JET | JIPS Essential Toolkit

TECHNICAL BRIEF ON

JOINT STRUCTURED ANALYSIS TECHNIQUES (JSAT)

JIPS informing solutions to internal displacement

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JIPS is an interagency service set up in 2009 and dedicated to bringing governments, displaced persons, host communities, and national and international actors together to jointly produce data and analysis that can inform durable solutions to internal displacement. All our efforts are driven by our vision of a world in which **internally displaced persons can progress towards durable solutions and live in dignity while doing so.**

A globally recognised neutral broker, JIPS specifically provides supporttechnical and collaboration support to field partners, namely on profiling, and strategic advice on data; consolidates its expertise into quality guidance and hands-on tools; and advances global practice and discourse towards sound global action and standards. Field-focused and committed to enhancing local ownership and capacity, JIPS brings specific expertise on protracted displacement, durable solutions, urban displacement and IDP statistics.

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01

INTRODUCTION

In the analysis phase of a collaborative data process, such as profiling or joint needs assessments, it is important to ensure that all voices are heard. This involves making space to discuss and understand consent as well as dissent around the reading of data, as well as relevant hypotheses and information that can support or enhance the analysis. **Joint Structured Analysis Techniques (JSATs) provide a structure to explore and challenge analytical arguments and mindsets collectively, stimulate creativity, and manage uncertainty.[1] They provide mental tools for externalising internal thoughts in a transparent and systematic way** for closer examination[2], shifting the focus from the what to the how one thinks to improve the quality of analysis[3] with increased objectivity and reduced bias.

"Joint Structured Analysis Techniques (JSATs) provide a structure to explore and challenge analytical arguments and mindsets collectively, stimulate creativity, and manage uncertainty. They provide mental tools for externalising internal thoughts in a transparent and systematic way."

While the value of joint analysis is recognised in the humanitarian field, there is a need for further exploration of the diverse ways to effectively facilitate it. This technical brief serves as a starting point: it offers a toolbox of facilitation techniques and discusses how they can be used to enable and elevate joint analysis processes. It also utilises lessons learned from other fields, namely the intelligence community, as a guide. It builds on an extensive literature review that was analysed applying an analytical framework specifically developed for this purpose and using the Data Entry and Exploration Platform (DEEP) to tag text. The tagged content was then synthesised, analysed and related to the joint analysis steps in the profiling process.

"This technical brief serves as a starting point: it offers a tool box of facilitation techniques and discusses how they can be used to enable and elevate joint analysis processes. It also utilises lessons learned from other fields, namely the intelligence community, as a guide."

1 US Government, 2009.
2 Pherson, 2013.
3 Peterson, 2008.

This technical brief is aimed at humanitarian and development practitioners engaged in coordinating and facilitating collaborative data processes, notably profiling coordinators, information management officers, and analysts. Being focused on facilitation, it is intended to go hand-in-hand with the JIPS Joint Analysis Guide, which discusses how joint analysis can be structured and planned as part of a displacement profiling process. The utility of certain techniques, however, may extend beyond joint analysis to other aspects of profiling, joint needs assessments or other collaborative data processes.

The technical brief is structured as follows:

Chapter 2: Defines what Joint Structured Analysis Techniques are and briefly discusses their history, key benefits and challenges, and good practices based on our literature review.

Chapter 3: Introduces commonly used JSAT categories and associated techniques.

Chapter 4: Provides a **brief guide to selecting JSAT techniques in view of a joint analysis process**, based on the task at hand and criteria.

Chapter 5: Describes each of the techniques that were previously introduced.

We hope that this technical brief will serve as a useful reference for all partners interested in the facilitation of collaborative analytical processes.

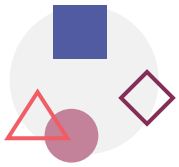
02

WHAT ARE JOINT STRUCTURED ANALYSIS TECHNIQUES?

What exactly are Joint Structured Analysis Techniques? Let's look at the building blocks of the concept:

Analysis

Varying definitions and levels of analysis exist. However, one overarching theme is that analysis consists of a process of breaking down an issue into its key parts for further examination.[4]



Structured Analysis

As different types of issues or questions exist, there are many ways to structure analysis. Determining the best structure for an issue to be approached is one of the first steps in its analysis.[5]

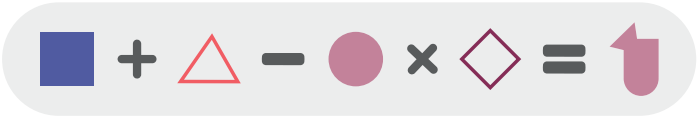
Structured Analysis Techniques (SAT)

Techniques provide a step-by-step process to handle the different parts of an analytical issue.[6] **Just as we use physical tools like utensils to eat, techniques provide a "box of (mental) tools" to help mitigate the adverse impact on analysis of one's cognitive limitations and pitfalls.**[7] SATs allow us to externalise internal thoughts in a transparent and systematic way so that the thought process may be examined, compared, and questioned by others.[8] They are thus intended to guide analytic thinking, and consequently increase objectivity and decrease analytic error.[9]

4 Krizan, 1999; Eaton et al., 2007; ACAPS, 2016.
5 Heuer, 1999.
6 Heuer & Pherson, 2011.
7 Heuer, 1999.
8 Pherson, 2013.
9 ACAPS, 2016.

Joint Structured Analysis Techniques (JSAT)

As SATs involve externalising one's internal thoughts to share, discuss and critique, this implies a collaborative effort to view an issue from different perspectives.[10] Therefore, the use of SATs often occurs in a joint process. **Techniques provide structure not only to the individual thought and analysis process – which may differ significantly from one person to the next – but also to the interaction of those involved.**[11] This transparency of sharing thoughts allows for effective communication at the working level, which is a necessity for collaboration.[12]



In fact, **the main benefits of SATs come when performed both early in the analytic process and jointly.** In this way, participants with different types and levels of expertise learn of alternative ideas, evidence or mental models (assumptions and expectations based on past experience).[13] JSAT can thus help to avoid cognitive limitations, pitfalls, and groupthink as the structure guides the group through the analytical process.[14]

History

The concept of **Structured Analysis Techniques** dates back to the 1980s in the United States, when an intelligence analyst started to write and teach about "alternative analysis". In 2004, when updating the CIA training program, this term no longer appeared appropriate to the intelligence community, and in 2005 the name "structured analysis techniques" was approved.[15] Following serious intelligence failures in the early 2000s (i.e. World Trade Center attacks and Iraqi weapons of mass destruction), the U.S. Intelligence Community turned to SATs to overcome cognitive limitations, analytic pitfalls and mindset problems.[16] As of 2011, the intelligence community had at least 160 SATs at hand, and by 2017 SATs were a main feature of U.S. intelligence analysis training programs.[17] SATs have not only been taught and widely used in the intelligence community, but also in academia, the private industry and business consulting.[18]

10 Duvenage, 2010; Pherson & Pherson, 2013; ACAPS, 2016.
11 Johnston, 2000; Heuer & Pherson, 2011.
12 Heuer & Pherson, 2011.
13 US Government, 2009.
14 Heuer & Pherson, 2011.
15 Grunt, 2017.
16 Ibid; PSU, 2014.
17 Moore, 2011; Chang et al. 2017.
18 Pherson & Pherson, 2013.

Collaboration

Structured techniques have been referred to as "**enablers of collaboration**". When facing complex issues, the coordinated interaction of several minds using a structured analysis is typically more effective than an individual's thinking.[19] Intelligence analysis, for example, has improved when bringing together analysts with complementary expertise and different perspectives.[20] This generally allows for divergent thinking to occur, opening minds to creative alternatives and thus ensuring substantive analysis and problem solving.[21]

Small groups of eight or fewer individuals, as is typically the case for JSAT sessions, are thought to be particularly conducive to improved analysis, especially when those involved are encouraged to share different opinions, ideas and perspectives. When groups exceed this small size, it has been found challenging to maintain trust between participants. The extent of sharing in a collaborative context may also be impacted by the sensitivity of information.

