually belong together, be at the same level of importance, and follow the same logical structure.

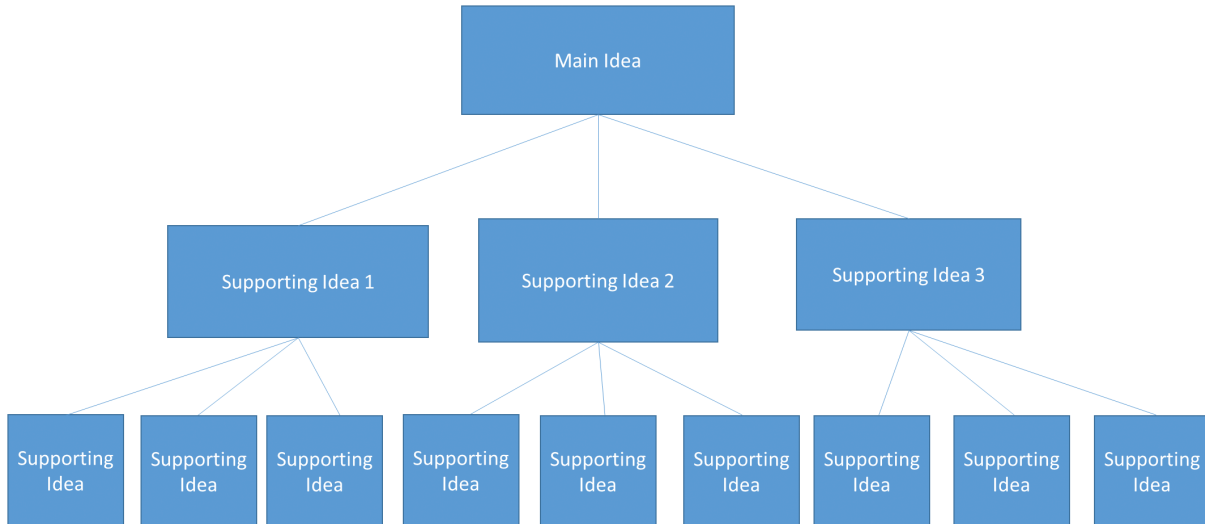Visually, this looks like Figure 9.

Figure 9: How the Pyramid Principle Organizes Ideas and Information

The Pyramid Principle can be used in various ways to help analysis teams switch their thinking from bottom-up to top-down. For example, it can be used to plan which findings will be included in the report and how they will be grouped and ordered; help develop the messages and organize those messages into a logical structure; and finally, support drafting findings as explained later in this chapter.

For examples of how analysis teams might use the Pyramid Principle to help structure their report in different types of JALLC analysis, see Annexes D, E, and F.

6.2.2 Identifying the Message(s)

As mentioned above, it is recommended to start with identifying the message(s). A message in the JALLC context is a statement of information directly addressing the AR and/or AOs that helps the target audience understand what they should *take away* from the story that follows.

When considering messages in the context of the Pyramid Principle, the story will have an overarching message which presents the main idea that is to be conveyed in the final product, and this message sits at the top of the pyramid. It should be one or two sentences that directly address the AR. For example, if an analysis were looking at how effective a process was, then the main message should, at a minimum, address the effectiveness of the process, e.g. *"The process has limited effectiveness because of several internal and external factors"*, or *"The process is already effective but could be improved"*. For examples of how the main message could look in different types of JALLC analysis, see Annexes D, E, and F.

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[49] This is the same as a thesis in academic or essay writing. It is also the main message of the report.

In most analyses, this overarching message is supported by related, subordinate messages (the "supporting ideas" in Figure 9). These supporting messages help articulate the findings and other results in a succinct manner. Note that the relationship between findings and messages is not always one-for-one. One message could be used to convey two or more findings, or one message could be used to convey one finding. For example, if the overarching message was that *the process effectiveness is limited due to internal and external factors*, then the supporting messages would likely, at a minimum, address the internal factors and the external factors. These supporting messages about internal and external factors may be the findings themselves, or they may set up an additional level in the pyramid for findings that have more granularity, e.g. *the internal factors are mostly related to process and organization issues*—where there is one finding about process and one about organization. In order to help the analysts in the team judge an appropriate level of granularity in the pyramid, it is necessary to understand the target audience.

6.2.3 Understanding the Target Audience

One of the earliest activities in the analysis was *identifying* the target audience (see Chapter 2). At this stage, it becomes necessary for the analysis team to *understand* the target audience. They must understand who they are writing for in order to understand how the work needs to be presented for the level of background knowledge the potential readers have.

A target audience is made up of stakeholders, including (but not limited to) the customer (as defined in Chapter 2). In JALLC analysis, there are often many other stakeholders, including any external individuals that provided input to the analysis and internal individuals that have input to or responsibility for the analysis (this includes the JALLC Commander).

Understanding that it is possible to have multiple stakeholders from very different backgrounds as the target audience, it is necessary to consider the level of knowledge the individuals in the target audience are assumed to have in order to draft the report so they can understand it and will find it useful. Often, it can be assumed that the customer will have a very high level of knowledge of the topic (by requesting the analysis, the customer is at least aware of the issues). If the final product were to be written only for the customer, then there would be no need to provide much background information, context, or detail—the customer can fill in those gaps with their assumed knowledge, and the analysis team can go straight to writing the findings and conclusions.

> ### The Analyst is Not the Target Audience
>
> One of the most difficult things to do when writing up the analysis results and findings is to recognize that the analyst is not writing for themselves. This is an important concept to keep in mind when determining the level of assumed knowledge. Analysis teams can almost become SMEs over the course of the analysis and, as such, have a high level of assumed knowledge. As such, the team must be careful when making assumptions about what background, context, and details are needed: the team may not think those details are necessary, but this is because they have the knowledge already.

However, the level of assumed knowledge of all the other potential stakeholders must be considered as well, and ultimately the stakeholder with the lowest level of assumed knowledge determines the level at which the final product is written, e.g. how much background information, context, and detail are required. Doing so ensures that the final product can reach the widest possible target audience and have the largest impact.

A final consideration with respect to the target audience is the future reader. JALLC analysis results in knowledge products and these products, although often intended for specific current purposes, should also have longevity. Not only are the products capturing a picture of the current state of things, but they should also provide enough information on the background and context of the topic so that if (and inevitably, when) the issue arises again in the future, there is a knowledge product that provides sufficient information for a future reader to be able to understand what happened and to be able to exploit it.

6.2.4 Report Structure

After identifying the messages and their hierarchical relationship to each other, and after understanding the target audience the analysis team is writing for, the Pyramid Principle can help the team develop an initial structure for the report.

It is important to note that there is no single report structure that will work for all analyses, and the initial report structure is often not the final report structure. In fact, the analysis continues well into drafting activities when analysis teams may find that the act of identifying messages and organizing them leads the team to rethink some of the original ideas. The analysis team may discover they need to bring in other findings to the story, or they may need to rework some of the findings to tell the story more appropriately. This is a normal part of drafting and should be seen as an opportunity to critically consider the work so far through iterations of the activities described above (sections 6.2.2 and 6.2.3).

In terms of structure, the opening chapter will routinely need to provide an introduction, background, and methodology. The primary rule for establishing a report structure is that it must be logical, and it must clearly and concisely convey the findings so that the target audience can follow the story.

Sometimes, the structure of the messages will already be quite logical and serve as a good starting point. However, other options for structuring the report include using logical divisions such as the AOs or themes in the findings to divide the report into chapters or sections. Much will depend on the nature of the analysis, the messages, the target audience, and the purpose of the final product. Getting the message(s) and the report structure right often requires iterative and collaborative work within the analysis team and with the support of the senior analyst and the editor.

6.3 Tools to Help Draft the Findings

When drafting the findings, every element must be clearly explained, logically linked, and supported by evidence. As a reminder, the three elements of a finding are the delta (i.e. the difference between what should have happened and what happened), the cause(s), and the effect(s). Drafting the findings, just as with determining report structure and target audience, is rarely a simple task. It requires taking a structured approach to ensure that all the elements of each finding are clear and explicit, and include sufficient and appropriate evidence to support them. In addition to the Pyramid Principle, PEAS is a tool that can help analysts transform a finding into a well-written and supported narrative.

Focus on the Ideas, not the English

The priority for drafting is not about writing style, format, or perfect English. The priority is getting all the ideas down in an organized fashion that will allow the analysis team to tell a story that will convince the customer and stakeholders that what the team found is valid and, as such, the recommendations (if any) are worth considering. In JALLC, the QA staff will help to refine the language once the ideas are solid.

6.3.1 Elements of a Finding and PEAS

The PEAS method is a means to present convincing arguments in writing. The letters PEAS refer to the content building blocks that need to be included in a paragraph for it to effectively communicate its point. PEAS stands for:

- **P**oint: offer a topic sentence that introduces immediately and directly the one idea on which the paragraph will focus.

- **E**vidence or **E**xplanation[50]: provide evidence regarding the topic of that paragraph and explain how the evidence supports the point.

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[50] In different interpretations of PEAS, some sources will use Explanation to help understand what should be included in that part of the paragraph.

- **A**nalysis: spend two or three sentences pointing out how the reader should understand and interpret the evidence.
- **S**o What?: tell the reader why this point is important to understand/remember in the context of the paragraph or the larger message.

Conceptually, the PEAS structure and the elements of a finding are a bit similar. Both are derived from concepts associated with developing and presenting ideas in a convincing way. However, the elements of the finding presented in this handbook are suggested as a tool to support the thinking process to reach a finding, while PEAS is presented as a tool to support communicating those findings effectively in a report.

A good way to use PEAS to draft the findings is to write one PEAS paragraph per element of the finding. This means the initial draft of a finding will have at least three paragraphs containing at least four sentences each.[51]

Using this method means that the draft of the finding will contain everything needed to support communicating the finding in a convincing way. If any part of the PEAS paragraph cannot be written easily, then more work on developing findings may be needed. In this way, drafting the report is an essential part of the work to develop findings.

Note that findings drafted using this method tend to contain more information than is needed as they do not take into account that some information may already be introduced elsewhere in the report, or that not all the evidence the analyst has used to support developing the finding may need to be included in the way it is communicated to the reader. It is recommended that analysts write more rather than less while drafting their findings as this supports the various reviews that will take place during activities to improve the draft (see Chapter 7). It is easier for reviewers to help identify surplus information rather than guess what is missing, thereby improving the quality of the draft more efficiently.

Many analysis teams will find that once they've drafted a finding using PEAS, they still need to add some context to make it fit into the overall narrative of the chapter/section/report. This additional context is typically an introductory paragraph and/or a concluding paragraph. The introductory paragraph may either introduce the main ideas of the finding or of a group of findings that is to follow, if the first PEAS paragraph has not already done so. A concluding paragraph will need to describe the So What? of the entire findings, i.e. to answer what needs to be understood/remembered about the findings.[52] The guidance that follows on writing introductions and conclusions can be applied to writing these paragraphs.

6.3.2 Findings and the Pyramid Principle

The Pyramid Principle can also be applied to support drafting findings in the following way:

1. The first paragraph of the finding sums up the whole finding in a very high-level way—what was the delta, what was the effect, what was the cause?

2. The first level of supporting ideas are the elements of the finding, and the order in which the elements of the finding are presented is chosen based on what makes sense for explaining that finding.

3. The next level of supporting ideas, under each element of the finding, are the ideas the analysis team needs to communicate to support that element of the finding. These ideas present the supporting evidence and the analytical reasoning.

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[51] Note that the So What? when using this method to draft elements of the finding will not usually be the So What? of the whole finding, but should describe how the element of the finding in the paragraph relates to the element of the finding in the next paragraph.

[52] This is often referred to colloquially as: tell them what you are going to tell them (introduction paragraph), tell them (PEAS paragraphs), tell them what you just told them (concluding paragraph) and is a best practice for writing in English.

See Figure 10 to understand how findings can be structured using the Pyramid Principle.
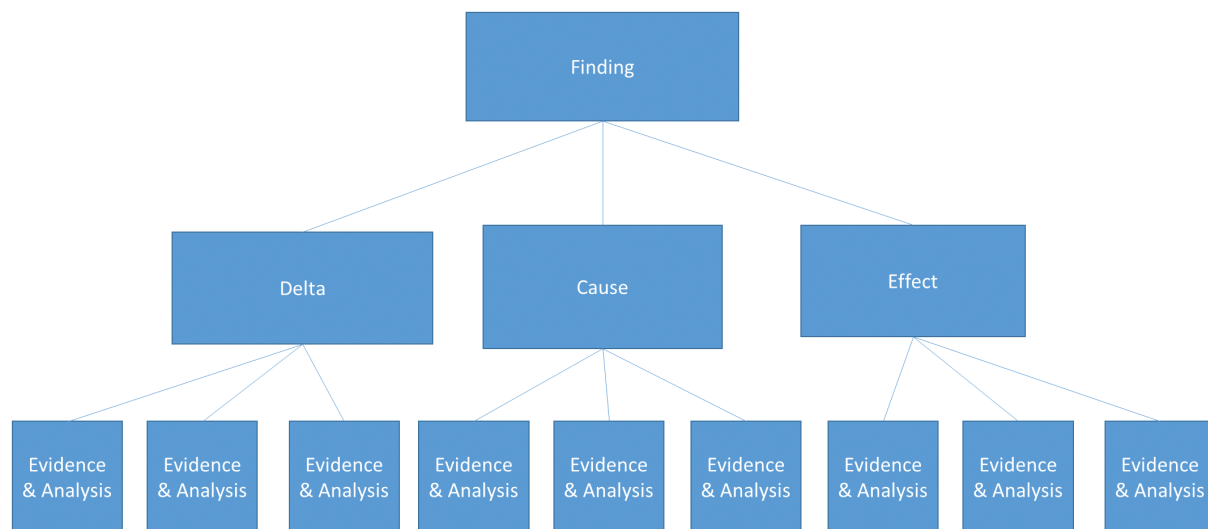
```
                          ┌───────────────┐
                          │   Finding     │
                          └───────────────┘
           ┌──────────────┬──────────────┐
    ┌──────────┐    ┌──────────┐    ┌──────────┐
    │  Delta   │    │  Cause   │    │  Effect  │
    └──────────┘    └──────────┘    └──────────┘
```

| Evidence & Analysis | Evidence & Analysis | Evidence & Analysis | Evidence & Analysis | Evidence & Analysis | Evidence & Analysis | Evidence & Analysis | Evidence & Analysis | Evidence & Analysis |

Figure 10: Structuring Findings Using the Pyramid Principle

6.4 OTHER KEY PARTS OF THE REPORT

6.4.1 Introductions and the Importance of Context

Introductions are narratives that put the analysis findings in context. Introductions are not just a summary of what is in the chapter/section/report: they need to introduce the upcoming content in the context of how it solves a problem, meets the AO, or satisfies the AR. They should convince a reader that the chapter/section is worth reading.

A good guide for crafting introductions is the three key components of a good introduction as described in The Pyramid Principle (Reference 14):

- the *situation*, which provides context;
- the *complication*, which provides urgency; and
- the *question,* which provides focus.

As with all other parts of the analysis and drafting, introductions are developed iteratively. The first attempt to draft them should occur early in the drafting process. It is best to make the first draft of introductions to chapters and major subsections at the beginning of drafting to see if the analysis team is able to clearly articulate the message of what they are about to write in the rest of the chapter or section. This challenges the team to pull themselves up and out of the individual findings and recommendations to focus on describing the overall message of what a particular section of the report is about. As well as being among the first parts the analysis team will draft, introductions will also be one of the last things the analysis team will draft. As the draft goes through the reviews intended to improve it, the content of chapters/sections/ findings will often diverge from the initial draft. Revised, or wholly new, introductions will need to be drafted to accurately reflect the new content. For examples of how analysis teams can use the three components to draft introductions, see Annexes D, E, and F.

6.4.2 Writing Conclusions

Conclusions are logical inferences about the analysis topic based on the findings. Conclusions are the most difficult parts of an analysis report to articulate. They are not just summaries of the findings: they are narratives that should put the findings into the context of how they fulfil the AR and explain the collective So What? of what has just been presented in the chapter/section/analysis report overall. The strength of the conclusions depends on the sufficiency and appropriateness of the evidence supporting the findings and the soundness

of the logic used to formulate the conclusions. Conclusions are more compelling if they lead to the recommendations and convince decision-makers and staff that action is necessary.[53]

Conclusions should be written last, after everything else has been written, because they require a different mindset to develop than the other content required and because they rely on the other content being mature enough to be reused without raising constant questions about its validity. It is best practice to discuss the analysis team's conclusions with the senior analyst prior to drafting them to ensure that the entire analysis team has the same collective understanding of the So What? of the findings and report.

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[53] GAGAS (Reference 13).