In today's increasingly virtual world, some posit that collaboration may be difficult when those involved have not met in person. One part of this is in not being able to read body language. Others argue, however, that this is less important with younger participants who are more accustomed to virtual social networking.[22]

Benefits

The benefits of using JSATs are manifold. Unlike traditional analysis, which often relies on intuition, JSATs employ **a systematic method that mitigates cognitive biases by rendering the thought process more rigorous, consistent, transparent and ultimately objective.**[23] This has been referred to as an "accountability mechanism", with the use of JSATs resulting in a reduced frequency and severity of error.[24] Shifting the focus from the *what* to the *how* one thinks, has been found to improve the quality of analysis while reducing the overconfidence that often arises with human intuition.[25] This in turn strengthens the credibility of analysis and helps to counter potential pressure to politicise it.[26]

"Shifting the focus from the *what* to the *how* one thinks, has been found to improve the quality of analysis while reducing the overconfidence that often arises with human intuition."

19 Heuer & Pherson, 2011.
20 National Research Council, 2011.
21 Duvenage, 2010.
22 Pherson & Pherson, 2013; Heuer & Pherson 2011.
23 Abdalla, 2010; Chang et al. 2017.
24 Pherson, 2013; Chang et al. 2017.
25 Peterson, 2008.
26 Duvenage, 2010; Pherson & Pherson, 2013.

The process of using JSATs has also been found to depersonalise arguments when there are differences of opinion. Communication is improved as it is guided through a step-by-step process.[27] This process **typically saves time when used early on in projects with groups to help build consensus, as it makes reasoning transparent and reduces the possibility of misunderstanding later.**[28] It also helps those involved to better understand complex problems and cope with information overload.[29]

Overall, JSATs are intended to help identify and overcome mental mindsets (assumptions and expectations based on past experience), challenge key assumptions, stimulate creativity, generate alternatives, manage uncertainties, and reduce the chance of surprise.[30] In this sense, JSATs provide the toolbox to structure and facilitate a joint analysis process, such as in the context of a profiling exercise or a joint needs assessment.[31]

Challenges

While JSATs have many benefits, **their use does not guarantee the "right answer" or accurate analysis.**[32] Structured thinking is a considerable contrast to the habitual way the human mind works – using simplified mental models of reality to solve problems mainly intuitively by trial and error.[33] While mental models are crucial for individuals to process information, they can result in important or missing information to be overlooked, rejected or forgotten.[34]

"To be used effectively, JSATs depend on the analytic skills and expertise of those using them. Analytical thinking is a skill that, like driving, requires learning by doing, involving substantial effort and hard work."

Breaking this habit to form a new way of thinking has been cited as a significant challenge[35], notably for those with more expertise and past success in using their mental models.[36] Working mental models must be challenged, refined, and challenged again when involved in interpreting complex and ambiguous issues.[37]

27 Heuer & Pherson, 2011; Smart, 2011.
28 Pherson, 2013.
29 Chang et al., 2017.
30 US Government, 2009; Directorate for Analysis, 2008; Pherson, 2005.
31 JIPS, 2021.
32 Abdalla, 2010.
33 Heuer, 1999; Folker, 2000.
34 US Government, 2009.
35 Folker, 2000.
36 US Government, 2009.
37 Heuer, 1999.

To be used effectively, JSATs depend on the analysis skills and expertise of those using them.[38] **Analytical thinking is a skill that, like driving, requires learning by doing, involving substantial effort and hard work.**[39] Hence, while JSATs can save time later on, some have viewed them as too time consuming to master and implement, particularly for projects with short deadlines.[40]

Good Practices

Further research is needed for a comprehensive understanding of best practices related to JSATs.[41] Nevertheless, some key takeaways and good practices can be identified from our literature review:

1. **There is no one-size-fits all approach to JSATs.** Many techniques can be used in more than one way, and each should be adapted to the issue at hand.[42] Establishing a clear goal is a prerequisite to deciding which technique(s) to use.[43]

2. As JSATs are typically used in complex or ambiguous situations, **multiple techniques are often needed** to address each "piece [of the] puzzle".[44] Structured analysis has been referred to as an art when it comes to knowing how to put these pieces together.[45] The appropriate use of several different techniques is intended to increase accuracy as it distances intuitive reasoning and its accompanying pitfalls.[46]

3. As with driving a car or riding a bike, **JSATs are best learned by doing.**[47] The regular use of JSATs is needed to gain confidence in their application, and encouraging this is important.[48] Ideally those using JSATs would be trained in all different tools and techniques to choose and apply the most appropriate ones.[49]

4. Lastly, **mental models or cognitive biases must be identified and addressed early on.** Objective analysis requires making basic assumptions and reasoning explicit, followed by having these challenged by others and re-examined by the individual.[50] Periodically, it is also important to recheck assumptions as situations change with time and assumptions from the past may no longer be relevant.[51]

38 Artner et al., 2016.
39 Heuer, 1999.
40 Artner et al., 2016.
41 Ibid.
42 Heuer & Pherson, 2011.
43 Stigall, 2012.
44 Heuer & Pherson, 2011.
45 Ibid.
46 Peterson, 2008.
47 Heuer, 1999.
48 Abdalla, 2010.
49 Duvenage, 2010.
50 Heuer, 1999.
51 Stigall, 2012.

03

CATEGORIES OF TECHNIQUES

Structured analysis techniques have been categorised in different ways over time. For instance, techniques have been organised based on their intended use, or how they help to overcome cognitive limitations or pitfalls. Below are eight categories, or families, of techniques developed by intelligence and SAT experts Richards Heuer and Randolph Pherson, **organised by purpose and main focus**, and commonly referenced in the literature[52]:

1. **Decomposition and Visualisation:** Analysis is complex, and typically only seven things (plus or minus two) can be kept in working memory at once. **Decomposition breaks an issue down** into its component parts, allowing each to be examined separately. **Visualisation organises** all parts on paper or digitally to see how they interrelate. All SATs use the techniques from this category to some extent to address the limitations of the human mind.

2. **Idea Generation:** As the name suggests, these are techniques that involve **creative thinking to allow for the development of new ideas or combine old ideas in new ways.** This allows for imaginative thinking to occur whereby new insights and different perspectives are developed. As with most structured techniques, these are particularly effective when used in a collaborative group process.

3. **Scenarios and Indicators:** As people have a tendency to see what they expect, the unanticipated is often overlooked. **Techniques in this category prepare users to recognise change.** When working with uncertainty, it is important to identify drivers that could change a situation and different potential scenarios or futures. Indicators subsequently allow for monitoring of signs that a particular future is more or less likely to occur.

4. **Hypothesis Generation and Testing:** Hypothesising about given information often occurs subconsciously, and validation of hypotheses intuitively. These techniques help users to **explore a wider range of hypotheses, and thus consider different possibilities and explanations.** They help to prevent another phenomenon known as "satisficing" or accepting the first good enough answer. Techniques allow evidence both for and against all potential hypotheses, explanations, or outcomes to be identified, considered and weighed. Focus is often on refuting rather than confirming hypotheses so that the remaining hypothesis is robust enough for subsequent examination.

5. **Assessment of Cause and Effect:** Making assumptions about the cause and effect of events or indicators can be a pitfall in analysis. In the context of lacking or ambiguous information or disinformation, untested assumptions and conclusions are risky. These techniques help to both **refine and strengthen how current and future situations are interpreted.**

52 Heuer & Pherson, 2011; Heuer, 2009; PSU, 2014; ACAPS, 2016; Duvenage, 2010; Bearstone Global, 2020; Pherson & Pherson, 2013; Grunt, 2017.