7
IMPROVING THE DRAFT

At this point, the analysis team have done all they can do in terms of creating a draft. They have worked iteratively with the data and analysis results to develop their findings. And they have worked iteratively with their findings to develop their draft report. But, the work is not finished yet. Now, the team must switch from a more creative mode of thinking to a more critical one in order to improve the draft. Figure 11 shows where this set of activities is in relation to the other activities.

| Clarify the Requirement | Design the Analysis | Collect and Analyse | Develop Findings | Draft the Report | Improve the Draft |

Figure 11: Sets of Activities in JALLC Analysis

The next set of activities is designed with the goal of improving the draft in order to ensure it is a logically and analytically sound product that effectively communicates to the target audience all the analysis team's hard work. These activities are mainly different types of reviews of the draft that result in required revisions.

In academic, scientific, and professional contexts, the use of peer review is a common practice to ensure the quality of written products. In the JALLC context, peer review can be both informal and formal. Informal peer review occurs when analysts seek out feedback on their work from other colleagues at different points in the analysis. Formal peer review occurs at specific points during drafting and is carried out by specific people in JALLC with the expertise in the areas of research analysis and communications. Regardless of the type of review, the general principle is that the more people are able to see the draft and provide feedback, the better the final product will be. Analysis teams are encouraged to seek input via informal peer review in addition to formal peer review.

> **Remember Cognitive Bias?**
>
> Reviews are activities that particularly help mitigate cognitive bias inherent to the team's thinking that is then represented in their draft.
>
> In JALLC analysis, the senior analyst and editor play a crucial role in mitigating bias and helping analysis teams produce high-quality analysis products. Analysis teams should understand that a fresh pair of eyes on the product may result in questions and ideas that the team were unable to see because they were so deeply involved in the analysis and drafting processes.

The key thing to keep in mind during the different reviews is that they are, in fact, different. Each review, done by different people with different roles, will consider the draft from a different perspective. In JALLC analysis, each of those perspectives will seek to answer the following questions:

- **Self Review**: Have we said everything we want/need to say?
- **Analytical Review**: Is the analysis sound and the evidence presented sufficient/ appropriate?
- **Editorial Review**: Has it all been communicated clearly?
- **External (SMEs, potential users) Review**: Is it technically/factually accurate? Can I use this?

Just like the previous activities were done iteratively, so are the review activities, where each iteration with each reviewer results in improvements that make the product more robust. The following sections discuss each of these review activities in more detail.

7.1 SELF REVIEW AND REVISION

The self review is a deliberate activity by the entire analysis team to go through the report from the first word to the last word and think critically about the presentation of the content, with particular attention to the findings and the evidence that is presented in support of the findings. A self review is an essential activity in every project because it is not uncommon when drafting a report as a team that some team members are more invested in some parts of the draft than others. During the drafting process, different team members take "ownership" of different parts of the report, and although they may have awareness of other parts, they may not necessarily understand how all those different parts fit together into a single product.

It is a difficult activity to review and revise one's own work. Humans are inclined to subconsciously fill in gaps in knowledge when reading their own work. This is why it is necessary to take a step back and actively work to change the mode of thinking from less creative to more critical. Following are some tips for teams and individuals to consider when conducting a self review:

- **Is the information presented a fact or an opinion?** Both facts and opinions are valid in the context of analysis, but must be presented accurately. Opinions must be presented with attribution, such as *"according to interviewees, the problem was with the software …"*.

- **Is the evidence used to support the finding convincing?** Is there enough of it? Consider these questions not as an analyst but as an outside reader who needs to be convinced.

- **Are there other plausible explanations for cause and effect that have not been ruled out?** It is important to consider what other explanations could account for the state of the findings and ensure those are stated explicitly as well. Doing so, and explaining *why* those explanations are not as valid in this particular context, provides context for potential readers and lends credibility to the findings.

> **Print It Out and Read It Out!**
>
> In JALLC analysis, teams often find it is much more helpful to review their own work in a different format than the one it was created in. So, if the draft was produced in a word processor, print out hard copies. Additionally, best practice shows that by reading the draft out loud, it is easier to identify issues than when read in your head.

- **Are the same ideas reused in multiple findings?** If so, this is often the first indication that the way the findings are framed could be improved, and analysts should consider how to group findings that centre around the same idea.

- **Is all the information necessary?** It is not uncommon that analysts who have spent months collecting and analysing data have a lot to say. However, not all of the analysis results are usually needed to effectively communicate the findings to the customer, stakeholders, and potential future readers. Take a critical look at whether every detail is *really* necessary. In other words, question whether it is "need to have" or "nice to have". Surplus information in the report distracts from the main ideas without adding value and should be removed.

In addition to the self review, there is a need to self edit the draft. This is where analysis teams make every effort to ensure that the draft includes accurate citations to reference

materials, that quotes are accurate and referenced correctly, that acronyms are spelled out where necessary, and a number of other editing activities. Errors such as the wrong date or the wrong originator can cause delays during subsequent reviews by other stakeholders and, in the worst case, discredit the work of the analysis team. Check these items and check them again. In JALLC analysis, a key tool to help with self editing can be found in the relevant SOP.[54]

7.2 ANALYTICAL REVIEW

In JALLC analysis, once the analysis team has completed the self review, it's time to hand over the draft to the senior analyst to begin the analytical review. Remember, at this point the analysis team have been "down in the weeds" for months and will have found it difficult to see the bigger picture from a logical/analytical perspective. As such, the senior analyst will conduct a more top-down, critical appraisal of the product to validate the analysis. This validation includes checking that arguments presented are convincing overall, ensuring that the evidence for findings is sufficient and appropriate, and verifying the quality of the reasoning. Note that comments from the senior analyst at this point are not questioning or changing the underlying findings but how those findings are communicated in the report. Nevertheless, it is not unusual to discover that a problem with how the findings are communicated is not superficial, and the analysis team will need to return to redo activities associated with developing findings such as interpretation and further investigation to remedy them.

During this review, the senior analyst will take a step back and look at the report from the perspective of a reader five years from now to check whether it achieves the following:

- The methodology used clearly describes what was done in such a way that would allow other analysts to replicate the study.

- Evidence and logic presented are robust enough to support the findings, recommendations, and conclusions.

- Facts check out: often, analysis teams run out of time to fully check certain facts or to update them in light of emerging concepts, doctrines, and guidance, and analysis teams need to be prepared to do some extra research to verify certain facts during this part of the process.

- Recommendations are actionable and make sense in the context of how NATO works.

7.3 EDITORIAL REVIEW

An editorial review is an overall critical appraisal to check the readability of the analysis report, to ensure that it is well-written, clear, accurate, and flows logically. In JALLC analysis, the review is often a combined effort by the editor and the analysis team, and usually takes the form of a full read-through of the draft together, addressing any substantive[55] issues as they are identified by amending, replacing, deleting, or adding content.[56]

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[54] At the time of writing, that is JALLC SOP 810 JALLC Editorial Standards (Reference 9), which defines the editorial standards applicable to JALLC analysis reports, including the citation system JALLC uses to refer to NATO and military documents, and the correct use of acronyms and terminology within NATO.

[55] At this time, substantive issues are those that affect the ability of an SME to understand the point the analysis team are trying to convey. These must be remedied before the Coordinating Draft is released. Technical issues or proposals to make the report more readable by a non-expert can be remedied by the analysis team while the report is out for external review.

[56] The editorial review may also identify additional technical changes that the analysis team will need to implement while the report is out for external review so that the report will meet JALLC's editorial standards identified in SOP 810 (Reference 9).

The editorial review serves the purposes of:

- checking the flow of chapters, sections, paragraphs, and sentences is logical and clearly conveys the analysis team's intended meaning;

- ensuring the text says what it means, and means what it says, especially with respect to the accurate and consistent use of terminology to convey clear and unambiguous meaning;

- identifying anything that appears to be inaccurate or illogical to an independent reader for the analysis team to check or clarify;

- checking that the balance and look of the product is consistent with the JALLC style; and

- checking that numbers, dates, times, and names are all accurate.

7.4 HOW TO APPROACH REVISION

The different reviews will always result in feedback for the analysis team to use to revise and improve the draft. This is normal, but analysis teams can often find this part of the project even more difficult than the analysis itself. That's because receiving criticism can often trigger an automatic emotional response where the analyst feels like their work has been evaluated as poor and thus they become defensive. But it is important to remember that the purpose of the reviews is to improve the draft product, not to grade it. Instead, analysis teams should think of the feedback as a road map that guides the team on how to make the draft even better and meet the expectations of a broader target audience.

7.4.1 Strategies for Thinking about Feedback

There are a number of strategies[57] analysis teams can use to overcome this automatic emotional response and benefit from the different perspectives provided by the reviews in order to improve their work effectively.

- **Pause for thought**. When analysis teams first receive/read the feedback, they should try to stop and *not* react. Even a few seconds is often enough time to allow the brain to process a situation. It helps to then re-read the feedback while keeping in mind that everyone's goal is to make the product even better, that the feedback is *constructive*[58] and not destructive.

- **Listen (and read) for understanding**. Teams should read all the comments, in their entirety, and try to understand the context in which they are being made, e.g. consider the expertise of the reviewer and their past experience in order to try to understand *why* they would have commented in the way they did.

- **Ask questions**. The reviews and subsequent revisions should be collaborative. If feedback is unclear (either in *why* it was given or in *what* it means), then analysis teams should seek clarification with the originating reviewer. It often helps to ask for a specific example or for suggested solutions. Doing so can sometimes uncover either unstated assumptions or misinterpretations of what was written.

- **Don't take it personally**. Remember that the feedback is on the content of the draft report and not a judgement of the collective or individual contribution. It is about the points, the arguments, the logic, and the consistency. It is not about the person.

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[57] Adapted from "Taking Constructive Criticism Like a Champ", by Nicole Lindsay; www.themuse.com; date last accessed 11 July 2024.

[58] *"Constructive—Having a useful and helpful effect rather than being negative or with no purpose."* Oxford English Dictionary, 12th Edition (Reference 4)

> **Review and Revision Take Time**
>
> The analytical and editorial reviews are time-consuming, and the analysis teams need to plan their time accordingly. For planning purposes, in JALLC analysis, there is an agreed standard which states that the process for the both the analytical and editorial reviews takes one full working day to review five to ten pages of a report. Usually the work the team must do to revise the draft product after the review will then take another five to seven working days.

- **Schedule time to follow up**. Once the analysis team has gone through all the comments and had time to implement some and understand the scope of them, it is useful to schedule a specific time to sit with the reviewer and follow up. This is a great opportunity to ask more questions.

- **Always do something.** One particular challenge that analysis teams usually confront during the various reviews is the perceived overlap of reviewers' comments, suggestions, and feedback on different parts of the draft. In instances where there appear to be conflicting comments or suggestions on the same part of the draft, it helps the analysis teams to take a step back and consider that, regardless of the content of the comments themselves, the fact remains that different people have noted an issue with that particular part of the draft. This should indicate to the team that there is *something* to be improved, even if the reviewers don't share the same perspective on what that *something* is. This may require more discussion, thinking, and potentially research to try and understand the underlying issue(s) that has prompted the reviewers to comment in order to identify the best possible solution.

7.4.2 Common Pitfalls when Incorporating Feedback

Feedback on JALLC analysis most often arrives in the form of comments in a Word document, which requires the analysis teams to go through each individual comment and make a decision regarding how to use it to revise the draft. Analysis teams must be aware that revision of the draft is often not as simple as hitting "accept change" in the document (although some comments will be that easy!). Instead, reviewers will have identified gaps in logic or evidence that require the team to think critically about the comment and what it reveals more broadly about that part of the draft. Or reviewers will identify wording that conveys a meaning to them that does not make sense in the context of the draft.

Reviewers will often point out the issue they are having and, when possible, suggest a change that might help address the issue. The action the analysis team then decide to take depends on various factors such as:

- the communication styles of the reviewers and team, which can lead to misinterpretations of the intent of either the reviewers or the team;

- the level of specific topic knowledge of the reviewer, which can lead to misunderstandings by both the reviewers and the team; and

- the amount of energy the analysis team has left at this point, which can lead to an inclination to look for the easiest solution.

These factors can result in the analysis team not always taking the most appropriate action for a given piece of feedback. The following table describes some examples of common situations that analysis teams find themselves in when incorporating feedback, common pitfalls that can occur, and what can be done to avoid the pitfall.

Table 7: Examples of common pitfalls when incorporating feedback and what to do about them

Situation	Pitfalls	What to do
The reviewer has suggested new text that seems reasonable. The analysis team accept the change or copy the new text directly into the report.	Suggested wording may not integrate well with the other text because it was written by someone else. Suggested wording may introduce discrepancies in the report, for example by using incorrect/different terminology, or more fundamentally by breaking the logical flow of ideas, e.g. introductions and conclusions don't match content, or elements of findings no longer align. Even though the new text seems reasonable, there may not be sufficient and appropriate evidence to warrant including it.	Use the suggested wording as a guideline for revision. Reviewers are not all-knowing and do not have insights into the data that the analysis team does, so consider how their suggestion can be incorporated within the context of all the relevant analysis results and findings. When text is changed in response to a comment, perform a self review to check everything is still consistent and coherent. Verify whether the change affects other parts of the draft and take action accordingly. Ask the reviewer for more details to help to establish sufficient and appropriate evidence. If sufficient and appropriate evidence cannot be found, check the next row of this table.
The reviewer has suggested new text that the analysis team: • do not agree with; • do not understand; • think is not needed; or • cannot find sufficient and appropriate evidence to support. Or the reviewer has not suggested any new text. The analysis team decide not to change anything in the report in response to this comment.	By not making any changes, the comment has not been addressed. Underlying issues with the part of the draft that prompted the comment have not been resolved. The underlying issue remains in the report, potentially undermining the findings and analysis results in other parts of the report. There is a risk that other readers will see the same issue and disagree with or reject the report while the issue remains.	Consider what the underlying issue that caused the reviewer to make the comment might be. For example, it can be an issue with the logic, with the evidence, or with the presentation of information. If the team thinks that the reviewer "just didn't understand", look for ways to add context or details elsewhere in the report that can make the intended meaning of the commented part clearer to everyone in the target audience. Be creative to develop a number of possible solutions. Call the reviewer to discuss the comment and develop together some possible solutions to resolve the issue.

Revising the draft in accordance with the various reviews requires many judgement calls to be made regarding what is essential for the quality of the product at its stage of development, what needs doing but can be done later, and what would be nice to have but may not get done. For drafts that are going on for external review, these judgement calls often relate to deciding what is essential to do at this exact moment in time and what can be put on the "to-do list" for the final product, once external comments are received. It is best to seek expert input from QA staff regarding the time needed and what changes are essential versus desirable for subsequent stages of the product development.

7.5 EXTERNAL REVIEW AND REVISION

Once the draft has gone through all the necessary internal reviews and been revised accordingly, this indicates that the internal stakeholders (i.e. the analysis team and other JALLC stakeholders) are relatively confident and in agreement on the messages, the findings, the conclusions, and the recommendations. Now it is time to share the draft with external stakeholders to see if that internal understanding stands up to scrutiny from the experts. This external review activity adds great value to the analysis because it:

- increases the reliability and credibility of the findings, conclusions, and recommendations within the broader NATO community; and

- gives confidence to both the analysis team and the JALLC Commander of the likelihood of acceptance of the findings, conclusions, and recommendations.

In JALLC analysis, the external review typically involves sending out the draft, accompanied by a comments matrix for stakeholders to fill. The stakeholders comprise not only those identified at the beginning of the project/task, but also anyone who provided input along the way. That includes interviewees, survey respondents, focus-group participants, SMEs, etc. The intent is to receive comments on the content and the ideas presented, particularly with respect to technical accuracy, validity of conclusions, and feasibility of recommendations.

In JALLC analysis, external commenters are asked to identify their comments as either critical or substantive:

- **Critical comments** mean the analysis team **MUST** change the report to address the comment because if the report stays as it is, the issue identified invalidates the analysis (either part or whole). Examples of critical comments may be comments pointing out incorrect use of NATO terminology, recommendations associated with the wrong tasking authority, or wording that implies specific individuals, entities, or Allies are being blamed for a problem.

- **Substantive comments** mean the analysis team **SHOULD** change the report to address the comment. Substantive comments nearly always indicate that the reader did not understand what was written in the way the analysis team intended it to be understood. *"The reviewer didn't understand properly"* is not a valid reason to dismiss a comment. The report needs to be revised to avoid other readers from reaching the same misunderstanding.

- **ALL** suggestions about the way a sentence is written or relating to spelling or grammar should always be implemented unless they would cause the report to break with the JALLC editorial standards or general style conventions for written English.

The only time that an external comment can result in no change in the analysis report is if the commenter has asked for a change that would make the analysis report factually inaccurate or is asking the analysis team to change the content of a finding, recommendation, or conclusion without providing adequate evidence to justify such a change.[59]

It is the responsibility of the analysis team, not the reviewer, to find a solution to comments provided. This means making every effort to understand why a reviewer made a comment and thinking creatively to find solutions and the supporting evidence in case the reviewer's proposed solution does not solve the issue. For critical or substantive comments, the analysis team should speak to the reviewer directly to better understand what the comment means and what kind of change in the report would best address the comments. Doing so often reveals the required additional evidence, or where it may be found.

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[59] In some instances, input from external commenters may also result in the analysis team needing to do a bit of additional data collection and analysis, which in some cases can lead to the need to substantially revise the findings, recommendations, or conclusions.