6. **Challenge Analysis:** Mindsets or mental models are our assumptions and expectations based on experience. These techniques **challenge one's thinking to allow for an issue or question to be viewed from different perspectives.** This reframing helps to identify and assess new ideas, arguments, perspectives and evidence. The techniques can also be useful for examining old ideas from an original point of view.

7. **Conflict Management:** When significant differences of opinion arise, these techniques provide an **effective means to resolve interpersonal analytic disagreements.** Techniques exist for situations in which those opposed are still open to a mutual exchange, and for those in which an objective third party is needed.

8. **Decision Support:** These techniques are available to support and facilitate planning and decision-making processes. **They allow the user to view an issue from the decision-maker's perspective.** The techniques help to describe what factors are anticipated to shape the decision, identify potential outcomes, and then pin down signs or indicators to keep in mind as potential early warning of the direction events may take.

A list of these categories and their associated techniques[53] are provided in table 1 in Chapter 4. It is not exhaustive, but contains those techniques that may be most useful or relevant for joint analysis processes in profiling or joint needs assessments. A description of each technique is provided in Chapter 5.

53 Mainly from Heuer & Pherson, 2011.

04

SELECTING TECHNIQUES FOR A JOINT ANALYSIS PROCESS

The selection of the most appropriate technique(s) will determine the accuracy and value of resulting products or processes. The use of multiple techniques is typically needed for different parts of a single project. For instance, different techniques can be used for coming up with ideas, evaluating them, identifying assumptions, making conclusions, and challenging previous conclusions.[54] Some techniques can even be used more than once in the process to continue to encourage open mindsets.[55]

How to know which technique to choose when it comes to a joint analysis process? How to decide with JSAT to apply and when in a collaborative analysis undertaking? Experts from the intelligence community, like Heuer and Pherson[56], have provided guidance to help users choose the most appropriate technique(s) based on the task at hand. Building on this work, we have examined how this relates to the different steps in the joint analysis process as outlined in JIPS' Joint Analysis Guide (also see Figure 2, the joint analysis process).

Table 1 at pages 24 and 25 outlines nine tasks along with their associated category, techniques and the three key steps of a joint analysis process. Tasks are diverse and range from defining a project to ultimately providing decision support.[57] Several of the techniques, such as those related to brainstorming and key assumptions, are versatile and applicable throughout or at different points along the process.

As discussed earlier, **SATs are generally most effective when used in a small group or team rather than by an individual. The classification of JSATs along the analysis process emphasises the importance of this**, particularly for those that can be used for explanatory, interpretive, anticipatory, and prescriptive types of analysis. It also provides an important conceptual framework for contextualising and operationalising JSATs in the joint analysis phase of the profiling process.

Five core techniques applicable across the analysis process

Heuer and Pherson also **identified 'core techniques' that all intelligence analysts starting out should be trained** in due to their frequent and broad applicability across the analysis process. These include **Structured Brainstorming, Cross-Impact Matrix, Indicators, Analysis of Competing Hypotheses, Key Assumptions Check, and Structured Self-Critique.**[58]

The **Key Assumptions Check** in particular is recommended for all major projects as assumptions play an important role in analysis, especially for situations with many uncertainties[59]. Figure 1 explains when each of the core techniques can be adopted at the initial stage of the analysis process.

54 Heuer & Pherson, 2011.
55 University of Foreign Military and Cultural Studies, 2012.
56 Heuer & Pherson, 2011.
57 Ibid; US Government, 2009; International Association for Intelligence Education, 2010.
58 Heuer & Pherson, 2011.
59 Heuer, 2009.

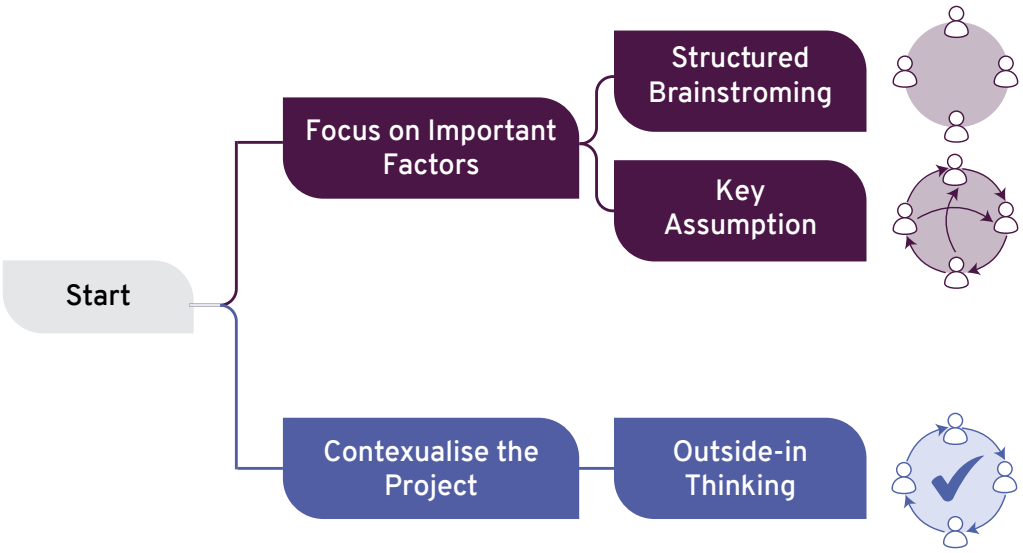


Figure 1. *Using core joint structured analysis techniques at the start of a collaborative analytical process*[60]

At the start of a collaborative analytical process, the use of **Structured Brainstorming** and **Key Assumptions Check** techniques are encouraged to avoid overlooking important factors. To contextualise the project in broader terms outside of one's expertise, **Outside-In Thinking** is recommended.

Throughout the analysis, techniques like **Indicators** or **Analysis of Competing Hypotheses** can be helpful, particularly with the acquisition and analysis of new information. The re-use of **Analysis of Competing Hypotheses**, for instance, can prevent premature closure and underline the most distinctive evidence for an analytic argument. Along with the development of hypotheses, applying a challenge technique such as **Structured Self-Critique** is important to view the analysis developed through a more critical lens.

In finalising the analysis, a **Key Assumptions Check** is useful to double check its underlying logic. **Structured Brainstorming** can also be revisited to verify that no plausible hypothesis has been overlooked. If a solid consensus has formed around an analysis and not been questioned for a while in a serious manner, the **Devil's Advocacy** technique can provide this service. In a final review, ensuring identification of a list of key indicators for future developments can provide a crucial guide to track these and monitor if conclusions reached are realised or need adjustment.

60 US Government, 2009.

Skills, training and time required

It is important to note that not all techniques are equally demanding in terms of the **skill level, amount of training and time needed to apply them effectively.** These variables are in fact closely linked and it is critical to consider all three of them when choosing a SAT.[61] For instance, a technique that is simpler will require less skill, training and time to employ.

Annex I provides an overview of the structured analysis techniques in light of the skills, training and time they each require. Each variable is classified as low, moderate, high, or a combination thereof. SATs that are classified as 'high' typically require a substantial investment in time, training, analytical resources and funds. Experienced facilitators and conferencing facilities may also be needed depending on the nature of the SAT.[62] For each technique, additional information is provided regarding data prerequisites, the most suitable number of participants, the process and the methods.

For instance, those in the categories of **Decomposition and Visualisation**, **Idea Generation**, and Decision Support generally involve a low to moderate amount of skill, training and time. **Hypothesis Generation and Testing**, **Challenge Analysis**, and **Conflict Management** on the other hand, require more of a moderate to high commitment of resources. The remaining categories of techniques fall somewhere in between.