8
Publishing and Post-Analysis: Dotting the Is and Crossing the Ts

At this point in the analysis, in any organization, there is typically a process for publishing and distributing the final product. In JALLC analysis, there are a number of specific tasks associated with this which can be found in the relevant SOPs.[60]

It is important for analysis teams to close down the analysis project/task in an organized and comprehensive way to ensure that lessons are not lost and that there is a clear path to sharing the knowledge documented in the final product. The most common activities include:

- **Distribute the final product directly.** As well as the formal distribution, it is good practice that the analysis team provide courtesy copies of the report directly to the SMEs they worked with during the analysis to ensure that they get a copy they can use as soon as possible.

- **Produce relevant marketing or communications products.** There is often a need to ensure that a wider audience is aware of the final product in case they need to use it. This is why it is essential to produce an exploitation plan and any relevant communication products. In JALLC analysis, this most often takes the form of a publicly releasable factsheet that is made available on the JALLC website so that the public can get a feel for the analysis that the JALLC is doing, and a slide deck summarizing a product's content in ten minutes.

- **Attend relevant conferences or meetings.** After an analysis report has been produced, analysis teams should identify a relevant conference or meeting held by the SME community where the analysis team can brief the results. Doing this helps to ensure that the analysis results are more readily exploited by the relevant SME community.

- **Conduct an after-action review.** During the after-action review, the analysis team need to review what they've learned about doing analysis during their project/task. What worked well? What did not work? In JALLC analysis, this is the time to reflect on whether the analysis team's observations should be developed into LI with recommendations to be implemented as part of JALLC's internal LL process.

- **Archive the project information.** It is very important this is done properly to ensure that the organization has a proper audit trail of what data was collected, how it was analysed, and how the final product was developed.

> **Knowledge Sharing is Key**
>
> The process of identifying and sharing lessons internally within the JALLC is extremely important and must not be neglected. Observations will have been collected and shared at the end of each stage of the analysis project/task, and analysis teams should also take advantage of internal JALLC meetings as opportunities to share their lessons, successes, concerns, and experiences with other analysts and increase knowledge sharing among project managers and JALLC analysts.

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[60] At this time, the most relevant is JALLC SOP 046 (Reference 1).

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ANNEX A
ACRONYMS

AltA	Alternative Analysis
AO	Analysis Objective
AR	Analysis Requirement
Bi-SC	Of NATO's two Strategic Commands (SHAPE and HQ SACT)
BLUF	Bottom Line Up Front
BP	Best Practice
COE	Centre of Excellence
DDH	Deputy Division Head
DOTMLPF-I	Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, Interoperability
FIR	First Impression Report
GAGAS	Generally Accepted Government Auditing Standards
JADL	Joint Advanced Distributed Learning
JALLC	Joint Analysis and Lessons Learned Centre
JFC	Joint Force Command
JPA	Joint Analysis and Lessons Learned Centre Project Approach
LI	Lessons Identified
LL	Lessons Learned (as in procedure or capability) or a Lesson Learned (as in a type of lesson which is a product of the NATO LL Process)
MECE	Mutually Exclusive and Collectively Exhaustive
NCS	NATO Command Structure
NFS	NATO Force Structure
NLLP	NATO Lessons Learned Portal
NS	NATO Secret
NU	NATO Unclassified
OA	Operational Analysis
ODCR	Observation, Discussion, Conclusion, Recommendation
PEAS	Point, Evidence, Analysis, So What
PMESII	Political, Military, Economic, Social, Information, Infrastructure
POC	Point of Contact
PRINCE	PRojects IN Controlled Environments
QA	Quality Assurance
QDA	Qualitative Data Analysis
Rep	Representative
SACT	Supreme Allied Command(er) Transformation
SME	Subject Matter Expert
SOI	Standard Operating Instructions
SOP	Standing Operating Procedure
TDY	Travel Duty
TOR	Terms of Reference

ANNEX B
NATO LL PROCESS

The idea of Lessons Learned (LL) in an organization is that, through a formal approach to learning (i.e. a Lessons Learned procedure), individuals and the organization can reduce the risk of encountering the same problems and increase the chance that successes are repeated. Within NATO, Lessons Learned is an essential part of being credible, capable, and adaptive in warfighting and warfare development through reducing operational risk, increasing cost efficiency, and improving operational effectiveness.

An LL process is part of a formal approach to organizational learning that deliberately processes observed issues arising from an activity until either an LL is reached, or the lesson is rejected/noted for various reasons. Figure 12 illustrates the NATO LL process used by the NCS, as described in the Bi-SC Directive 080–006 Lessons Learned.[61] It comprises two phases (Analysis and Implementation) and respective component steps (Plan, Observe, Analyse, Decide, Implement & Validate, and Share).
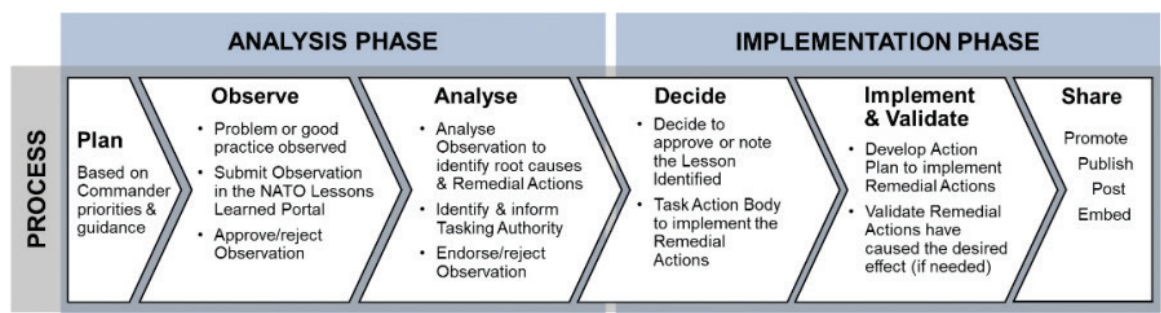

Figure 12: The NATO Lessons Learned Process

More detail regarding the activities in each of these phases can be found in the NATO LL Handbook and the Bi-SC Directive 080–006.

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[61] Bi-SC Command Directive 080–006 Lessons Learned, 23 February 2018, NATO Unclassified.

ANNEX C
IMPORTANT COMPETENCIES FOR ANALYSTS

The JALLC has been producing analysis reports since 2002, using a staff of both military and civilian analysts. Those staff that have been in the JALLC for years and have worked on dozens of analysis projects endeavoured to identify some knowledge, skills, and expertise that would help an analyst in the JALLC context. Using the Framework for 21st Century Learning Definitions as an initial guide,[62] the following four main competencies were agreed. The two sections below describe those four competencies, followed by a table to guide the reader through how each competency can play a role in the different analysis activities described in the JALLC Analysis Handbook.

Competency 1: CREATIVITY

- Uses a wide range of idea-creation techniques (such as brainstorming).
- Creates new and worthwhile ideas (both incremental and radical concepts).
- Elaborates, refines, analyses, and evaluates their own ideas.
- Identifies and asks significant questions that clarify various points of view and lead to better solutions.
- Demonstrates originality and inventiveness in work, and understands the real-world limits to adopting new ideas.
- Views failure as an opportunity to learn.

Competency 2: CRITICAL THINKING

- Uses various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.
- Uses systems thinking.
- Analyses how parts of a whole interact with each other to produce overall outcomes in complex systems.
- Makes judgments and decisions.
- Effectively analyses and evaluates evidence, arguments, claims, and beliefs.
- Analyses and evaluates major alternative points of view.
- Synthesizes and makes connections between information and arguments.
- Interprets information and draws conclusions based on the best analysis.
- Reflects critically on learning experiences and processes.

Competency 3: COMMUNICATION

- Articulates thoughts and ideas effectively using oral, written, and non-verbal communication skills in a variety of forms and contexts.
- Listens effectively to decipher meaning, including knowledge, values, attitudes, and intentions.
- Uses communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade).
- Communicates effectively in diverse environments (including multi-lingual).

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[62] Partnership for 21st Century Learning, Framework for 21st Century Learning Definitions, Battelle for Kids, 2019.

Competency 4: COLLABORATION

- Demonstrates an ability to work effectively and respectfully with diverse teams.
- Exercises flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal.
- Assumes shared responsibility for collaborative work, and values the individual contributions made.
- Is open and responsive to new and diverse perspectives; incorporates group input and feedback into the work.

Table 8 explores how each of the competencies can help a JALLC analyst think about the different activities that occur during an analysis task/project.

Table 8: Examples of how different competencies can help think through JALLC analysis activities

	Creativity	Critical thinking	Communication	Collaboration
Clarifying the analysis requirement	What do I still need to find out to make this clear? Who might be able to support me with this analysis?	Does what is being asked make sense? What scope and limitations should apply? Is the business case sound?	What do I need to know from the customer rep? Is the analysis requirement statement clear?	Does everyone in the JALLC and the customer rep have a common understanding?
Designing the analysis	What data, methods, tools, and techniques could I use? What questions do I need to answer with this analysis?	How should we approach this analysis? Can the available data provide the analysis results I need?	Have I written down my analysis design clearly? Is my write-up of my understanding so far clear and logical?	Have we worked closely with the senior analyst? How will we all individually and collectively contribute to the analysis?
Collecting and structuring data	Is there anything else I might need to collect? What options are there for structuring this data?	Is my data collection complete enough? How should I structure this data?	Have I written up my observations and interviews clearly? Do I have clear definitions for structuring my data?	Have we reviewed and provided feedback on the data other team members collected? Are we all in agreement with the way the data has been structured?
Analysing data	What other insights might I be able to get out of this data? Do I arrive at different analysis results if I look at the data from different perspectives?	What are the different parts and how do they interact? Have I applied the analysis methods, tools, and techniques properly?	Have I written up my analysis results clearly? Have I written up my methodology clearly?	Did we review and provide feedback on each other's analysis? Are we all in agreement with the analysis results?
Exploring and interpreting analysis results	What could these results tell me? Are there other possible ways to interpret the analysis results?	Which is the best explanation in light of the evidence and the analysis requirement?	Have I written down my initial findings?	Have we all reviewed and provided feedback on all the initial findings? Are we all in agreement with the analysis results?
Investigating initial findings	Where else might I find evidence for this initial finding?	Is the evidence sufficient and appropriate? Is this finding valid?	Can I provide a clear and convincing explanation of my initial finding using my evidence?	Does everyone I've shown this to agree it makes sense? How can I use feedback from others to strengthen my initial findings?
Drafting a report	What could I include in my report? How could I organize my ideas?	What should I include in my report? What should I not include in my report?	Is it easy for the reader to take away the key points? Does it make sense when you read all of it in one go? What diagrams/tables could make my message clearer?	Have we all reviewed all parts of our report and provided feedback? Have we worked closely with the senior analyst? Have we been responsive and open to incorporating external feedback into our work?
Developing recommendations	What options could possibly solve this? Have I considered that the most obvious solution may not be the best?	What options are most feasible and beneficial to solve this? Are these recommendations actionable?	Is it clearly written what needs to be done? Will the target audience be convinced by the report that this is the right thing to do?	Have we socialized these recommendations widely? Do we all agree these are the best recommendations?
Self review	Is there another way to present/ argue this?	Does this make sense to me? Does it convince me?	Is what's written consistent and coherent? Will it be clear and convincing to my target audience?	Have we worked together to create the best quality product we can? Are we all 100% happy with everything in our product?

ANNEX D
WORKED EXAMPLE OF AN ANALYSIS WITH HIGH COMPLEXITY

This annex describes an example of a hypothetical JALLC analysis team's work on a hypothetical AR. The analysis will have a high level of complexity and take the team nine months to complete.

The example takes the reader through the sets of activities as described in the JALLC Analysis Handbook and explains some of the specific things the hypothetical analysis team does during each set of activities and why. The example is not exhaustive in that it does not include every single analysis activity a team might undertake in this type of analysis, but it provides a snapshot of some of the practical ways in which an analysis team might approach different parts of their analysis.

DISCLAIMER: All the information in this annex related to the analysis topic, data collection, analysis, and findings was created for training purposes only and is completely hypothetical.

CLARIFY THE REQUIREMENT

The JALLC received the following AR from a customer in SHAPE J3:

> *Operations Assessment (OPSA) is a key activity that brings together and assesses inputs from all parts of an operation to inform the Commander's decision-making. Recent changes to NATO and an increased focus on bigger, more intense operations means that OPSA needs to change as well because it is used to the processes used in expeditionary operations. It needs to be analysed, and we need recommendations about OPSA. The analysis must consider OPSA in future operations.*

The original AR lacks some detail about the focus of the analysis and about how it will be used. So the team do some basic research, checking key documents like policies, doctrines, and handbooks, to identify what questions they still need to ask the customer representative.

After discussions with the customer representative and various OPSA Subject Matter Experts (SME), the analysis team hold a series of working meetings to refine the AR into a single statement. Their refined AR follows:

> *Analyse best practices, challenges, and lessons with respect to NATO's historical and current operations assessment (OPSA) in order to contribute to the understanding of the organization, process, and tools requirements for conducting effective OPSA in multi-domain operations (MDO).*

DESIGN THE ANALYSIS

Topic Visualization

One of the first things that the analysis team starts doing for this project is to visually map out what they are finding out during their research regarding the AR. This helps them to better understand the system elements of the topic, i.e. "organization, process, and tools for conducting OPSA". After a few days, they have the following (draft) concept map (see Figure 13).
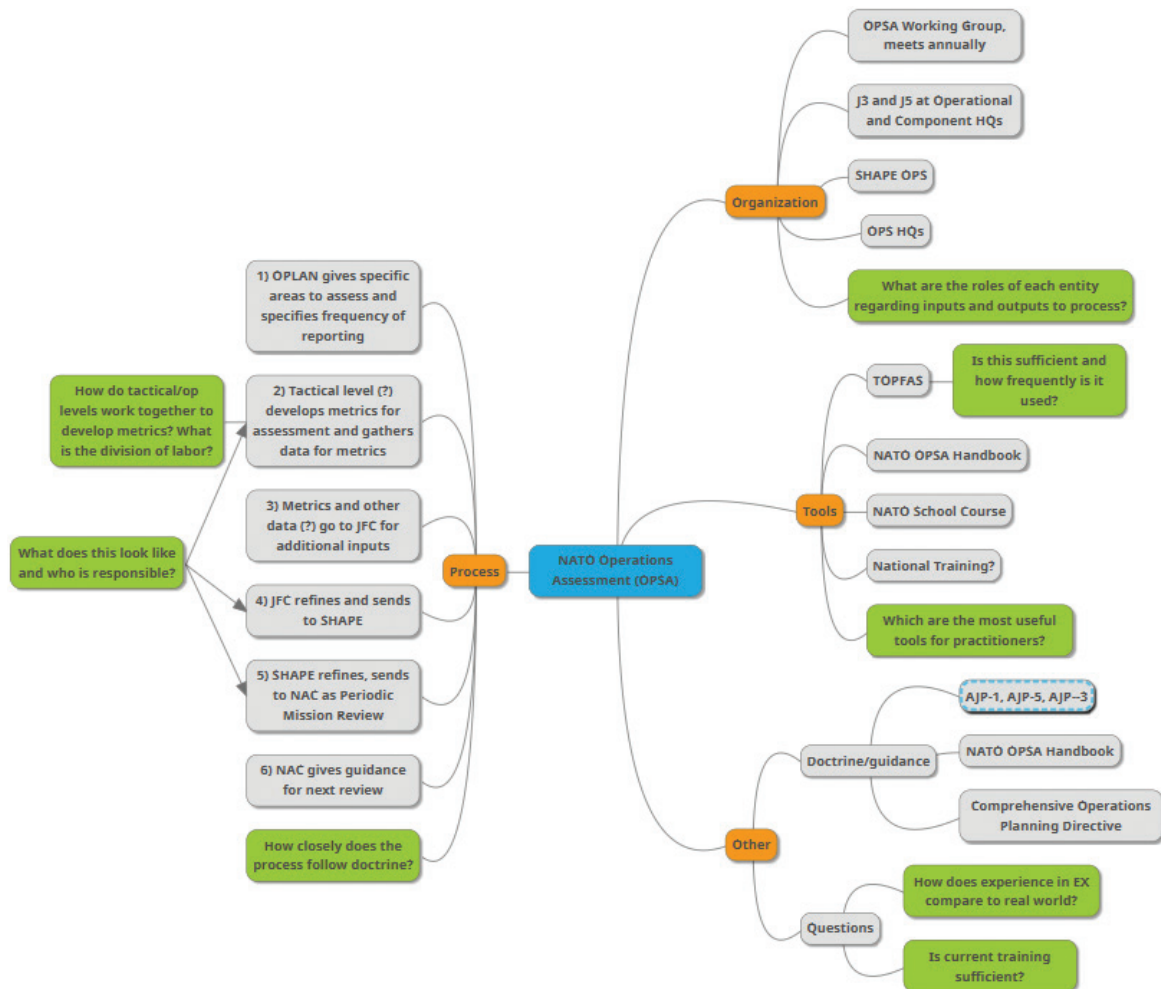
Figure 13: Example System Elements Diagram

The team also decide to use notations and different colours to indicate where they still have to fill in gaps in information. For example, question marks indicate uncertainty, and green boxes indicate initial questions—some of which may be answered in the continuing document research and some of which may be answered later in the analysis. The concept map will be refined throughout these initial activities and will become a reference point throughout data collection and analysis.