As mentioned earlier, these classifications are dependent on the complexity of the issue at hand as well. It should also be noted that while some SATs require more resources, **they may save time in the long run** (e.g. **Analysis of Competing Hypotheses**) as they help to avoid analytical pitfalls later on in the process.[63] In addition, the indicated time and training required will decrease as facilitators gain experience and expertise in effectively employing the different SATs in the humanitarian and development field.[64] To accelerate the learning process, the CIA for instance has used "tradecraft cells" or small groups of analysts whose job was to help less experienced analysts choose the most appropriate techniques, guide the use of them, and facilitate group processes.[65]

61 Heuer & Pherson, 2011; Folker, 2000.
62 US Government, 2009.
63 Pherson, 2013.
64 Heuer & Pherson, 2011.
65 Heuer, 2009.

Varying levels or phases of analysis exist and are succinctly illustrated by the Assessment Capacities Project (ACAPS)' Analysis Spectrum.[66] Analysis along this spectrum ranges from exploratory (what exists on a topic of interest), to descriptive, explanatory, interpretive, anticipatory and prescriptive. The spectrum starts with more individual analysis that is data-driven using a reactive approach, and ends with more shared (or joint) analysis that is concept-driven and proactive. It also moves from hindsight to insight, to foresight-focused types of analysis.[67]

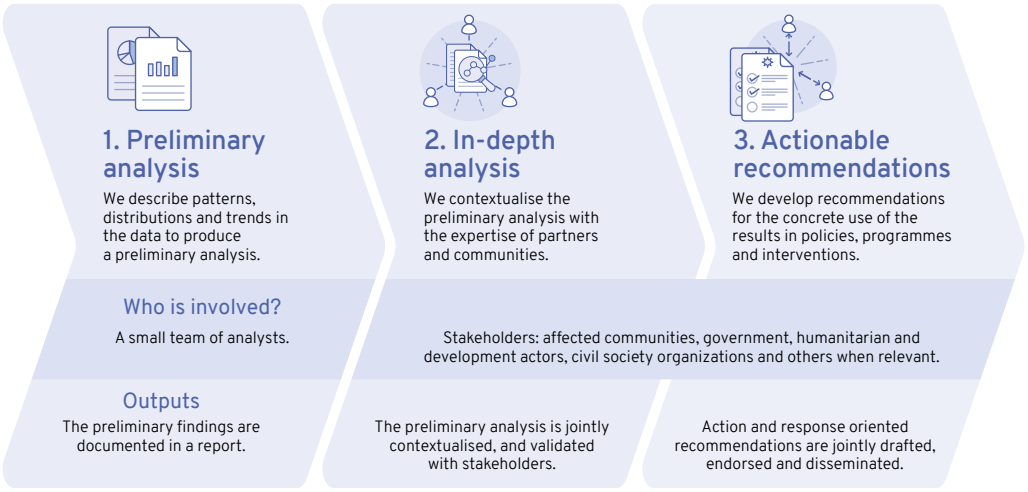


Figure 2. *The three key steps of the joint analysis process*

The JIPS Joint Analysis Guide defines Joint Analysis as a collaborative process during which partners with complementary areas of expertise and responsibilities collectively make sense of information from a given context, following an agreed-upon methodology. The purpose of this approach is to transform information into actionable findings to support decision-making.

The Guide describes three key steps in a joint analysis process:

1. **Preliminary analysis** (→ Descriptive Analysis): What do we see in the data?
2. **In-depth analysis** (→ Explanatory & Interpretive Analysis): Why do we see what we see?
3. **Recommendations** (→ Anticipatory & Prescriptive Analysis): So, what now?

66 ACAPS, 2020.

67 ACAPS, 2020; Krizan, 1999.

Relationships between techniques

Other considerations include the relationships between techniques. In many cases, techniques complement or use one another, thus "mutually reinforcing" each other. For instance, **Mind Maps** and **Concept Maps** can be used to visualise the results from many other techniques, particularly the different types of Brainstorming and **Cross-Impact Analysis** techniques. While not exhaustive, Annex II indicates some of the interrelations between techniques. An explanation can be found in the technique description in Chapter 5. The linkages between JSAT categories and techniques have also been mapped more extensively by experts.[68]

There are numerous ways to implement techniques, and some experts avoid using one technique twice in the same way. Experience in using techniques allows for them to be adjusted well to the issue at hand.[69]

68 Heuer & Pherson, 2011; Gay et al., 2012.

69 Heuer & Pherson, 2011.

TASKS

1: Define the Project
2: Get Started
3: Examine & make sense of the data
4: Explain Recent Events
5: Foresee the Future
6: Challenge your mindset
7: See from another perspective
8: Manage Conflicting Mindsets
9: Support Decision on Different Options

PRELIMINARY ANALYSIS

IN-DEPTH ANALYSIS

RECOMMENDATIONS

CATEGORY	TECHNIQUE	1	2	3	4	5	6	7	8	9
Decomposition & visualisation	Getting Started Checklist	●	●							
	Customer Checklist	●	●							
	Issue Redefinition	●	●							
	Chronologies & Timelines		●	●						
	Sorting		●	●						
	Ranking, Scoring, Prioritising		●							
	Matrices		●							
	Network Analysis		●	●						
	Mind Maps & Concept Maps		●	●						
Idea Generation	Structured Brainstorming	●	●							
	Virtual Brainstorming	●	●							
	Nominal Group Technique	●	●							
	Starbursting	●	●							
	Cross-Impact Matrix	●	●	●						
Scenarios & Indicators	Simple Scenarios					●				
	Alternative Futures Analysis					●				
	Multiple Scenarios Generation					●				
	Indicators					●				
	Indicators Validator					●				

TASKS

1: Define the Project
2: Get Started
3: Examine & make sense of the data
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IN-DEPTH ANALYSIS

RECOMMENDATIONS

CATEGORY	TECHNIQUE	1	2	3	4	5	6	7	8	9
Hypothesis Generation & Testing	Simple Hypotheses				●					
	Multiple Hypotheses Generator				●					
	Diagnostic Reasoning				●					
	Analysis of Competing Hypotheses				●	●				
	Argument Mapping				●					
	Six Thinking Hats				●					
Assessment of Cause & Effect	Key Assumptions Check					●		●	●	●
	Role Playing							●		
	Outside-In Thinking									
	Fishbone Analysis									
Challenge Analysis	Structured Self-Critique					●	●			
	Devil's Advocacy					●	●			
	Delphi Method					●	●	●		
Conflict Management	Adversarial Collaboration							●	●	●
Decision Support	Force Field Analysis									●
	Pros-Cons-Faults-and-Fixes									●
	SWOT Analysis									●

Table 1. *Nine tasks associated with their category, techniques, tasks and the three key steps of the joint analysis process.*

05

DESCRIPTION OF TECHNIQUES

Decomposition & Visualisation

Getting Started Checklist

As the name suggests, this technique is useful when starting a project. It provides an opportunity to reflect on important aspects of the project, allowing for time to be saved in the long run and the quality of the final output to be enhanced. Heuer and Pherson provide a suggested list of starter questions to begin the process. Examples include:

1. "What prompted the need for analysis?"
2. "What is the key question to be answered?"
3. "Why is this issue important, and how can analysis make a meaningful contribution?".[70]

Customer Checklist

The **Customer Checklist** is used to shape an output according to the end user's or "customer's" needs to ensure its relevance and value. If there are multiple end users, the requirements of the main audience should be addressed. The needs and preferences of the end user/main audience should be taken into account throughout the process. Heuer and Pherson propose a list of user or customer-focused questions to include in the checklist. For instance:

1. "Who is the key person for whom the product is being developed?"
2. "Will this product answer the question the customer asked or the question the customer should be asking?"
3. "What is the most important message to give this customer?".[71]

Issue Redefinition

Issue Redefinition is a technique for exploring the various ways in which an issue can be defined. An issue statement is typically how many analytic projects begin. This technique is thus effective at the start of a project as issue definition will substantially influence its subsequent direction. It is also useful to employ later when a new hypothesis or important new evidence appears. Alternatively, if the analysis feels stuck or has veered off track from the original issue definition, **Issue Redefinition** can help as well. Intelligence experts identify several strategies for issue redefinition including:

- rephrasing
- asking why
- turning (the issue) 180 degrees
- broadening
- narrowing
- redirecting the focus

As with most techniques, **Issue Redefinition** is most effective when employed in a collaborative manner, in this case to develop and track the definition process with a sharable modality such as a wiki format.