Developing AOs

The analysis team now feel ready to try to break down the AR into a set of AOs and Sub-AOs. After a series of workshops with the senior analyst, they arrive at the following set of AOs that they feel are mutually exclusive and collectively exhaustive.

AO-1: Identify all the potential organization, process, and tools requirements for OPSA in MDO.

Sub-AO-1.1: Identify the organization, process, and tools requirements for OPSA according to standing NATO doctrine and directives.

Sub-AO-1.2: Identify any additional (to Sub-AO-1.1) requirements for OPSA according to the MDO concept.

Sub-AO-1.3: Explore additional requirements for OPSA in MDO, according to practitioners and decision-makers.

AO-2: Identify the current status of the organization, process, and tools used for OPSA.

> **Sub-AO-2.1** *Describe the organization, process, and tools that are currently used to conduct OPSA in selected current NATO operations.*

> **Sub-AO-2.2** *Attend Exercise STEADFAST JUPITER (STJU) to identify what works well and what does not work well with respect to the organization, process, and tools used for OPSA.*

AO-3: *Compare the organization, process, and tools from AO-2 to those identified in AO-1.*

> **Sub-AO-3.1** *Map the requirements from AO-1 to what was identified in AO-2 and describe the differences and similarities.*

> **Sub-AO-3.2**: *Investigate areas where the organization, process, and tools do not align to understand how and why the misalignment occurred and actual or potential impacts for MDO.*

AO-4: *Explore options for adapting OPSA organization, process, and tools to mitigate impacts identified in Sub-AO-3.2.*

In order to double-check their thinking and ensure the AOs are mutually exclusive and collectively exhaustive (MECE), the team did a parsing exercise to see how the AOs addressed each part of the AR.

> *Analyse best practices, challenges, and lessons with respect to NATO's historical and current operations assessment (OPSA) …* **(Relevant AOs: AO2, AO3)**

> *. . . in order to contribute to the understanding of the organization, process, and tools requirements for conducting effective OPSA in multi-domain operations (MDO)* **(AOs: AO1, AO3, AO4**).

Methodology

The next step the team take is to design and describe the methodology for each AO, the logical connections between the AOs, the data collection required for each AO, the chosen analysis techniques, and how the results can be used in the context of the entire analysis. In Table 9 below is the methodology they arrive at for one of the AOs.

Table 9: Example methodology for an analysis objective

AO-2	Data collection	Analysis	How the results can be used
Identify the current status of the organization, process, and tools used for OPSA (includes 2 sub-AOs)	The data collection for this AO involves two primary activities: (1) sending a survey to OPSA practitioners; (2) attending EX STJU to make observations and interview EX participants. The team will develop an electronic survey tool using Microsoft SharePoint to distribute to all OPSA practitioners at SHAPE and JFCs to gather responses related to the current process, organization, and tools used to conduct OPSA and any related challenges, lessons, best practices (BPs). Some follow-up interviews are likely to gather more detail regarding responses. The team will make observations at STJU by attending battle rhythm events related to OPSA, such as the Assessment Working Group, Assessment Board, Joint Coordination Board, and others. Observations should seek to understand process, tools, and organization. The team will interview various exercise participants to better understand organization, process, tools, and aspects related to the conduct of OPSA at the exercise, including what worked well, what did not work well, and why. In order to ensure the attendance at the exercise is optimized, the team will create a data-collection matrix that captures all questions to be answered, cross-referenced to the event and/or person(s) who will provide a response. All observations will be recorded in a template shared by the team. Each interview will be recorded in an interview template.	The survey responses will be automatically exported to an Excel file that the team will use to analyse them. The first level of analysis will include deriving relevant descriptive statistics regarding how many responded and Likert scale responses related to the efficacy of the current process, organization, and tools. Sentiment analysis will be run on open-text responses to capture whether practitioners have generally positive or negative views of the current OPSA process, organization, and tools. Content analysis will be conducted on open-text responses to categorize challenges, BPs, and lessons and explore them further. The completed observation templates and interview templates from STJU will be reviewed after the exercise to extract relevant pieces of data and information from them and put them into an Excel file. Then, each piece of information/data will be coded as either *organization, process, or tools.* The data in the exercise Excel will be combined with the data in the survey-response Excel file and cleaned to ensure the fields all align and allow further analysis. This comprehensive Excel file will then be filtered by each of the codes to allow the team to identify trends, patterns, or themes related to each code.	The results can be used in two ways: 1. The results will be used to meet AO-3, which requires that the results be compared with AO-1 to identify any potential misalignment in the organization, process, or tools requirements for OPSA in MDO. 2. The results from filtering the data along each code will provide the team with an understanding of inter-related observations that need further investigation (for subsequent AOs). For example, if filtering the data along the code "organization" reveals that there is confusion about current roles and responsibilities in OPSA, that can be used to ask more questions to interviewees regarding *why* there is confusion and *what could be done* about it (related to AO-4).

The analysis team makes an effort to be as detailed and specific as possible, following a few key tips.

- They don't just list the data-collection methods (e.g. observation and interviews), but they also identify specific events where they might observe key pieces of data. They also described the ways in which the data collected will be systematically recorded and organized.

- The analysis column does not specifically call out an analysis method, but what is described is a form of content analysis, demonstrating that they understand what systematic steps need to be taken even if they don't know the exact names of all analytical methods.

- They use the final column to identify different interactions with other AOs. This helps them identify gaps in thinking about the data collection or analysis for previous AOs.

Analysis Tasks and Schedule

The analysis team now feel ready to plan their analysis in more detail. They have already planned out the weeks of preparation for attending the exercise to observe OPSA, but now they need to plan the tasks for recording the data they collect at the exercise, following up with interviewees after the exercise, and how specifically they will analyse the data they've collected from both the survey and the exercise. Part of their schedule details these tasks and their interactions below in Table 10:

Table 10: Example weekly schedule for part of an analysis project

Week	Tasks	Responsible
. . .	. . .	. . .
5	Return from exercise.	All
	Write trip report.	Project manager (PM)
	Review notes and refine with additional information/thoughts.	All
	Put interview transcripts and observation transcripts in TT+.	Analyst B
	Download survey results from Sharepoint to Excel and begin cleaning data.	Analyst A
6	Start populating data sheets with relevant data from interviews and observations.	All
	Start identifying follow-up questions and POCs.	All
	Calculate descriptive statistics from survey results in line with analysis design.	All, senior analyst
	Conduct sentiment analysis using appropriate software.	Analyst A and B + senior analyst
	Begin coding survey responses along best practice, challenge, and lesson codes.	All + senior analyst
	Seek senior analyst guidance on cleaning datasets and initial coding.	All + senior analyst

(*continued*)

Table 10 (continued)

Week	Tasks	Responsible
7	Finish populating data sheets from exercise.	All
	Start coding data sheets from exercise; conduct coding demo/training for entire team.	Analyst A
	Continue coding survey data.	All
	Continue identifying follow-up questions and POCs.	All, senior analyst
	Check in with senior analyst.	All
8	Combine data sheets from exercise and survey, and clean/ align data fields.	Analyst A
	Code full data set further, if required.	All
	Identify follow-up questions and POCs.	Analyst B
	Contact POCs to schedule follow-up interviews as identified in survey responses.	All, senior analyst
	Check in with senior analyst.	All
9	Conduct follow-up interviews with survey respondents.	All
	Identify exercise POCs for follow-up phone calls.	All, senior analyst
	Conduct review/validation of coding with team and senior analyst.	Analyst B
10	Begin mapping data sheet results to results from AO-1.	Analyst A
	Follow-up discussions with exercise participants.	PM and Analyst B
	Record interviews in interview transcripts.	PM and Analyst B
	Populate data sheets with new data from transcripts.	PM and Analyst B
. . .	. . .	. . .

DATA COLLECTION AND ANALYSIS

Structuring Data

During the planning and design, the analysis team developed a data-collection and analysis tool to use for combining, structuring, and analysing the data from the two datasheets (i.e. exercise and survey) that were the result of data collection for AO2: *Identify the current status of the organization, process, and tools used for OPSA.* The team decide to use an Excel file that will allow them to collate all the text-based data and subsequently code and analyse that data according to pre-defined codes.

The team received 16 responses to the survey and collated the responses in an Excel data sheet in accordance with the analysis design. The team also deployed to the exercise and observed 18 events and conducted 24 interviews, and recorded them in transcripts, and they saved ten PowerPoint presentations providing relevant context. To structure that exercise data, the analysis team systematically went through each of the interview transcripts and the observation records, and transferred (copied/pasted) each individual piece of relevant text to an Excel row.

As described in the analysis team's analysis design, they then combined the data from these two Excel files after some initial coding. Now they have to do additional coding to analyse the data as a more comprehensive dataset. A snapshot of part of the team's combined Excel file is in Figure 14 below.

	A	B	C	D
1	Data Excerpt	Source Type	Source	
2	assessment staff do not use the tool that they should use to do the assessment	survey	JALLC	
3	the command group lacked visibility of the assessment at the exercise	interview	JFC J3	
4	assessment staff don't always have all the required training for the post	survey	JFC J3	
5	assessment staff showed confusion about who should be at the AWG	observation	JALLC	
6	assessment is important	interview	JFC COS	
7	info flow between J2 and J3 could be improved	survey	JFC J2	
8	there was confusion about time horizons during the Assessment Board	observation	JALLC	
9	All inputs to the Assessment WG did not get submitted in time	observation	JALLC	
10	the assessment tool was not set up from the start of the exercise and only started working on day five	observation	JALLC	
11				

Figure 14: Snapshot of an Example Excel Tool for Structuring Data

Analysis

The analysis team decide to apply a mixed-method approach to the data in their data-collection and analysis tool. For the qualitative piece, they code each piece of data along two code sets (see columns D and E). The result is seen in Figure 15 below.

	A	B	C	D	E
1	Data Excerpt	Source Type	Source	Code1: Process, Tools, Organization	Code2: DOTMLPF-I ▾
2	assessment staff do not use the tool that they should use to do the assessment	survey	JALLC	tools	materiel
3	the command group lacked visibility of the assessment at the exercise	interview	JFC J3	process	leadership
4	assessment staff don't always have all the required training for the post	survey	JFC J3	organization	training
5	assessment staff showed confusion about who should be at the AWG	observation	JALLC	organization	personnel
6	assessment is important	interview	JFC COS	process	doctrine
7	info flow between J2 and J3 could be improved	survey	JFC J2	process	interoperability
8	there was confusion about time horizons during the Assessment Board	observation	JALLC	process	training
9	All inputs to the Assessment WG did not get submitted in time	observation	JALLC	process	interoperability
10	the assessment tool was not set up from the start of the exercise and only started working on day five	observation	JALLC	tools	materiel
11					

Figure 15: Snapshot of Example Excel Tool for Coding Data

Once this is done, the analysts then filter along some of the codes to see if interesting things start to emerge. For example, by filtering for the data only related to *process,* the analysts may discover some things about the information flow between divisions/branches. This would prompt them to dig a little further and question *why* information flow was a problem. *What* did staff try to do to mitigate the problem? Has it historically been a problem? Etc., etc. … These interesting things may or may not form part of the findings in the next parts of the analysis, but they should not be discarded until considered from all angles.

Additionally, in accordance with their methodology, the analysis team do some calculations to derive descriptive statistics regarding the amount of data related to each code. They find that just over 20% of the data related to issues with organization and just over 20% related to issues with tools. They also find that just over 50% of the issues related to process. These kinds of results might prompt the analysis team to dig in further on the *process* issues. In the next activities they can try to find out whether many of the issues really are process issues, what those look like in different contexts (e.g. operations, exercises), and what guidance exists to define the process.

DEVELOP FINDINGS

Exploring and Interpreting Analysis Results

The analysis team has used various filters to explore the analysis results in the Excel file in many different ways. The team uncovered a few specific items that seem to be interesting and related, and may be used to develop a single potential finding about the assessment tool.

- *"assessment staff do not use the tool that they should use to do the assessment"*

- *"the assessment tool was not set up from the start of the exercise and only started working on day five"*

The team decide to try to form a finding with these analysis results as shown in Figure 16, where the left circle depicts the cause and the right circle depicts the effect.
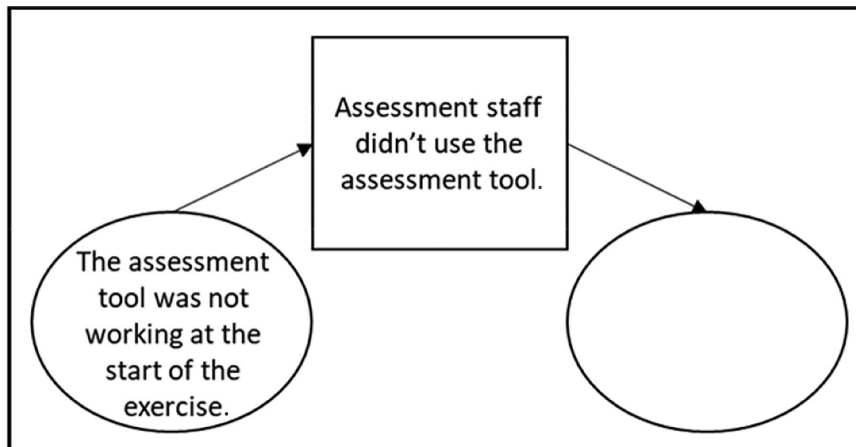

Figure 16: Example Potential Finding in a Visual Finding Map

The analysis team can see that they are missing part of this finding. They do not know what effect the staff not using the tool had, either at the exercise, nor in everyday use for operations. They look through their analysis results again to see if anything they have there might have been caused by the staff not using the tool. They find several possible effects, including some products being delivered late in the exercises and a lack of command group visibility on the assessment. As the lack of command group visibility seems to be the most impactful effect, they decide to include it as the main effect in their initial finding: see Figure 17.
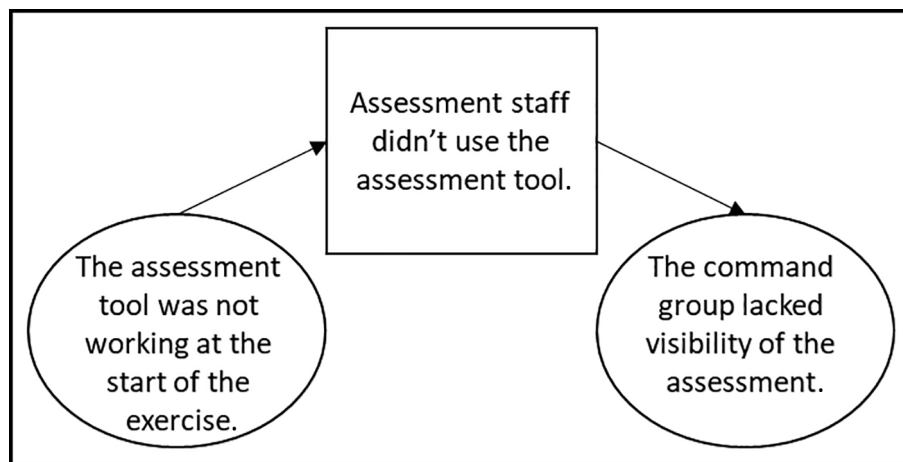

Figure 17: Example Potential Finding in a Visual Finding Map

With this finding, the analysis team were lucky: they already had everything in their analysis results to form a complete finding.

Further Investigation

The analysis team aren't 100% certain that their potential finding has all the sufficient and appropriate evidence to make it a robust finding, so they decide to conduct further investigation. The following sections describe how parts of the investigation into the potential finding in Figure 15 might proceed.

In the first case, the investigation reveals that the cause is only supported by one interview, and therefore the **evidence is not sufficient** to support the inference that the tool not being available at the start of the exercise caused the assessment staff not to use it. Although it is logical that the tool not being available means staff didn't use it, it is also logical to infer that staff would have started using the tool when it did become available.

In this case, the analysis team need to collect some more data from the assessment staff, specifically to ask them whether there are any other reasons behind them not using the tool once it became available; maybe this will reveal that the tool is not useful to them, or they haven't received the training they need to use it. If no sufficient additional evidence can be found, the analysis team will have to weaken the wording of the finding to indicate that the tool not being available at the start of the exercise may only be one among many factors that contributed to the staff not using the tool during the exercise.

In the second case, the investigation also reveals that the **evidence is not appropriate** to support the delta being that the assessment staff didn't use the assessment tool. The evidence for this element of the finding came from an interview transcript, but whether staff used the tool or not is something that can be verified in the tool itself, and so this element of the finding should be supported by more than just testimonial evidence. In this case, the analysis team should go back and check the user logs and data and information stored in the assessment tool to find out conclusively to what extent the tool was actually used.