It is often used with the Getting Started Checklist and the Customer Checklist.[72]

70 Ibid.

71 Ibid.

72 Ibid; University of Foreign Military and Cultural Studies, 2012.

Decomposition & Visualisation

Chronologies & Timelines

Chronologies and timelines allow for data on significant events or actions to be organised and visualised in chronological order. This is useful for identifying patterns, correlations, developing issues, anomalies, information gaps, and/or key events. Chronologies and timelines are typically used at the start of a project to contextualise an issue.

The technique is simple whereby an Excel spreadsheet or a Word document can be used to keep track of and organise new information by date or order in which it occurred. Heuer and Pherson provide a series of questions and suggestions to guide the subsequent analysis of the chronology or timeline. For example: "Look for relationships and patterns in the data connecting persons, places, organizations, and other activities. Identify gaps or unexplained time periods, and consider the implications of the absence of evidence " [73].

Sorting

This is a simple technique to organise data in a way that may provide new understanding. It is particularly suitable when information needs to be disaggregated into categories or subcategories and compared. Similarities, differences, trends or abnormalities that may otherwise be overlooked are thus examined. This technique is especially useful during initial data collection and hypothesis creation. It can be done in an Excel spreadsheet or database, following a series of steps. These include reviewing the data to discern categories, grouping associated items into the categories, sorting and analysing the data within them, and lastly a final review to see if other ways of sorting exist. Note, it is important that sorted data be standardised.[74]

Ranking, Scoring, Prioritising

Ranking, Scoring, and Prioritising consists of methods that can be applied to lists to identify factors like value, importance, priority, probability, and more. **Ranking** is useful when a list contains too many elements to decipher at a glance, or to aggregate opinions on ranking from a group. It is typically used after an **Idea Generation** activity such as **Structured Brainstorming, Virtual Brainstorming** or the **Nominal Group Technique**.

Ranked Voting is the most simple and fastest ranking method and typically suffices. Participants in a group first individually rank each item according to their preference or opinion of its importance. The votes are then tallied, with the lowest ranking item designated number one. **Ranked Voting** is accurate for the top two or three ranked items, but less so for lower-ranked ones. It indicates how items are ranked in relation to one another (higher or lower), but not to what extent.

Paired Comparison is another way of ranking, whereby all items are compared with each other and assigned a score indicating the relative importance, preferability or probability of one versus another. It thus goes a step beyond simple ranking to indicate the "degree of importance or preference for each item". **Weighted Ranking** provides further information by applying a set of criteria to rank items and assigning weights for each item in a list.[75]

It can be used after Brainstorming SATs.

73 Heuer & Pherson, 2011; Duvenage, 2010.

74 Heuer & Pherson, 2011.

75 Ibid.

Decomposition & Visualisation

Matrices

Matrices are analytic tools used to sort and organise data for analysis and comparison. They allow for complex data to be broken down into its component parts and to be visualised. As such, each element can be examined separately within the general context of the issue at hand. Matrices are also useful for creating analytic frameworks to understand an issue, providing more structure to explain a situation.

A matrix is a flexible and easy tool composed of a simple grid with cells. All matrices have enough rows and columns for two sets of data to be entered and compared.

SATs that use matrices include **Analysis of Competing Hypotheses, Cross-Impact Matrix**, and **Ranking, Scoring**, and **Prioritising**, among others.[76]

Network Analysis

Network Analysis consists of reviewing, compiling and interpreting data to understand the relationships or links that exist between individuals, groups, or others. It also examines what these connections mean to those involved, and the extent to which such links may be strengthened or weakened. As such it assists in both understanding and seeing opportunities to influence actors. **Network Analysis** can be divided into three stages:

1. Network charting (or link charting): identifying people, groups, events or things (nodes) and connecting them with lines (links) based on different kinds of association
2. Network analysis: structuring the chart by grouping relationships (sorting) and looking for patterns within and between groups
3. Social network analysis: deriving additional information from the chart, particularly by mathematically measuring variables related to the distance between nodes and kinds of relationships to understand the extent and kind of impact the nodes have on each other

Depending on the issue at hand, either one or all three stages may be appropriate.[77]

Mind Maps & Concept Maps

Mind maps and concept maps illustrate visually an individual or group's thinking about a given topic. They are diagrams that show both ideas perceived to be relevant to the topic and connections (lines) between the ideas. These techniques start with a focal question and then follow a series of steps. Mind maps and concept maps can be used for many purposes including analysis and decision-making. Advantages include facilitation of thinking, a shared understanding of fundamental concepts, and communication of complex relationships.

The size and complexity of both types of maps can vary considerably as a result of why and how they are used. Although they provide a simplified version of reality, mind maps and concept maps provide an overview of relevant variables for a topic and their interrelations, thus providing a solid basis for determining next steps. Experts cite the process of making these maps as the main value rather than the maps themselves as new ideas spring forth, concepts are clarified, pertinent knowledge is identified, and differences of opinion are resolved.

Mind Maps and Concept Maps can be used as visualisations of results obtained through other techniques, such as Cross-Impact Matrix and Brainstorming SATs.[78]

76 Heuer & Pherson, 2011; Duvenage, 2010.

77 Heuer & Pherson, 2011.

78 Heuer & Pherson, 2011; Duvenage, 2010.

Idea Generation

Structured Brainstorming

Structured Brainstorming is typically used at the start of a project in a small group to discuss pertinent information or insights. It can be used to identify and make a list of relevant variables, driving forces, important stakeholders, a comprehensive range of hypotheses, available sources of information, possible solutions to a problem, potential scenarios or outcomes and more.[79]

Structured Brainstorming can also be useful at critical points of a project to encourage new thinking. Due to its extensive nature, it is applicable to nearly all other SATs. The structured brainstorming process consists of a **divergent thinking phase** to come up with and gather new insights and ideas, followed by a **convergent thinking phase** to group and organise ideas around key concepts[80] For this to be most effective, it is important the issue under discussion be clearly identified, an objective set, and a list of relevant outcomes recorded.[81]

It is useful to follow **Structured Brainstorming** with a **Cross-Impact Analysis** to take a closer look at the relationship between variables, stakeholders, or other elements identified.[82]

Virtual Brainstorming

Virtual Brainstorming is different from **Structured Brainstorming** in that it occurs online with participants in different geographic locations or who are not able to meet in person. The technique can take a **synchronous** or an asynchronous form. A synchronous virtual brainstorming session involves all participants at the same time, and thus allows for a similar synergy as that of **Structured Brainstorming** with reacting to and building upon ideas in real time.

An **asynchronous** virtual brainstorming session allows participants to provide their input and read that of others in their own time. In this way, the participant's full attention can be focused on their ideas and reviewing those of others. When this occurs over two or three days, participants can revisit all inputs with a fresh mind, which is typically conducive to coming up with additional ideas. Whether it is synchronous or asynchronous, **Virtual Brainstorming** also allows for participants to contribute their ideas anonymously. This may be preferred to add objectivity to the process where hierarchy or status would otherwise impact participants' thinking.[83]

Nominal Group Technique

The **Nominal Group Technique** offers an alternative to **Structured Brainstorming** when there is concern that more experienced or outspoken participants may dominate the session. It is also useful when there is concern that some participants may not contribute to the discussion, or if the issue at hand is controversial and may lead to a heated exchange.