Confirming Findings

Regardless, the team realize they need to go back and follow up with additional interviews. In doing so, they find that the issue about not using the tool goes beyond the exercises and is also an issue for everyday operations, where the tool is not consistently used. Six OPSA practitioners confirmed this in interviews. The team also find out during these interviews that the cause of this inconsistent use is related to a couple of things: the tool doesn't meet user requirements for the entire OPSA process, and staff rarely get sufficient training on the tool. This last point is supported by results from the survey that the team have already captured. With this newly understood information, the team decide to reframe the finding once more to add a bit more context to the delta and articulate a cause they know they have the evidence for. The team update their potential finding to reflect the new understanding as follows.
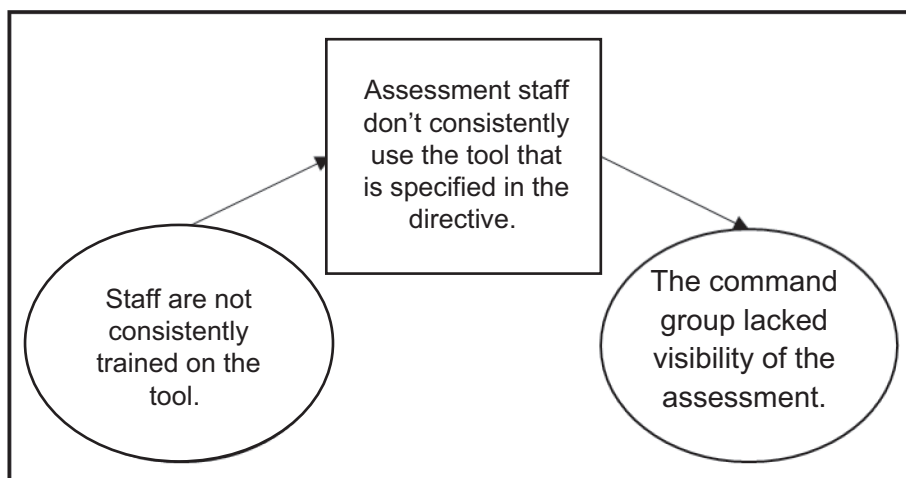

Figure 18: Example Potential Findings in a Visual Finding Map

Since the AR is about making OPSA more effective, and part of the AR relates to tools, then this potential finding at Figure 16 is definitely relevant as it stands.

DRAFT THE REPORT

Report Structure and Target Audience

The analysis team are ready to start drafting, but first they want to settle on an agreed main message. They have the senior analyst facilitate a session during which they decide on the following message: *The current way OPSA is conducted may not be sufficient in the future, but there are many opportunities to improve it in terms of process, tools, and organization.* This message provides a clear way forward for the report structure where the analysis team can dedicate one chapter to discussing *process*, one for *tools*, and one for *organization*.

The analysis team also need to think about what each of the potential readers might be seeking from the product. For example, an OPSA practitioner in SHAPE J3 will likely not want to use the report in the same way as the Commander of a JFC or as a J2 officer.

Elements of a Finding and PEAS

The analysis team now intend to apply the PEAS method to draft the finding at Figure 4 related to the assessment tool. Following is the first draft of their PEAS paragraph for the Delta:

> *[Point] The tool that is intended to assist assessment staff to collect all inputs and relate them to assessment metrics is not used consistently in exercises or operations. [Evidence] In interviews with OPSA practitioners, many confirmed that they only use the tool for two specific functions, but for the rest of the assessment they work in other tools. A similar scenario was observed at EX STJU where, for example, the four assessment staff were observed to be using PowerPoint to collect all the inputs from other staff elements for the assessment. When asked what tool they should be using, the staff explained that they use the tool for producing the visual elements of the OPSA picture at the end of the process, but that they didn't use it for collecting and processing all the inputs, and instead they were using PowerPoint as a workaround. [Analysis] According to both the relevant directives and the OPSA Handbook, using the tool is required in all operations to ensure visibility both internal and external to the HQ. [So What?] The inconsistent use of the tool is at odds with the directive and potentially undermines the purpose of OPSA to ensure visibility.*

If the analysis has nothing else to explain about the delta, then the next PEAS paragraphs the analysis team write will be a paragraph for the effect(s) and a paragraph for the cause(s).

Pyramid Principle

Now that the analysis team are putting all the elements of every finding into narrative form, they decide to use the Pyramid Principle to organize their entire chapter on the assessment tool. They have three findings they need to discuss regarding the tool. Putting the ideas into the pyramid structure then might look like the following Figure 19.
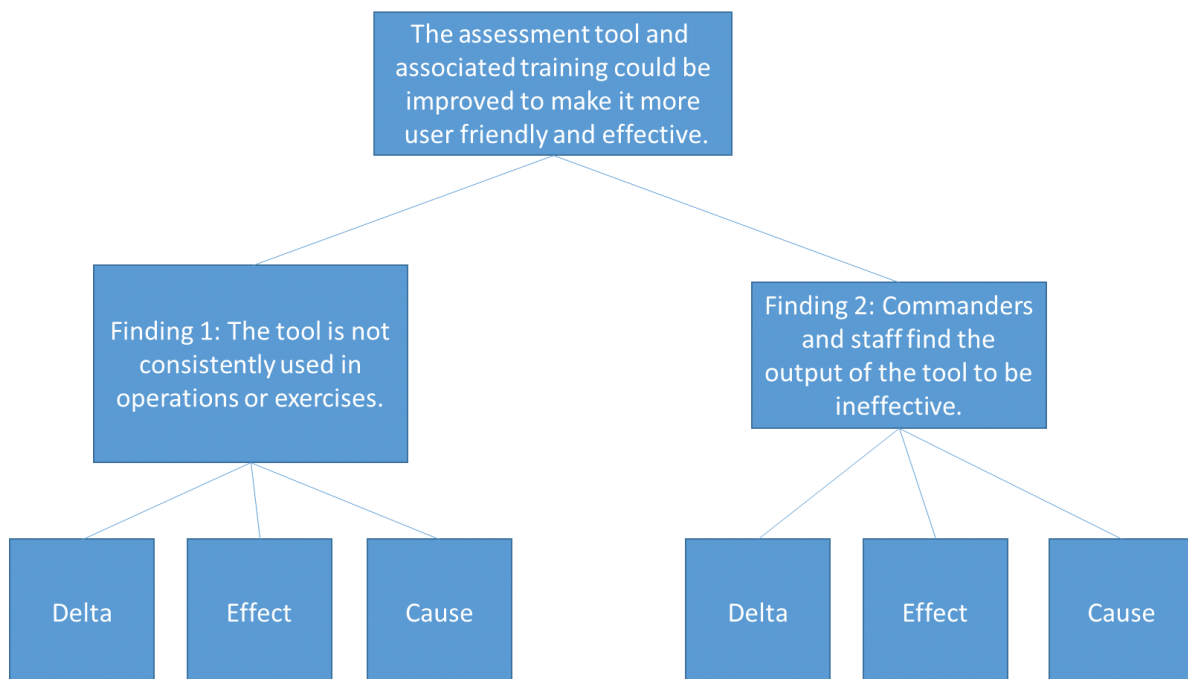

Figure 19: Example Pyramid Principle to Structure a Chapter and Findings

The team are happy with this structure and they do a similar exercise for the two other chapters on process and organization. They then divide the drafting amongst them: the project manager will draft the first draft of the chapter on process, one analyst will draft the chapter on organization, and another will draft the chapter on tools. After five days they switch chapters with one another so that they can provide input and help each other with the other parts of the report. As those parts of the report become more concrete, they also start to draft other necessary parts of the report like the background and a conclusions section.

Recommendations

The analysis team are now thinking about their recommendations. They start with: *"Staff need to use the assessment tool",* but when they look more closely they realize it's not a very good recommendation because it is not **actionable**. Instead, it is a statement of the effect needed (the need to remedy the delta); it does not say what needs to be done to achieve that effect. The recommendation should offer a way to ensure that the tool is used, as would, for example, a recommendation for specific training and exercise events to educate staff about the assessment tool.

Introductions

The analysis team need to write an introduction for the chapter on tools. They start with the three components: situation, complication, and question. Their first draft of the introduction looks like this:

> **[Situation]** *There is a primary tool in NATO that is intended to support OPSA in any operation or other context.* **[Complication]** *The experience at Exercise STJU demonstrates that the tool is neither used consistently nor do commanders find the output of the tool useful.* **[Question]** *The following sections describe these issues, and their causes in terms of user requirements and training, which can help NATO identify opportunities to optimize the assessment tool.*

This is a good starting point and it will be used to iteratively refine the introduction until it aligns well with the entire chapter and sits within the context of the entire report.

IMPROVE THE DRAFT

Analytical and Editorial Review

After many iterations and receiving some D&G from their Technical Director and Project Director, the analysis team have a draft report ready to be peer reviewed by the senior analyst and editor. The analysis team send 34 pages and three annexes for review, and they receive back many comments, about ten per page, but they know the number of comments is not a concern. The nature of the comments is more telling of the work ahead.

The team decide to read through all the comments together first. In doing so, they identify about 18 comments from the analytical reviewer that they don't fully understand, and about 22 from the editor that need clarification. It looks to the team like the reviewers may have misinterpreted something or may have some knowledge about the topic that the team hadn't uncovered in their research.

The team and the reviewers all sit down in a meeting to discuss the comments. This meeting reveals a couple of things:

- Some of the unclear comments were a result of the reviewer reading the text in a way it was not intended. This is an indication to the team that the text needs to be changed to more clearly convey their intent.

- Some of the comments were the result of unintentional omissions of key information by the analysis team so that the reviewer was reading text that was based upon a previous idea that had not been explicitly described. This requires the team, with the help of the reviewers, to not only adjust the current text but to also return to previous

sections to ensure that all the necessary information and context is made clear from the first point it is mentioned.

The work to incorporate all the comments in a satisfactory manner takes about ten days, but the team and the reviewers all feel confident that the draft is now much improved from the previous version and is ready to go for external comment.

External Review

The analysis team next send out the draft for external review. After ten working days, they receive all the comments back from stakeholders and collate them in a single matrix in order to address them all. Many J3 staff provide good feedback, particularly on technical aspects of the report that require some refinement. Below is a sample of some of the comments received and what changes they necessitated the analysis team to make in the draft.

- Comment from SHAPE J3: *The terms "Measures of Performance" and "Measures of Effectiveness" should not be used interchangeably as they are distinct elements of the assessment.*

  ○ Team action: The team assess this comment and appreciate the need for factual accuracy in how the draft is written. They realize that there are several places in the report where the two terms are used. This requires them to find every single instance of the use to make sure that they are using the right terminology. In total, they found 83 uses of both terms and, of those, they had to correct 14.

- Comment from JFC J3: *The recommendation regarding training on the tool should also extend to the process. Training for OPSA practitioners in general is a challenge, and just training on a tool is not sufficient if someone does not understand the rationale (i.e. process) behind it.*

  ○ Team action: The team assess that the comment has a sound rationale and that it is worth implementing. They revisit some of their analysis results to confirm whether the training issue was also relevant outside of the context of the tool. Not only do they confirm it is relevant to the process, but they also discover they had overlooked including a piece of their analysis regarding job descriptions and training requirements. They are able to adjust the recommendation as suggested by the commenter and to add another recommendation related to their own analysis.

Annex E
Worked Example of an Analysis with Moderate Complexity

This annex describes an example of a hypothetical JALLC analysis team's work on a hypothetical AR. The analysis will have a moderate level of complexity and take the team nine months to complete.

The example takes the reader through the sets of activities as described in the JALLC Analysis Handbook and explains some of the specific things the hypothetical analysis team does during each set of activities and why. The example is not exhaustive in that it does not include every single analysis activity a team might undertake in this type of analysis, but it provides a snapshot of some of the practical ways in which an analysis team might approach different parts of their analysis.

DISCLAIMER: All the information in this annex related to the analysis topic, data collection, analysis, and findings was created for training purposes only and is completely hypothetical.

Clarify the Requirement

The JALLC receives the following AR from a customer:

> *Provide Initial Observations on the Battle Rhythm in STEADFAST JUPITER 23.*

As the original AR lacks some clarity and detail in the focus and does not indicate the intent of the analysis, the analysis team do a bit of initial research by checking key documents like policy, doctrine, and handbooks, and talking to a few colleagues in the JALLC, to identify what questions they will need to ask the customer representative to refine the AR.

During their initial research, they discover that the JALLC did quite a bit of analysis on battle rhythm (BR) in exercises over the last ten years and so, with support and guidance from the JALLC's senior and principal analysts, who'd been involved in some of those old projects, they develop a summary of the main findings of those old analysis reports as a way to help them put the current analysis requirement in context.

After sharing this summary with the customer representative, they discover that the AR is not for completely new observations on the BR, but for observations that would help the BR development team to validate that the latest changes to the BR had solved known issues and that the new BR is effective in enabling SHAPE as a strategic warfighting HQ. The customer representative asks the JALLC to deliver its initial observations in the NATO LL reporting format ODCR, but as they only needed initial observations, they did not need the JALLC to fill the recommendation part of the ODCR.

The analysis team then hold a few working meetings with the senior analyst to refine the AR. Their refined AR is as follows:

> *Develop observations on the extent to which the BR implemented in STJU23 resolved issues observed in previous exercises and enabled SHAPE as a strategic warfighting HQ in order to validate the new BR and identify any ways in which it could be further improved.*

Design the Analysis

Topic Chronology

One of the first things that the analysis team starts doing when they are working to clarify the requirement is to develop a topic chronology. They find that the BR has evolved since it was

first introduced in 2019. They figure that if they can understand how, when, and why it has changed over time, that understanding will give them more context to frame their questions and maybe to write their ODCRs in the final product. The first draft of the chronology is below.

- *June 2019*, SHAPE Directive 080-XYZ is released, defining the BR during Crisis

- *October 2019*, SHAPE BST to train the BR

- *November 2019*, Final Exercise Report contained eight recommendations to change the BR that were approved

- *January 2020*, JALLC Report on Exercise is released with BR observations

- *May 2020*, Directive is updated to reflect changes. Changes include clarifying roles of Assessment Boards and merging intelligence-related working groups

- *November 2020*, SHAPE BST to train the BR; takes place virtually because of COVID-19 pandemic restrictions

- *January 2021*, Final Exercise Report contained five recommendations for BR

  - [???? Still looking for what happened to those recs.]

- *February 2021*, JALLC Report with BR observations from Exercise

  - [TBD—we think the directive was updated, but more research required]

- *October 2021*, Major Joint Exercise, SHAPE was not focused on BR but it was a secondary Training Objective

- *September 2022*, entirely new directive is written, subsuming the previous BR along with other processes

- *October 2022*, major effort in SHAPE to develop Terms of Reference for BR events

  - September 2023, Major Exercise for SHAPE to train BR

  - [???? New restructure of HQ—we need to find out if this affects the BR]

The team have used notations to indicate where there are currently known gaps in their chronology/timeline that they will focus on filling in their next round of research.

Develop AOs

The analysis team now feel ready to try to break down the AR into a set of AOs and sub-AOs. After a series of workshops with the senior analyst, they arrive at the following set of AOs that they feel are mutually exclusive and collectively exhaustive.

AO-1: *Identify what in the STJU23 BR is different and why it was changed.*

> **Sub-AO-1.1**: *Compare the STJU23 BR with the BRs from previous STJU exercises and list the main differences.*

> **Sub-AO-1.2**: *Identify old BR-related lessons, in JALLC reports, FERs, and the NLLP, and map them to the differences in the new BR that could address them.*

> **Sub-AO-1.3**: *Identify the BR requirements of a strategic warfighting HQ and map them to the BR differences that could address them.*

> **Sub-AO1.4:** *Assess whether the differences between the BRs seem to address old lessons, or enable SHAPE as a strategic warfighting HQ, or both.*

AO-2: *Develop a data-collection matrix for what needs to be observed during STJU23, using understanding of how and why the BR is different in STJU23 from AO-1.*

> **Sub-AO2.1:** *Identify which boards and working groups analysts need to attend and what they should look out for at them.*

Sub-AO2.2: Identify which staff sections analysts need to speak to and what they need to ask them about.

Sub-AO2.3: Identify which exercise documentation analysts need to collect from the exercise mission network.

AO-3: Collect data from STJU23 in accordance with the data-collection matrix.

AO-4: Develop initial observations in accordance with the AR.

Sub-AO4.1: Identify the deltas where what was observed did not match what was planned or did not have the intended effect.

Sub-AO4.2: Identify the relevant deltas where a delta indicates a lesson was not learned, or hindered SHAPE as a strategic warfighting HQ (Referring back to AO-1 results).

Sub-AO4.3: Develop the relevant deltas into ODCs, conducting additional investigation as needed to provide appropriate and sufficient evidence.

Methodology

The next step the team take is to describe the methodology for each AO, the logical connections between the AOs, the data collection required for the AO, the chosen analysis techniques, and how the results can be used in the context of the entire analysis. In Table 11, below, is the methodology they arrived at for one of the AOs.