Like structured brainstorming, the **Nominal Group Technique** is a process that facilitates coming up with and evaluating ideas. As opposed to opening the floor for ideas to be shared freely, however, it employs a round-robin approach in which ideas are presented one at a time in an iterative process until all ideas have been exhausted. A facilitated group discussion then follows.[84]

79 Heuer & Pherson, 2011.
80 US Government, 2009.
81 McDowell, 2009.
82 Heuer & Pherson, 2011.
83 Ibid.
84 Ibid.

Idea Generation

Starbursting

Starbursting is a type of brainstorming that generates questions instead of ideas or answers. It is typically used to help define a project after a topic or issue is chosen for analysis. The following six questions are posed:

Who? When? What? Where? Why? and How?

A Starburst diagram is then created in the form of a star, with each question placed at one of its points. Participants try to come up with as many questions as possible related to each point. These are then prioritised for answering or sorted into logical categories.

The **Ranking, Scoring, Prioritising** technique can help to prioritise questions to address. **Starbursting** can also be combined well with the **Getting Started Checklist** and **Issue Redefinition** techniques. It is closely related to **Cause and Effect Assessment** as well.[85]

Cross-Impact Matrix

The **Cross-Impact Matrix** is the logical next step to brainstorming that identifies a list of pertinent variables, driving forces, or key stakeholders. It can help a group to visualise and subsequently discuss how these are related. **Cross-Impact Matrix** is a useful technique early in a project to address complex issues when there are many interrelations. Participants systematically look at how each element of a given context influences others it seems related to.

This approach requires all assumptions about relationships to be clearly communicated. Depending on the project, a discussion of relationships between variables may suffice, or recording variables and their interactions in a matrix may be necessary. In addition to identifying relationships and their direction, a cross-impact matrix is particularly useful for illustrating important interactions between variables that may have previously gone unnoticed, or combinations of variables that can reinforce one another. Discussions that come from using this technique may be further developed with a mind map or concept map of the relationships.[86]

85 Heuer & Pherson, 2011.

86 Ibid.

Scenarios & Indicators

Simple Scenarios

As with scenario analysis in general, **Simple Scenarios** look at the different ways a situation could evolve to decrease uncertainty and manage risk. It is best for complex situations or when it is not possible to trust only one prediction due to significant uncertainty. The technique is quick and easy, and can be used by an individual, although it is recommended to be used in a group as with most SATs.

Simple Scenarios identify drivers, forces and events that will likely influence the future, and groups them together into at least four plausible scenarios – best case, worst case, baseline and an additional one. The implications of each scenario are then specified, and a list of indicators for each is produced to help monitor and understand which scenario may be unfolding. Scenario analysis in general can be followed by generating a cross-impact matrix to identify and analyse possible interactions or "feedback loops" between each scenario's different driving forces.[87]

Alternative Futures Analysis & Multiple Scenarios Generation

Alternative Futures Analysis and **Multiple Scenarios Generation** take the same approach to scenario analysis, only differing in the number of scenarios analysed. As opposed to **Simple Scenarios**, both are appropriate for larger projects that need a group of experts (typically decision-makers and academics), and employ a more systematic process for which a trained facilitator is recommended.

Alternative Futures Analysis utilises two driving forces with two extremes, which are combined to create four possible scenarios. A narrative is developed for each scenario, along with indicators that are subsequently monitored. **Multiple Scenarios Generation** has no limitations on the number of scenarios, aside from the time available and complexity.[88]

Indicators

Indicators are observable, or possibly observable, events or actions that can be used as an objective baseline to detect, monitor or assess change over time. They are often used with scenarios to identify which possible scenario is evolving. Their added value thus comes in preparing the user to recognise signs of change that would otherwise go unnoticed. They can also help to "depersonalise" arguments by moving attention to an objective set of criteria. Indicators are listed in detail for each scenario or hypothesis to help open minds to the different possibilities. They are then monitored regularly to detect signs of change.

Indicators often use some type of brainstorming to elicit diverse expert thought in creating them. They are also used in scenario analysis and as evidence in **Analysis of Competing Hypotheses**.[89]

Indicators Validator

Indicators Validator is the logical next step to the **Indicators** technique. Indicators are rated according to their likelihood of occurrence. Indicators that are the least likely are removed, and the analyst may develop new and more feasible indicators or scenarios.

This is particularly important to employ after indicators are developed for scenarios or competing hypothesis analyses.[90]

87 Heuer & Pherson; 2011, Duvenage, 2010.
88 Heuer & Pherson; 2011, Duvenage, 2010.
89 Heuer & Pherson, 2011; US Government, 2009.
90 Heuer & Pherson, 2011.

Hypothesis Generation & Testing

Simple Hypotheses

A hypothesis is a plausible explanation or conclusion to be tested by gathering and presenting evidence. It is an "educated guess" based on data, understanding and speculation, that is formulated into a declarative statement. Development of hypotheses is useful when the issue at hand necessitates a systematic analysis of all alternatives, several variables are part of the analysis, users have competing perspectives, or uncertainty about the outcome exists.

Simple Hypotheses starts by defining the issue and determining how hypotheses will be used at the start of a project – in hypothesis testing, as a foundation for developing scenarios, or a way to choose from a large range of alternative outcomes that require close consideration. A diverse group comes together to review available information and propose hypotheses.

Several other types of techniques can be used to generate hypotheses, including Structured Brainstorming, Starbursting, Scenario Analysis (to follow), and the Delphi Method.[91]

Multiple Hypotheses Generator

Multiple Hypotheses Generator is a structured technique for when many factors are at play in an analysis and a high level of uncertainty exists regarding the outcome, or those making decisions have competing perspectives. It begins by generating as many hypotheses as possible, followed by rating these according to their credibility, and listing the most important for additional examination. This technique can provide more confidence than others that an important alternative or outlier has not been missed.[92]

Diagnostic Reasoning

Diagnostic Reasoning is a useful technique when examining a new development in a situation of interest, or the reliability or importance of new information. It helps the user avoid making a quick intuitive judgement in their assessment. Therefore, the user must examine whether the new information is consistent with other logical conclusions or alternative hypotheses. This technique involves a process whereby the user(s) attempts to refute alternative conclusions instead of confirming what is already thought to be true. A series of steps can be followed to guide this process.

Diagnostic Reasoning is useful to apply to other SATs, particularly Indicators Validator and Analysis of Competing Hypotheses.[93]

91 Heuer & Pherson, 2011; Heuer, 1999; McDowell, 2009.

92 Heuer & Pherson, 2011; Duvenage, 2010.

93 Heuer & Pherson, 2011.

Hypothesis Generation & Testing

Analysis of Competing Hypotheses

Analysis of Competing Hypotheses is used to help make judgements about issues for which alternative hypotheses, explanations or estimates need to be weighed. Essentially, it helps users to consider all possibilities to determine the best solution instead of choosing the first solution that appears satisfactory. The technique is particularly effective when a large amount of data must be taken into account and evaluated. A matrix is created for these alternatives and evidence is provided for each to analyse the weight. Hypotheses are compared to each other, along with each piece of evidence, instead of assessing their plausibility separately. Ultimately, the best hypothesis is the one with the least evidence against it, rather than the most evidence for it.

Although it can be used by an individual, Analysis of Competing Hypotheses is most effective when used in a small team with participants who can challenge one another's assessment of the evidence. If being used for the first time a facilitator is helpful to lead participants through the process.