Table 11: Methodology for an Analysis Objective

AO-1	Data collection	Analysis	How the results can be used
Identify what in the STJU23 BR is different and why it was changed.	The data collection for this AO will occur before the exercise execution. It will involve collecting data on the following: 1. BR planned for STJU23 (from customer rep, BR and associated SOPs, SOIs, TORs, and templates). 2. BR used in previous exercises (from customer rep, BR and associated SOPs, SOIs, TORs, templates, and old JALLC reports). 3. All old *lessons* about BR (JALLC reports, NLLP items, FIRs).	First the team will identify differences in the BRs by comparing them with each other. The comparison will consider differences in: 1. Frequency and number of meetings. 2. Names and purposes of meetings. 3. Roles and responsibilities and attendance. 4. Information flow and templates. 5. Other. A list of differences in each category will be recorded in a spreadsheet, one difference per row with the type of difference.	This understanding of how and why the BR has changed for STJU23 is needed in order to develop a data-collection matrix (AO-2) to focus the team's data-collection efforts during the exercise execution. It is also necessary to judge whether the observed deltas at the exercise are relevant to answering the AR (AO-4), and to putting them in context regarding whether they are previously reported issues reoccurring or new issues arising in the new context of SHAPE as a strategic warfighting HQ.

(*continued*)

Table 11 (continued)

AO-1	Data collection	Analysis	How the results can be used
	4. BR *requirements* of SHAPE as a strategic warfighting HQ (from related doctrines, concepts, and plans). A spreadsheet will be used to store all lessons and requirements extracted from documentation in a common format. Each row will detail the lesson or requirement and exactly where it came from.	The team will then review the list of differences and try to map lessons or requirements to them. The mapping will identify whether the difference appears to address a lesson or requirement, or both. The team will synthesize these results into a narrative description of how and why the BR is different in STJU23, if possible supported by diagrams to highlight the differences.	

Tasks and Schedule

The analysis team are now ready to plan their analysis in more detail. They start by planning what they need to do before the exercise execution. The example of a weekly schedule below in Table 12 gives an idea of all the tasks undertaken so far during analysis planning, and those that still need to be done in the lead up to deploying for the exercise.

Table 12: Weekly schedule and tasks for analysis planning

Week	Tasks	Responsible
1	Coordinate analysts' attendance at exercise with exercise OPR.	PM
	Get TDY approval and book travel.	All analysts who will deploy
	Workshop with senior analyst to develop AOs.	Analysis Team, senior analyst
	Start drafting Analysis Plan.	PM
	Find all documents containing BR information from STJU23 and previous exercises, and add to workspace.	Each analyst leads the search for one type of information
	Find all reports containing lessons relating to BR and add to workspace.	All analysts
	Export all lessons relating to BR from NLLP and add to workspace.	Analyst A
	Find all documents referring to SHAPE as a strategic warfighting HQ and add to workspace. **[Note, the analysis team do not yet know what they will do with all of this information, but it's obvious from the AR they will need it stored all in one place and organized so they can refer to it later.]**	All analysts
	Provide weekly progress update to DDH.	PM

(continued)

Table 12 (continued)

Week	Tasks	Responsible
2	Continue finding documents in case some were hard to find.	As in week 1
	Workshop with senior analyst to refine AOs and work through the analysis design.	Analysis Team
	Finalize Analysis Plan.	PM
	Develop templates/tools to support BR comparison and single lessons/requirements list.	Analysis Team
	Deliver analysis plan for Director review.	PM
	Provide weekly progress update to DDH.	PM
3	Do BR comparison and identify differences.	Civilian analyst + military analyst
	Extract all lessons and requirements into one list.	PM + military analyst
	Provide weekly progress update to DDH.	PM
4	Map lessons/requirements to differences, synthesize the results in narrative form (initial draft only at this time).	Analysis Team
	Develop data-collection matrix and divide up responsibilities for it.	Analysis Team, senior analyst
	Workshop with senior analyst to review and refine data collection matrix.	Analysis Team
	Develop deployed observation and interview guides.	All analysts who will deploy
	Provide weekly progress update to DDH.	PM
5	Week 1 of deployed data collection—send observations, interview notes, and documents back to JALLC.	All analysts who will deploy
	Daily coordination meeting on site at exercise.	PM
	Daily coordination meeting with JALLC reachback.	All analysts + reachback
6	Week 2 of deployed data collection—send observations, interview notes, and documents back to JALLC.	All analysts who will deploy
	Daily coordination meeting on site at exercise.	PM
	Daily coordination meeting with JALLC reachback.	
7	. . .	

Following detailed planning, the analysis team conduct a risk assessment. From the efforts they've already made to find out as much about previous BRs as possible, they realize it is very likely they will have incomplete and inconsistent information about previous battle rhythms. This prompts them to change their analysis design slightly, to specify that instead of *"comparing battle rhythms with each other"*, which implied a comprehensive comparison, they will only identify *"how the STJU23 BR is different"* from what they can discover from available data on the previous battle rhythms. This weakens the analysis because it means there will be potentially many differences that the analysis doesn't capture, but this limitation is an unavoidable consequence of gaps in the available data.

They decide to mitigate this risk by interviewing the customer rep, who designed the new STJU23 BR. They will ask the customer rep to tell them specifically about the differences they have introduced and why, and ask them whether there are any specific aspects of the new BR that they would like the analysis team to focus on.

DATA COLLECTION AND ANALYSIS

Structuring Data

During the planning and design, the analysis team develop a data-collection and analysis tool to use for structuring and analysing the data relevant to AO1: *Identify what in the STJU23 BR is different and why it was changed.* The team decide to use an Excel file that will allow them to do two things: first, to collate all the lessons and requirements and, second, to map them to the differences identified in the BRs.

For the first task, the team use the tool to create a single master list of all the lessons and requirements extracted from the different types of documentation. The result of populating the tool with the data looks something like Figure 20 below.

	A	B	C	D	E	F	G	H
1	ID	How is STJU23 BR Different?	Type of Difference	Discovered from comparison with which BR	Linked Lesson	Linked Rec	Lesson/Requirement Description	Comme
2	001	There are no daily command group meetings planned, but they were previously included	1-Frequency and number of meetings	TRJU 17 - Executed	003		The addition of a daily command group meeting into the battle rhythm significantly helped with senior leader situation awareness, and enabled rapid resolution of priority issues. Recommend: continue this practice.	
3	002	Campaign synchronization is explicitly included on the agenda of the joint coordination board meeting, but wasn't before	2-Names and purposes of meetings	ACO Directive 2019		004	The HQ's battle rhythm is critical to enabling campaign synchronization.	
4	003	Templates for the daily situation awareness briefing are now being used and weren't before	4-Information flow and templates	STJU 22 - Planned				
5	004	There are an average of 8 meetings in a day instead of 6	1-Frequency and number of meetings	STJU 22 - Planned	002		The battle rhythm during the exercise was too busy. Key staff often found themselves needing to attend concurrent meetings at different ends of the HQ, or rushing between meetings with no time in between to think or do work. Recommended limit number of concurrent meetings to 2 and leave windows open in the day where staff can prepare for the next meeting.	
6	005	There are at most 4 concurrent meetings being held instead of 3	1-Frequency and number of meetings	STJU 22 - Planned	002		The battle rhythm during the exercise was too busy. Key staff often found themselves needing to attend concurrent meetings at different ends of the HQ, or rushing between meetings with no time in between to think or do work. Recommended limit number of concurrent meetings to 2 and leave windows open in the day where staff can prepare for the next meeting.	This also maps to lesson 021 and 025
7	006	The name of the assessment working group has changed to the campaign assessment working group	2-Names and purposes of meetings	ACO Directive 2019				

Figure 20: Snapshot of Example Data-Structuring Tool

On another sheet in the same Excel workbook, they create a list of BR differences they identify from their comparative analysis of the BRs.

In building their structuring tool, the analysis team use the data-validation feature in Excel so that the Type of Difference column is filled from a fixed drop-down menu. This guarantees that no typos or inconsistencies are entered into the spreadsheet and allows them to benefit from the sort-and-filter function in Excel to move differences of the same type together in the list.

Analysis

Once the team has identified BR differences in their comparative analysis, they now need to map those differences to the original lessons/requirements they identified. They use the same Excel tool to do the mapping analysis (see Figure 21 below), where the difference they identified is found in column B and the type of difference is in column C. Then, in columns E, F, and G, the team identify the lesson/requirement that was linked to the difference.

	A	B	C	D	E	F
1	ID	L-Lesson R-Requirement	Lesson/Requirement (paraphrased if not in quotes)	Activity	Source	Source Ref ID
2	001	L	Staff turning up to BR meetings were not aware of their role at the meeting. Recommended to publish TOR and disseminate them during Battle Staff Training.	STEADFAST JUPITER 22	NLLP ID 34XXX	3
3	002	L	The battle rhythm during the exercise was too chaotic, frequent changes to meeting times and attendance meant that staff became confused about when and where to turn up. Recommended to keep battle rhythm information centrally up to date in a single central place on the exercise portal and notify attendees by email when the date/time/location of their meeting changes.	TRIDENT JUPITER 19	NLLP ID 29XXX	73
4	003	L	The addition of a daily command group meeting into the battle rhythm significantly helped with senior leader situation awareness, and enabled rapid resolution of priority issues. Recommend: continue this practice.	TRIDENT JUNCTURE 17	JALLC Report, page 17, para 55	4
5	004	R	The HQ's battle rhythm is critical to enabling campaign synchronization.	ALL	AJP-XXX Page 4, Para 3	19
6	005	R	A battle rhythm should to enable the commander's decision making process.	ALL	AJP-XXX Page 4, Para 3	19
7	006	R	The SHAPE battle rhythm enables SHAPE's deliberate decision-making process.	ALL	ACO Directive XXX, Page 6, Para 7-1a	21

Figure 21: Snapshot of Example Data Analysis Tool

Upon reviewing all the differences and the mapping, the analysis team draft a narrative summary of the differences by category, e.g.

> **Frequency and Number of Meetings:** *The STJU23 BR is busier than previous BRs have been, both in terms of the overall number of meetings and how many of those meetings are being held concurrently. However, it does not include daily command group meetings, which were previously included. It is not clear from documentation how the BR can simultaneously be busier and miss a daily meeting that was previously held. Additionally, the busier BR and removal of the daily command group meetings is contrary to the recommendations from previous lessons.*

The analysis team create a summary for every category of difference. These narratives are kept in a working document in the team's workspace because they know they will need to use it later when building the ODCRs for the final product.

Through summing up what they have discovered so far in narrative form like this, the analysis team realize that they have some specific gaps in their knowledge. Namely, they do not know what extra meetings are causing the BR to be busier, and they don't know why the BR designers decided to make the BR busier this time, even though previous lessons recommended that it should be less busy. Their analysis design and schedule ensured that they discovered these unknowns before the exercise execution. Therefore they were able to add these knowledge gaps to their data-collection matrix and specifically look for data during the deployed exercise execution that could help them fill them.

DEVELOP FINDINGS

Exploring Analysis Results

The analysis team made lots of observations and conducted lots of interviews at the exercise execution and sent all of their filled observation templates, interview transcripts, and relevant documents back to the JALLC on a daily basis throughout their deployed data collection.

Back at the JALLC, a member of the analysis team is processing all of this data and extracting data that fulfils answers to questions in the data-collection matrix. The reachback analyst is connecting daily with the team to highlight where they need to focus data collection the following day if they are to answer all the questions in the data-collection matrix before the window to collect data during exercise execution ends.

The reachback analyst, with guidance from the deployed analysts, is also looking for emerging patterns, trends, or anomalies in the data that may indicate the beginning of a finding to be developed. While the deployed data collection is ongoing, the reachback analyst will develop a summary of these interesting results and, when the rest of the analysis team get back, they will review the interesting results and add anything that they feel may have been overlooked.

One interesting result that is emerging from the deployed data collection relates to the busyness of the BR. This was already identified as an area of interest prior to the deployed data collection as the new BR was busier than previous BRs, even though lessons recommended that it should be made less busy.

Interpreting Analysis Results

The analysis team decide to try to form a finding about the busy BR.

They have several ideas relating to this topic to work with already.

- *"the BR was busier than previous exercises in total number of meetings and concurrency of meetings"*

- *"the BR designers told the team that they believed that making the BR busier rather than less busy would not be a problem as the concurrent meetings involved different groups of staff, and no individual staff should have had more than two meetings to attend per day"*

- *"the BR designers made the BR busier because the lessons from the previous exercise indicated the need to incorporate an additional set of effects and campaign-synchronization-focused meetings at the staff level"*

- *"lessons from previous exercises recommended that making the BR less busy would enable staff to prepare for BR meetings more effectively"*

- *"during this exercise, decision-makers at the boards complained that the quality of the products they were being given to support their decision making was poor"*

- *"in a quick poll of staff attending BR meetings, eight out of ten staff indicated that they needed to attend more than two BR meetings that day and one out of ten staff reported they had missed a meeting they should have attended in the previous 24 hours due to being unable to be in two places at the same time"*

- *"many staff who were interviewed by the analysis team indicated that they felt stressed and overwhelmed by what one interviewee referred to as the 'killer' BR"*

The team decide to consider everything they know about this topic so far and map some of ideas to the elements of a finding as shown in Figure 22.
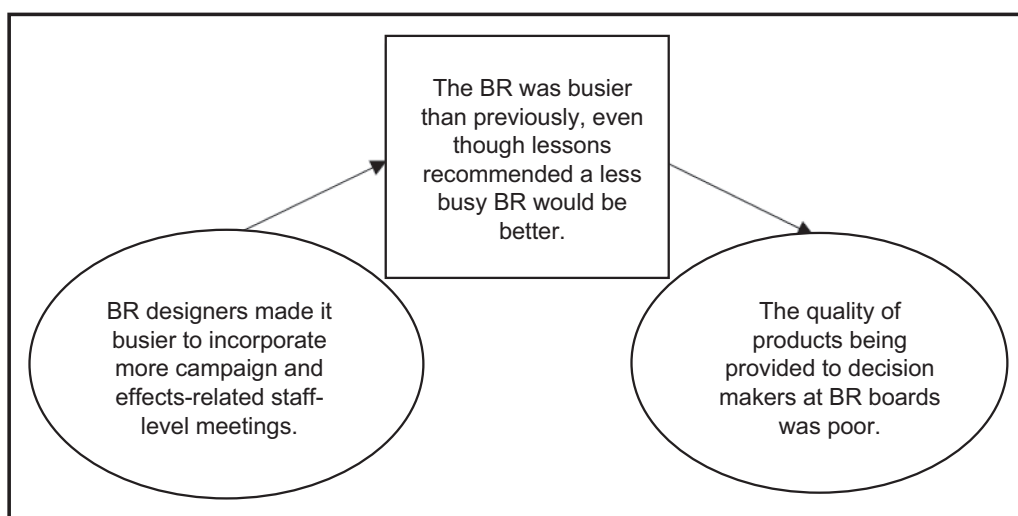

Figure 22: An Example Potential Finding in a Visual Finding Map

This potential finding looks very promising for inclusion in the final report as it has all three elements filled in and it clearly relates to the AR.

Further Investigation

The analysis team can see that many of the ideas they listed that relate to the topic of the busy BR can be used as evidence to support the potential finding they have developed. They look critically at what evidence they have to assess whether it is appropriate and sufficient.

Cause: The BR designers made the BR busier to incorporate more campaign and effects-related staff-level meetings

Assessment of evidence: This information was provided to the analysis team directly by the BR designers during their interview with them about what had been changed and why it had been changed prior to the exercise. Therefore it is both sufficient and appropriate to support the delta.

Delta: The BR was busier than previously, even though lessons recommended a less busy BR would be better.

Assessment of evidence: The analysis team have documented evidence that the BR in this exercise has more meetings per day on average and more concurrent meetings than the last exercise BR. However, the wording of the delta suggest that this BR was busier than all or at least most previous BRs, and this evidence alone is not enough to support that claim. The analysis team needs to check a few more previous BRs to find out whether they were also less busy than this BR.

The other part of the delta says that lessons recommended that a less busy BR would be more effective. Lessons 002, 021, and 025 all make recommendations like this. The analysis team need to be careful about confirmation bias here. They already noticed a number of lessons that make the kind of recommendation they need to support their point, but if there are an equal number of lessons making the opposite recommendation, that would invalidate their point. They need to go back to the lessons list to check any lessons recommending to add things to the BR, i.e. make the BR busier, and consider whether on balance, looking at all of these lessons together, they support the case for a busier or a less busy BR.

Effect: The quality of products being provided to decision-makers at BR boards was poor.

Assessment of evidence: Complaints from decision-makers is probably sufficient and appropriate to support this claim of the product quality being poor. The analysis team may just need to check whether all the decision-makers agreed the quality was poor or whether there were any who thought they were OK.

However, there is no direct evidence that it was the busyness of the BR that caused this product quality to be poor. The analysis team need to consider and rule out other potential causes of poor-quality products being delivered to the BR boards, and understand if they are a consequence of the busy BR or other possible root causes. Further investigation is needed.