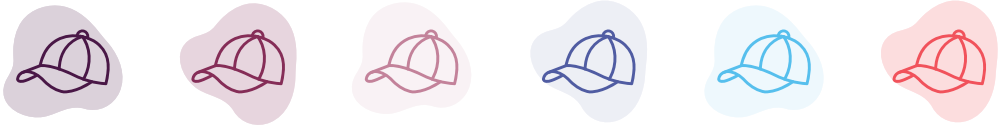
The technique is often used with Structured Brainstorming, Nominal Group, Hypothesis Generator, and the Delphi Method, which can identify hypotheses or evidence to be used in the Analysis of Competing Hypotheses or to assess the evidence's importance. Diagnostic Reasoning is part of the technique, and Indicators are identified for tracking future developments.[94]

Argument Mapping

Argument Mapping is complementary and ideally used together with Analysis of Competing Hypotheses, although it can also be used separately. It is different from the latter in that it aims to test a single hypothesis or initial analytic judgement with logical reasoning (as opposed to a more general analysis of several hypotheses). It allows an analyst to test one's own reasoning when making a judgement that is intuitive. Thinking is clarified and organised with a visual map (box-and-arrow diagram) showing the reasoning along with evidence for and against it, to distill the strengths, weaknesses and gaps in the argument. This is helpful not only for thinking about a complex issue but also provides a guide for presenting the rationale and conclusions to others.[95]

Six Thinking Hats

Six Thinking Hats involves a "parallel thinking process" to examine a hypothesis, idea or data from different perspectives. Six roles and/or coloured hats are assigned to participants as follows:



Facilitator | Neutral | Emotional | Creative | Optimist | Pessimist

Participants may only think in the way their hat prescribes. Ideas are discussed from each perspective, and hats are then changed until everyone has worn all six. The benefits and limitations of each point of view are thus communicated and acknowledged by all. This helps to overcome assumptions and biases, as well as to generate new ideas to adapt plans with new information taken into consideration.[96]

94 Heuer & Pherson, 2011; ACAPS, 2016; Duvenage, 2010; US Government, 2009.

95 Heuer & Pherson, 2011; Duvenage, 2010.

96 ACAPS, 2016; Eaton et al., 2007.

Assessment of Cause & Effect

Key Assumptions Check

Key Assumptions Check is used to investigate assumptions (mental models) based on situational logic, expert judgement and understanding of similar situations. The most significant working assumptions of an analysis are listed explicitly and questioned to then guide interpretation of evidence and reasoning for an issue. This is done in a group, whereby all possible assumptions are first listed, then questioned, categorised (i.e. solid, correct with some caveats, or unsupported/questionable), filtered (last category removed), and the remaining refined.

This technique has been cited as most useful at the start of an analytic project (an individual or team spends an hour or two with it). However, rechecking assumptions is valuable at any other stage of the project as a quality control before reaching conclusions.

Key Assumptions Check is often paired with and applicable to all other SATs, particularly Analysis of Competing Hypotheses as "evidence" in such a matrix.[97]

Role Playing

This involves assigning participants roles according to the subject of the analysis. Responses are then played out accordingly. Generally, the scenario is the same as the current situation with a real or hypothetical new development thrown in for response. This technique is commonly used to better understand what may happen with interactions between two or more people or organisations. In this way, participants can also view the issue from a different perspective or context. New information and insights are consequently gained.[98]

Outside-In Thinking

Outside-In Thinking entails identifying all factors, trends and basic forces that could impact an issue indirectly. It is most helpful in conceptualising an analytic project whose aim is to identify critical external factors that could impact the development of a situation. Participants explore all variables from global, political, social, legal, environmental, economic, and technological perspectives. As most people focus on factors familiar to them within their field, or think from the inside-out, this technique requires participants to broaden their perspective and reflection on issues to a larger contextual and conceptual framework. In this way, they may discover other factors, significant dynamics, or a pertinent alternative hypothesis. This also leads to new information gaps and hypotheses to be further examined.[99]

97 Heuer & Pherson, 2011; Duvenage, 2010; US Government, 2009.

98 Heuer & Pherson, 2011.

99 Heuer & Pherson, 2011; Duvenage, 2010; US Government, 2009.

Assessment of Cause & Effect

Fishbone Analysis

Fishbone Analysis is a technique employed to demonstrate cause and effect. It identifies and subsequently explores the factors surrounding a given issue. The issue to be examined is described on the right side of a diagram and forms the fish head. Major bones of the fish are then created and represent the main information categories for the issue at hand. These form the analysis framework and may consist of people, methods, policies, etc. Minor bones are then added to the major bones to indicate contributing issues for each information category. By breaking down an issue in this way, this technique is meant to identify the causes of a problem in order to recommend potential solutions.

SATs like Structured Brainstorming and the Nominal Group can also be used to help come up with ideas for solutions.[100]

100 Prunckun, 2015

Challenge Analysis

Structured Self-Critique

Structured Self-Critique is a technique for groups to identify weaknesses in their analysis and subsequently reframe the issue. This occurs prior to sharing an analysis with outsiders and helps to instill analytic rigor. Participants take on a critical perspective and respond to a list of questions regarding the analytical processes employed, important assumptions, sources of uncertainty, information gaps, and more. A review of the responses then occurs, and together participants reassess overall confidence in their own judgement. The analysis may consequently be modified if needed. **Structured Self-Critique** serves both as an analytic quality control and a way to resolve conflicting opinions. This technique has also been noted as more impactful than a similar one of **Devil's Advocacy** as it requires an entire group or team to play the critic.[101]

Devil's Advocacy

Devil's Advocacy is used to challenge a key assumption or analytic consensus concerning a crucial question or a proposed analytic judgement, plan or decision. It therefore serves as a check on a prevailing mindset, to make sure consideration of alternative solutions takes place. This technique is employed by an individual who was not involved in the earlier analytic processes. The individual critiques the analysis, identifying among other factors its faults and potential impact for decision-making.[102]

Delphi Method

The **Delphi Method** uses a consensus methodology whereby experts with different levels and types of experience separately provide their input (ideas, judgements or forecasts) on a given issue. Once this information is collected, participants receive feedback about overall judgements from the group on an anonymous basis and may modify their previous responses. A second round then occurs with questions building on the first round's results, and expert input is provided again. This iterative review and response process continues until some type of agreement is reached.

The Delphi Method is designed to take place within a controlled system. Experts often participate remotely to avert emotional and dynamic interactions resulting from personal contact. While applicable to many situations, the technique is particularly useful when the issue at hand is complex and information is limited. Due to its iterative and dispersed nature, it requires a significant investment of both time and effort.[103]

It is used to generate Simple Hypoteses alongside Ranking, Scoring and prioritising, and Virtual Brainstorming.

101 Heuer & Pherson, 2011; Duvenage, 2010.

102 Heuer & Pherson, 2011; Duvenage, 2010; US Government, 2009.

103 McDowell, 2009; Heuer & Pherson, 2011; IPC, 2015.

Conflict Management

Adversarial Collaboration

Adversarial Collaboration is essentially an agreement between opposing groups on how they will work together to better understand and resolve differences, or collaborate on a joint product that explains these differences. Participants are tasked to understand the assumptions or evidence behind opposing opinions and explore how to best address them. An open mind to consider and discuss an issue is required on both sides for this to take place.

The following techniques can be used to help reach agreement:

1. Key Assumptions Check;
2. Analysis of Competing Hypotheses;
3. Argument Mapping;
4. Mutual Understanding;
5. Joint Escalation;
6. The Nosenko Approach.