After this investigation into the sufficiency of the evidence, they may update their potential finding to reflect their new understanding as seen in Figure 23.
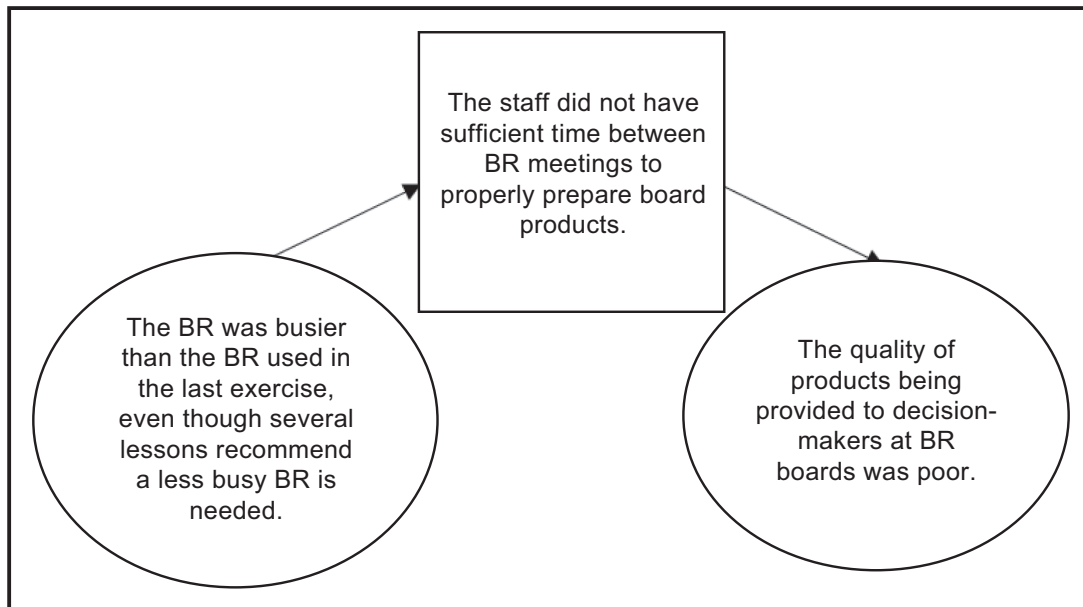
Figure 23: Reframed Example Potential Finding After Further Investigation

Complete Findings

Since the AR is about validating the new BR and identifying any ways in which it could be further improved, this potential finding in Figure 23 is definitely relevant as it stands. However, it's not very interesting by itself. So what if the products arriving at the boards are poor quality: is this putting lives at risk or risking the success of the operation? Or is it just frustrating for the decision makers? Also, the team don't feel like it really gets to the root cause of the busy BR because they questioned the cause further. They know that the design was changed intentionally to make the BR busier, but they don't know exactly what was changed about the BR that made it so, or whether it was a direct result of the design change, or whether it is just an artificiality caused by the increased tempo of the exercise.

Therefore, as written, it's going to end up with the analysis team recommending to make the BR less busy, just like those previous lessons, which have not been learned. The analysis team need to investigate further to understand why the previous lessons were ignored.

Luckily, the analysis team already have some ideas from the interview with the customer rep, where they were told:

- *"the BR designers told the team in an interview that they believed that making the BR busier rather than less busy would not be a problem as the concurrent meetings involved different groups of staff, and no individual staff should have had more than two meetings to attend per day"*

- *"the BR designers told the team in an interview that they made the BR busier because the lessons from the previous exercise indicated the need to incorporate an additional set of effects and campaign-synchronization-focused meetings at the staff level"*

Considering the first point here, along with the quick poll data and complaints from staff about the "killer" BR, the analysis team conclude that the BR designers did not accurately anticipate the pressure that the BR they had designed would have on individual staff. They make a follow-up call with the customer rep to ask about what happened here, and the customer rep tells them that they are unable to calculate the impact of the BR design on individual staff. The analysis team see a potential recommendation for a scheduling tool to be provided to the BR design staff to solve this issue and this helps them to feel confident in this being a root cause.

Considering the second point here, and the other lessons the analysis team found that recommend adding meetings to the BR, the analysis team conclude that, despite an awareness that the BR should not be too busy, there are pressures on the BR designers to add more meetings to provide the level of collaboration needed to deal with increasingly complex operations.

This further investigation results in re-framing the old potential finding into a new potential finding that looks more like what is shown in Figure 24.
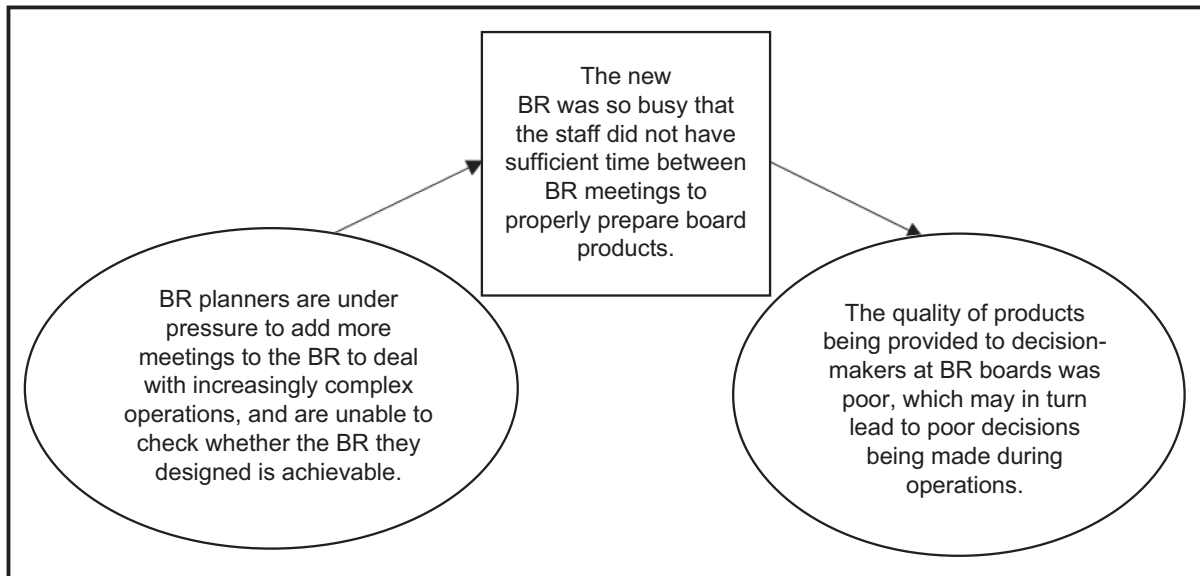

Figure 24: Reframed Example Potential Finding to be More Relevant to the AR

DRAFT THE REPORT

Report Structure and Target Audience

The analysis team are ready to start drafting, but first they want to settle on an agreed main message. They brainstorm and decide on the following message: *The new BR implemented during STJU23 solved a number of known issues reported previously in lessons and met many of the requirements of SHAPE as a strategic warfighting HQ. However, BR designers still face significant challenges in overcoming some recurring lessons and meeting the collaboration requirements of increasingly complex operations.* This message provides a clear way forward for the report structure where the analysis team can dedicate a chapter to discussing *the extent to which previous lessons and requirements were met with the new BR,* and another chapter to presenting ODCs that represent *the challenges BR designers face in overcoming recurring lessons.*

Pyramid Principle

Applying the Pyramid Principle, the analysis team come up with the following report structure seen in Figure 25 below.

The new BR implemented during STJU23 solved a number of known issues reported previously in lessons and met many of the requirements of SHAPE as a strategic warfighting HQ. However BR designers still face significant challenges in overcoming some recurring lessons and meeting the collaboration requirements of increasingly complex operations.
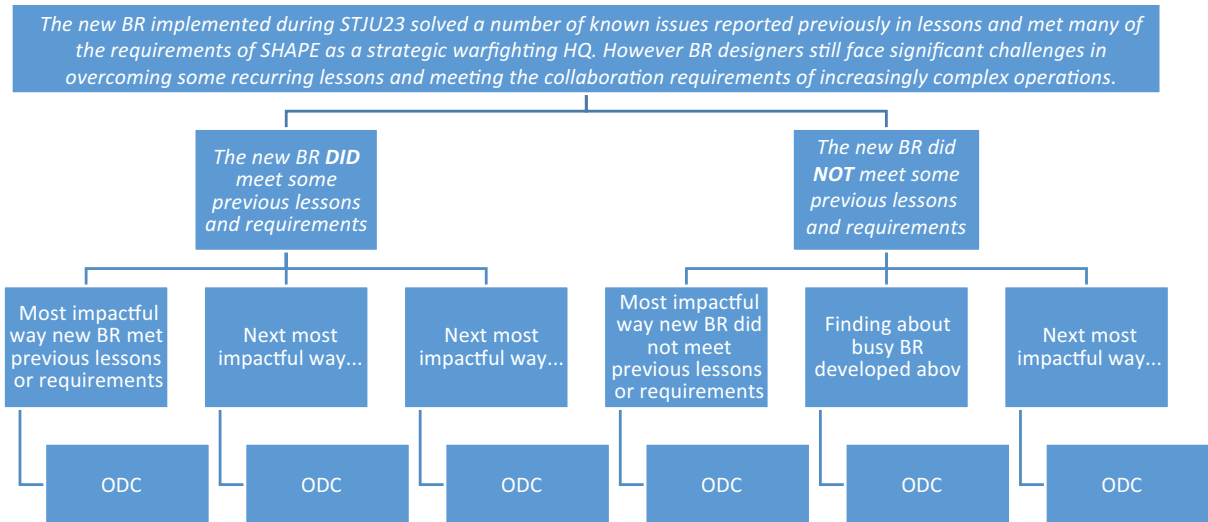
Figure 25: Example Report Structure in the Framework of the Pyramid Principle

Elements of a Finding and PEAS (and ODCR)

The analysis team now intend to apply the PEAS method to draft the finding in Figure 24 related to the busyness of the BR. Following is the first draft of their PEAS paragraph for the delta:

> *[P] The new BR was so busy that the staff did not have sufficient time between BR meetings to properly prepare. [E] Compared with the previous BR, the new BR had two extra meetings per day and an extra meeting occurring concurrently at its busiest point. Many staff commented that they had to attend more than two BR meetings a day, and some staff reported having to miss meetings as they could not be in two places at the same time. [A] This new BR was much busier than previous BRs. It was perceived as so busy that staff referred to it as the "killer" BR. Attending more than two BR meetings in a day left the staff with too little time to prepare products between meetings. [S] Running such an intense BR overwhelmed the staff and impacted the quality of the products delivered to the boards.*

If the analysis has nothing else to explain about the delta, the next PEAS paragraphs the analysis team write will be a paragraph for the effect(s) and a paragraph for the cause(s).

As the AR requires the findings to be presented in the ODC format, the analysis team will transfer the relevant text from their elements of a finding PEAS into the ODC format. For example, the P drafted above would make a good O. The E/A/S above will be the first part of the D. The PEAS paragraphs for Effect and Cause will also go entirely in the D. The team will need to draft a new C, in much the same way they would have had to draft a concluding paragraph for their finding.

Recommendations

The AR doesn't require the analysis team to come up with recommendations. Nevertheless, the analysis team will have considered whether it is possible to come up with actionable recommendations from their potential findings as part of the checks that findings are complete and relevant.

Introductions

The analysis team need to write an introduction for the chapter on ways in which the new BR did not meet the previous lessons or requirements. They start with the three components: situation, complication, and question. Their first draft of the introduction looks like this:

[Situation] *Over the years there have been many lessons identified about how to improve the BR in HQs; at the same time there is a need to adapt SHAPE's BR to its new role as a strategic warfighting HQ.* **[Complication]** *However, designing a BR is not straightforward and there will inevitably be some recurring lessons or new requirements that a new BR will not quite meet.* **[Question]** *The following initial observations from STJU23 describe several ways in which the new BR did not resolve recurring lessons or meet new requirements, including how the BR was too busy for staff to prepare quality products for the boards, etc.*

IMPROVE THE DRAFT

The analysis team have used the report structure and introduction described above as the starting point to draft the report. After the team have gone through several iterations of their draft, they send it to the senior analyst and to the editor for review. The draft report is 19 pages. When the analysis team receives the draft back after reviews, it has about 12 comments per page.

- Many of the analytical review comments identify the need for additional context and details to ensure that the elements of the findings are fully and explicitly supported. A few of the comments identify broken logic in some of the findings.

- Many of the editorial review comments identify paragraphs in which the order of ideas doesn't appear to be the most effective for conveying the messages. The comments additionally identify several terms/phrases that are not described clearly and/or could be left open to interpretation by different readers.

The analysis team first take a day to read through all the comments and identify those that they feel confident they can implement and those that they want to discuss further with the reviewers to ensure that they have understood what needs to be done to effectively improve the draft. The analysis team meets with the reviewers for a few hours to discuss these comments in detail, and they reach agreement on the way forward for the comments that were more difficult to implement.

The analysis team incorporate these comments to improve the draft over the next six days—which takes a little more time than they anticipated because a number of changes in the second half of the report necessitated changes in the first half. After this work, the draft will not go for external comment, as agreed with the customer, and instead will go through the chain of command for final comments and approval.

ANNEX F
WORKED EXAMPLE OF AN ANALYSIS WITH LOW COMPLEXITY

Following is an example of a hypothetical JALLC analysis team's work on an AR. The analysis will have a low level of complexity and take the team one month to complete.

The example takes the reader through the sets of activities as described in the JALLC Analysis Handbook and explains some of the specific things the hypothetical analysis team does during each set of activities and why. The example is not exhaustive in that it does not include every single analysis activity a team might undertake in this type of analysis, but it provides a snapshot of *some* of the practical ways in which an analysis team might approach different parts of their analysis.

DISCLAIMER: All the information in this annex related to the analysis topic, data collection, analysis, and findings was created for training purposes only and is completely hypothetical.

CLARIFY THE REQUIREMENT

The JALLC receives the following AR from a customer:

> *Provide a summary of the lessons in the NATO Lessons Learned Portal (NLLP) relating to Maritime Security.*

As the original AR lacks some detail and does not indicate the intent of the analysis, the analysis team set up a virtual meeting with the customer representative to better understand their requirement, including deliverables and deadlines. The customer representative provides additional information on the requirement and confirms that they would like two deliverables:

1. A report detailing the findings and NLLP references, due in one month.

2. Presentation slides detailing the main takeaways, to be presented virtually to the customer representative and immediate stakeholders in two months.

The analysis team then hold a meeting with the senior analyst to refine the AR. Their refined AR is as follows:

> *Provide a summary of the tactical- and operational-level lessons* in the NLLP relating to Naval Mine Countermeasures (MCM) in order to inform the Main Events List/Main Incidents List (MEL/MIL) Scripting Workshop for an upcoming exercise.*
>
> ** The customer is interested in all types of lessons in the NLLP Staffing Area[63], except Observations Submitted and Observations Rejected, and relevant documents in the NLLP Document Library.[64] However, they are only interested in items submitted in the NLLP on or after 01 January 2022.*

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[63] The NLLP Staffing Area contains products of the NATO LL Process, including those that are still progressing through the process (in the Tracking Area) and those that have ended the process (in the Archive Area). See the NATO LL Handbook for more information.

[64] The NLLP Document Library contains documents (reports, publications, handbooks, etc.) uploaded by NLLP users. It also contains certain products of the NATO LL Process that are automatically generated when the NATO LL Process ends. These products are also in the Archive Area, so they are excluded.

The analysis team share the refined AR with the customer representative via email to gain their approval.

DESIGN THE ANALYSIS

Topic Visualization

In order to develop a better understanding of the topic, the analysis team decide to produce a concept map for Naval MCM and the related elements using the DOTMLPF-I framework to help them to think about the different aspects of the topic. Other frameworks could be used depending on the topic, such as People, Process, and Technology. After a short working session, they come up with the initial (incomplete) concept map shown in Figure 26 below.

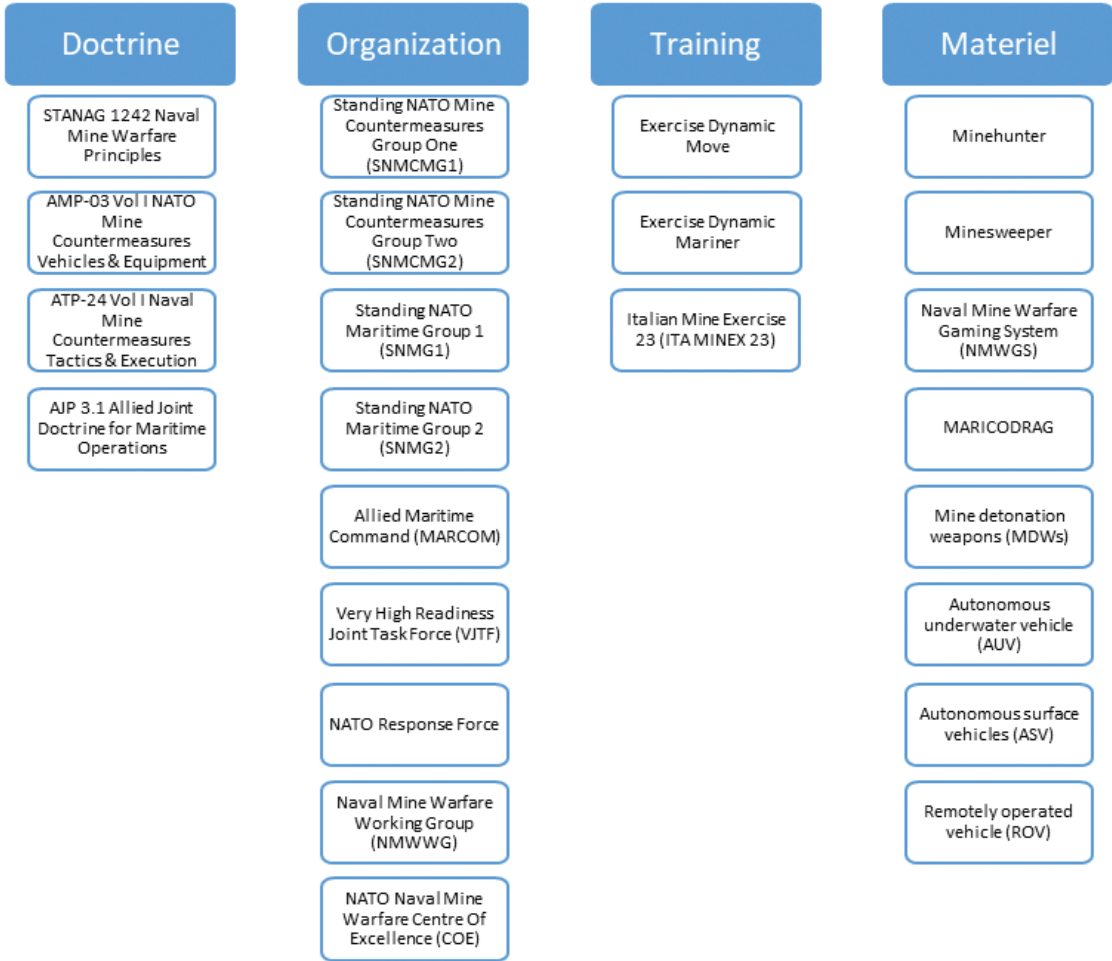| Doctrine	Organization	Training	Materiel
STANAG 1242 Naval Mine Warfare Principles	Standing NATO Mine Countermeasures Group One (SNMCMG1)	Exercise Dynamic Move	Minehunter
AMP-03 Vol I NATO Mine Countermeasures Vehicles & Equipment	Standing NATO Mine Countermeasures Group Two (SNMCMG2)	Exercise Dynamic Mariner	Minesweeper
ATP-24 Vol I Naval Mine Countermeasures Tactics & Execution	Standing NATO Maritime Group 1 (SNMG1)	Italian Mine Exercise 23 (ITA MINEX 23)	Naval Mine Warfare Gaming System (NMWGS)
AJP 3.1 Allied Joint Doctrine for Maritime Operations	Standing NATO Maritime Group 2 (SNMG2)		MARICODRAG
	Allied Maritime Command (MARCOM)		Mine detonation weapons (MDWs)
	Very High Readiness Joint Task Force (VJTF)		Autonomous underwater vehicle (AUV)
	NATO Response Force		Autonomous surface vehicles (ASV)
	Naval Mine Warfare Working Group (NMWWG)		Remotely operated vehicle (ROV)
	NATO Naval Mine Warfare Centre Of Excellence (COE)		

Figure 26: Initial Concept Map for Naval MCM

The team learns that a colleague has some experience of Naval MCM, so they arrange a meeting to further develop the concept map. Following the meeting, the team are satisfied that the resultant concept map is good starting point, although they intend to refine the map throughout the project as they identify new elements. The team plan to use the concept map to identify keywords to use in NLLP searches and to identify relevant metadata filters in the NLLP to narrow down their searches.

Methodology

The next step the team take is to describe the methodology to satisfy the AR, including how the data will be collected and processed, the chosen analysis techniques, and how the agreed deliverables will be produced. The resulting methodology is described in Table 13 below.

Activity	Description
1. Data collection	Data collection from the NLLP will involve the following steps:
	a) Using the Naval MCM concept map and Naval MCM documentation (such as those listed under *Doctrine* in the concept map), develop a list of keywords that can be used to search the NLLP for relevant lessons/documents.
	b) Using the Naval MCM concept map, identify organizations that could be the Originator, Originating Authority, and/or Tasking Authority of relevant NLLP items (can be used to filter NLLP items).
	c) Identify other NLLP filters/metadata relevant to Naval MCM.
	d) Use the keywords and filters* identified in steps a)—c), as well as the Submission Date filter (submitted on or after 01 January 2022) and Status filter (exclude *Observations Submitted* and *Observations Rejected*) to identify potentially relevant NLLP items.
	e) Download the NLLP items from the Staffing Area as Excel file(s) and relevant items from the Document Library as PDF files.
	The NLLP data will be imported into MAXQDA (qualitative analysis software) to enable the team to highlight relevant issues and categorize them. In this project, *relevant issues* are those that relate to the AR, i.e. tactical or operational issues that relate to Naval MCM and could be useful for MEL/MIL Scripting for the upcoming exercise. The team will research the exercise to better understand the topics that could be relevant to the MEL/MIL Scripting. This will likely involve looking at the Exercise Specification, in particular the exercise aims and objectives, among other documents.
	* Although the AR refers to "tactical- and operational-level lessons", the team decided not to use the *Level of Planning* NLLP filter (tactical, operational, and strategic) because it is not consistently applied to NLLP items, meaning they could miss relevant lessons. Instead, the team will assess whether each NLLP item is describing a tactical or operational issue when categorizing the NLLP items (activity 3).
2. Develop the categorization framework	A categorization framework will be developed based on a bottom-up approach. The framework will be refined over the analysis and will inform the structure of the final report. The framework will be added into MAXQDA as a code set.
3. Categorize the NLLP items	The NLLP items will be analysed and categorized using the framework from activity 2. This will be done by labelling segments of text against the categorization framework in MAXQDA.
4. Extract and analyse the categorized NLLP items	The NLLP content that was categorized in activity 3 will be extracted from MAXQDA and analysed to establish findings for the report.

(continued)

Table 13 (continued)

Activity	Description
5. Develop the report	A report outline will be developed based on the categorization framework, the outputs of activity 4, and the standard JALLC report template.
	The report will then be drafted using the outline and reviewed/ refined in coordination with the senior analyst, the editor, the Project Director, and the customer representative. The QA/ review activities will be defined in the project plan.
6. Deliver/share the report (Deliverable 1)	The report will be shared with the customer/audience (the delivery method and sharing/communication activities would be defined in an Exploitation Plan).
7. Develop the presentation slides	The team will liaise with the customer representative to understand the format, length, and focus of the presentation. The presentation slides will be developed based on the final report, and reviewed/refined in coordination with the senior analyst, the editor, the Project Director, and the customer representative.
8. Deliver the presentation (Deliverable 2)	The presentation will be presented to the customer/audience virtually. Feedback from the customer will be sought.

Schedule and Risks

The analysis team decide to develop a schedule of the aforementioned activities (Figure 27) to help them to understand when each activity needs to finish to allow them to deliver on time. The team commit to periodically updating this schedule to ensure they stay on track. The team later overlay major milestones and reviews on the schedule once the dates are agreed.
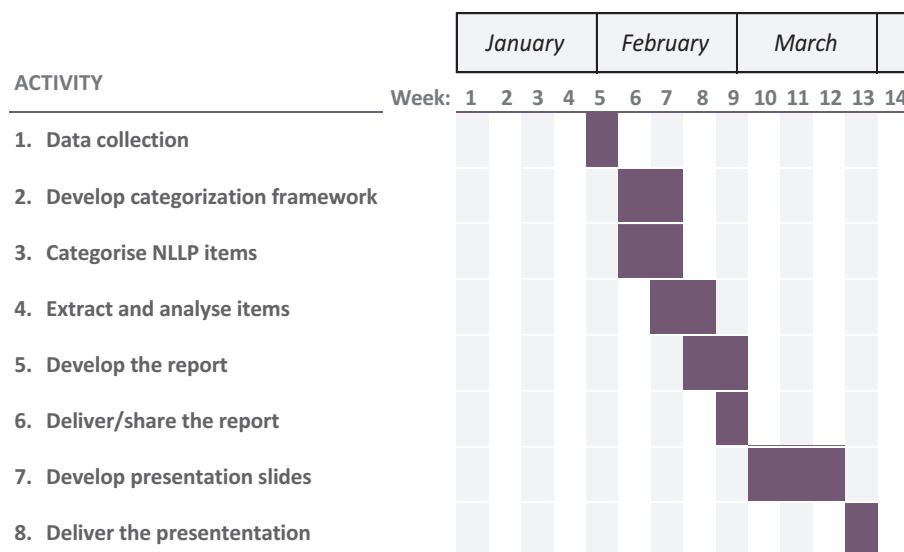

Figure 27: Example Project Schedule

The analysis team then conducts a risk assessment to identify major risks to the above schedule and potential mitigations (Table 14). The team decide to keep an eye on these risks throughout the project, especially those with high impact and/or high probability.

Table 14: Example risk register

Risk description	Probability	Impact	Mitigation
JALLC resource availability—The analysts have other commitments over the production period, which may delay the project activities.	High	High	Keep team members updated on the level of effort required for other activities. Utilize the JALLC interns and other resources. Work extended hours.
Lack of subject-matter expertise—The analysts do not have prior knowledge of Naval MCM, so there is a risk that issues are not well-understood.	Medium	Medium	Leverage other information sources to learn more about the topics. Utilize the expertise within JALLC and in the NATO Naval Mine Warfare COE.
Poorly written NLLP items—NLLP items are often poorly written and contain jargon. There is a risk that issues are not well-understood.	Medium	Medium	Contact the originators of the NLLP items to clarify content. Leverage other information sources to learn more about the topics. Utilize the expertise within JALLC where possible.

DATA COLLECTION AND ANALYSIS

Structuring Data

The analysis team download the NLLP data as described in the Methodology. Data downloaded from the NLLP Staffing Area in an Excel file is already structured: there is one row per NLLP item and there are 44 columns representing the NLLP metadata fields, such as Title, Submission Date, Originating Authority, Tasking Authority, Observation, Discussion, Conclusion, and Recommendation. The relevant documents in the NLLP Document Library are downloaded as individual PDF files.

The team import the NLLP Staffing Area data into MAXQDA, which has a function that automatically imports data from Excel. This results in one document per NLLP item in the MAXQDA Document System, as shown in Figure 28 below (named by NLLP ID). The PDF files from the NLLP Document Library are imported separately and can also be seen in Figure 28 (named by title).

Figure 28: Example Document System in MAXQDA

Analysis

The analysis team analyse each NLLP item individually in MAXQDA and, if relevant to the AR, label segments of text against one or more categories. The categories are developed iteratively based on the topics/issues described in the NLLP items. For example, the team keep finding items that mention equipment, tools, and systems, so they create categories for these topics. Once they've categorized all of the NLLP items, they look at these categories again and realize that all three could be captured under a single category of "systems" because all of the items are referring to all or part of an electronic system that is used by staff. So, in the next iteration of the analysis, the team re-labels all the relevant items under the "systems" category.

Items from the NLLP Staffing Area (products of the NATO LL Process) follow the Observation, Discussion, Conclusion, and Recommendation (ODCR) format. The team label the whole ODCR when categorizing these items, as all parts of the ODCR will be needed to fully understand the issue when reviewing the extracted segments in the next activity.

Once the team have finished categorizing the NLLP items, the segments of text that were deemed relevant are exported from MAXQDA into Excel for further analysis. The Excel file lists the segments of text under each category and includes the source of the segment (NLLP ID or document title).

DEVELOP FINDINGS

The analysis team use the Excel file exported from MAXQDA to review the segments under each category and group issues that could be presented together in the report. They decide to exclude certain segments that, on reflection, appear to be less relevant than others. They highlight segments extracted from NLLP items that have completed the NATO LL Process as Lessons Learned or Best Practices, as these are more mature items with validated remedial actions and may warrant emphasis in the report. The team check whether there is any additional information in the *Comments* field in the NLLP on how the remedial actions were implemented. If so, this information is added to the Excel file.

DRAFT THE REPORT

Report Structure

The analysis team produce a report outline based on the standard JALLC report template, the categorization scheme, and the findings. They use some of the standard sections in the JALLC report template and structure the *Findings* section based on the categorization scheme (one heading per category). They include some subsections based on the grouping of related issues under each category. They ask the senior analyst to review the report outline before progressing with the report writing.

The analysis team are now ready to draft the report. The following paragraphs describe how each section of the report is developed.

Executive Summary

Although this is at the start of the report, this is the last section to be developed. At the time of producing the report outline, the team weren't sure if an Executive Summary would be needed, as it depends on the length of the report. Given that the draft report is 12 pages long, they decide to include a one-page Executive Summary consisting of a brief introduction and methodology, followed by the key takeaways.

Distribution

The team develop the distribution list based on the Exploitation Plan developed in the planning phase. The resultant list includes the primary customers and other stakeholders who may be interested in the report.

Findings

The team decide to start with a short introduction explaining the structure of the findings. This is followed by a quantitative overview of the relevant NLLP items, so that the customer/ audience understands the maturity of the items (what stage of the NATO LL Process they are in) and the proportion of items relating to each category.

The remaining subsections within the Findings section are based on the categorization scheme. The team uses the Excel file exported from MAXQDA, which now contains their grouped segments and annotations, to draft the findings including the NLLP references.

The team recognize that they cannot include all of the information included within segments covering whole ODCRs, so they summarize the lesson by briefly describing the issue, the impact, the root cause, and the recommended remedial action. If it is a Lessons Learned or Best Practice (i.e. it has completed the NATO LL Process), the team consider adding any additional information on how the remedial action was implemented in the lesson summary.

Key Takeaways

The analysis team decide to summarize the key takeaways from the findings in relation to the AR, given that the findings section is relatively long and the AR doesn't require the analysis team to come up with conclusions and recommendations. Nevertheless, the

analysis team consider whether it is appropriate to make any recommendations based on their findings. In this case, it is not appropriate because the lessons in the NLLP do not provide a complete picture on the topics, and the team does not have a good understanding of MEL/MIL Scripting. If their analysis had focused on NLLP content from a particular entity, they may have had observations on that entity's conduct of the NATO LL Process. If so, the team could have made recommendations to improve the conduct of the NATO LL Process, although such recommendations are not directly related to the AR and would therefore be better suited to a section titled *Other Factors Observed*.

References

The team add the NLLP references in two tables:

- **References from the NLLP Staffing Area**—Contains the following columns: NLLP ID, Title, Status, Classification, Originating Authority, Tasking Authority, and Visibility.

- **References from the NLLP Document Library**—Contains the following columns: Title, Classification, Originator, and Visibility.

IMPROVE THE DRAFT

Once the analysis team is happy with the first draft of the report, they ask the senior analyst to review the report. The senior analyst reviews the report and makes comments and amendments using the Track Changes function in Word. Their comments include:

- The Executive Summary does not sufficiently describe the purpose of the report. This was likely a result of the team trying to make the Executive Summary as short as possible. The senior analyst recommends how the Executive Summary could be made more concise in other ways, allowing more space for a clear description of the purpose.

- The Methodology section of the report explains the approach in too much detail and assumes the customer/audience will have prior knowledge of MAXQDA. The senior analyst recommends simplifying the methodology and offers suggestions.

- The graph with the quantitative overview at the start of the Findings section lacks axis labels and overstates the number of relevant NLLP items identified in the NLLP Document Library. After looking at the Excel spreadsheet that was used to generate the graph, the senior analyst discovers that the chart series was referencing the wrong data.

- Some of the issues described in the Findings section are over-summarized, making it difficult for the reader to really understand the issue or what was done about it. The senior analyst advises adding some additional information in order to improve the exploitability of the report.

- Although the team included references to the NLLP items, the language used sometimes implies that the recommended remedial actions came from the analysis team as opposed to coming from the originators of the items. The senior analyst advises how to rephrase these findings to avoid misunderstanding.

The senior analyst returns the report to the team and follows up with a short meeting to explain their comments. The team revise the report and send the new version to the senior analyst. After another iteration of review and revisions with the senior analyst, the report is further refined through the Project Director, editor, and customer reviews.

DISTRIBUTION/SHARING

The analysis team distribute the report to the customer/audience and other stakeholders in accordance with the Exploitation Plan. This plan also states that the team are to upload the report to the NLLP, generate a factsheet for the JALLC website, and deliver a lunchtime

session at the JALLC to share the findings with their colleagues. The team plan to do this after they have delivered the presentation to the customer/audience (Deliverable 2).

The team develop an outline for their presentation based on the report and the information provided by the customer (presentation time, audience, etc.). The team discuss the outline with the senior analyst and the Project Director to ensure they are heading in the right direction. The resultant slide pack contains an introduction slide describing the background and the AR, a methodology slide, and three slides covering the key takeaways. Following internal reviews, the analysis team present the slides to the customer/audience over VTC. Finally, feedback is sought from the customer representative, which is captured in a central database within the JALLC. The team contact the customer representative again a couple of months later to understand the impact of the deliverables and if there is potential follow-on work.