The first three techniques have been described previously. **Mutual Understanding** involves a meeting of both sides with a facilitator, moderator or decision-maker. Both are required to describe the other's perspective accurately, and then discuss their differences in a more rational and less emotional manner. Joint Escalation requires participants to prepare a joint statement about the disagreement and present it together to their superiors, thus discouraging the escalation that can arise when this is done separately. The Nosenko Approach is typically applied to an analytic controversy that is long-standing. Its main rule is that issues that are important to both sides must be seriously considered by all.[104]

104 Heuer & Pherson, 2011; Duvenage, 2010.

Decision Support

Force Field Analysis

Force Field Analysis is a simple technique whereby all forces for and against a change, issue, or goal are listed and evaluated. This technique measures the relative strength of both types of forces. It is based on the theory that driving forces must surpass obstructing forces for change to happen. It allows for the issue at hand to be closely examined with many elements considered that may otherwise have been overlooked. After defining the issue and identifying the key influencing forces, a list of driving and restraining forces is made, weights are applied and totalled, the difference is assessed, and finally a corresponding action plan developed. **Force Field Analysis** is typically used at the start of a project with data collection, issue definition, or the development of recommendations for action.[105]

Pros-Cons-Faults-and-Fixes

Pros-Cons-Faults-and-Fixes is an easy technique for quickly assessing a new idea or a systematic analysis of a choice between two options. Parts of an issue are organised both logically and objectively to aid the decision-maker. As the name indicates, a list of pros and cons is developed, reviewed, and consolidated. If there is overwhelming acceptance of the pros, then the faults of these are examined. Similarly, if the cons are regarded as more prevalent, the next step is to look for fixes. Ultimately this technique is intended to ensure careful consideration of all aspects of a new idea or analysis and prevent any rush to conclusions.[106]

SWOT Analysis

SWOT Analysis is a simple technique that is frequently used in projects or plans to assess strengths, weaknesses, opportunities, and threats (SWOT). It is useful to incorporate after developing an objective or goal, as a framework to gather and organise information in support of planning and decision-making to achieve this. Strengths and weaknesses are linked to the plan or project (inside environment), while opportunities and threats are from the outside environment. Although simple, SWOT Analysis provides a useful foundation for more analysis and often indicates specific actions that may be taken.[107]

105 Heuer & Pherson, 2011.

106 Heuer & Pherson, 2011; Duvenage, 2010.

107 Ibid.

CONCLUSION

This technical brief has outlined the meaning, types, selection and use of **Joint Structured Analysis Techniques**. Though not a panacea, JSATs are of great value in guiding analytic thinking and group interactions in collaborative processes. Analogous to a 'box of tools' to reduce the effects of human cognitive limitations and analytic pitfalls [108], techniques can range from simple to complex, and utilise text-based or visual methods [109]. They can help users to identify and overcome mental mindsets, challenge key assumptions, stimulate creativity, generate alternatives, manage uncertainties, and reduce the chance of surprise. [110] Their main benefits come when used early in an analytic process and jointly in small groups.[111]

As we have seen, there is no one-size-fits-all approach to these techniques. Many can be used in more than one way, and each should be adapted to the issue at hand.[112] Synergies and complementarity also exist between different techniques. The appropriate use of multiple techniques may increase the accuracy of analysis.[113] Whether using one or several techniques, having a clear goal in mind is fundamental to determining which to choose.[114] In the context of joint analysis, a solid understanding of the analysis step(s), objectives, and the target audience is needed to identify an appropriate technique. Experience and the regular use of techniques facilitate this process as, like riding a bike, they are simply best learned by doing.[115] Therefore, while this technical brief provides an overview of JSATs both generally and within the context of a joint analysis process, it is not a replacement for training and experience in the different techniques.

108 PSU, 2014.
109 Chang et al., 2017.
110 US Government, 2009; Directorate for Analysis, 2008; Pherson, 2005.
111 Heuer & Pherson, 2011; Pherson & Pherson, 2013.
112 Heuer & Pherson, 2011.
113 Peterson, 2008.
114 Stigall, 2012.
115 Abdalla, 2010; Heuer, 1999.

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Annex I

Skills, training and time required per structured analysis technique

CATEGORY	TECHNIQUES	SKILL/TRAINING/TIME	ADDITIONAL INFORMATION
Decomposition & visualisation	**Getting Started Checklist**	Low	**Prerequisites:** None **Participants:** Individual or Group **Process:** Single step (answer checklist questions) **Methods:** Thought or discussion
	Customer Checklist	Low	**Prerequisites:** None **Participants:** Individual or Group **Process:** Single step (answer checklist questions) **Methods:** Thought or discussion
	Issue Redefinition	Low/Moderate	**Prerequisites:** None **Participants:** Group **Process:** Multiple steps (question, rephrase, redirect focus, etc.) **Methods:** Discussion
	Chronologies & Timelines	Low	**Prerequisites:** Temporal data related to the issue **Participants:** Individual or Group **Process:** Multiple steps (list, question, synthesize, etc.) **Methods:** Discussion, text (list), visualisation (timeline)
	Sorting	Low	**Prerequisites:** Existing data that can be broken into categories or subcategories **Participants:** Individual or Group **Process:** Multiple steps (review, list, group, etc.) **Methods:** Thought or discussion, text (list), and visualisation (table)
	Ranking, Scoring, Prioritizing	Low/Moderate/High	**Prerequisites:** Existing list or group opinions **Participants:** Individual or Group **Process:** Multiple steps (varies by technique) **Methods:** Voting, text (list), visualisation (table), calculation
	Matrices	Low	**Prerequisites:** Existing data to be compared **Participants:** Individual or Group **Process:** Multiple steps (varies by technique) **Methods:** Visualisation (table)
	Network Analysis	Moderate/High	**Prerequisites:** Existing data for review, compilation, and interpreta-tion **Participants:** Individual or Group **Process:** Multiple steps (varies by technique) **Methods:** Text (list), visualisation (network), measurement
	Mind Maps & Concept Maps	Low/Moderate	**Prerequisites:** None **Participants:** Individual or Group **Process:** Multiple steps (question, list, sort, etc.) **Methods:** Thought or discussion, text (list), visualisation (map)

CATEGORY	TECHNIQUES	SKILL/TRAINING/TIME	ADDITIONAL INFORMATION
Idea Generation	**Structured Brainstorming**	Low/Moderate	**Prerequisites:** Defined purpose, topic, and initial ideas from partici-pants **Participants:** Group (with at least one "outsider") and Facilitator **Process:** Multiple steps (question, discuss, sort, etc.) **Methods:** Thought, text (ideas), discussion (open), visualisation (sticky notes)
	Virtual Brainstorming	Low/Moderate	**Prerequisites:** Defined purpose, topic, initial ideas from participants, and internet access **Participants:** Group (external expert panel or geographically dis-persed team) and Facilitator **Process:** Multiple steps (question, discuss, sort, etc.) **Methods:** Thought, text (ideas), discussion (online input - synchro-nous or asynchronous)
	Nominal Group Technique	Low/Moderate	**Prerequisites:** Defined purpose, topic, and initial ideas from partici-pants **Participants:** Group and Facilitator **Process:** Multiple steps (question, present ideas individually, dis-cuss, etc.) **Methods:** Thought, text (ideas), discussion (round-robin approach)
	Starbursting	Low	**Prerequisites:** Defined purpose and topic **Participants:** Group and Facilitator **Process:** Multiple steps (diagram, questions, prioritize, etc.) **Methods:** Discussion (generate questions) and visualisation (star-burst diagram)
	Cross-Impact Matrix	Low/Moderate	**Prerequisites:** Brainstorming session **Participants:** Group **Process:** Multiple steps (discuss, visualise, compare, etc.) **Methods:** Discussion and visualisation (table)

CATEGORY	TECHNIQUES	SKILL/TRAINING/TIME	ADDITIONAL INFORMATION
Scenarios & Indicators	**Simple Scenarios**	Low/Moderate	**Prerequisites:** None **Participants:** Individual or Group (ideal) **Process:** Multiple steps (issue definition, grouping, matrix, narra-tive, indicators, etc.) **Methods:** Thought or discussion, text (lists, etc.), visualisation (ta-ble), monitor (indicators)
	Alternative Futures Analysis	High	**Prerequisites:** None **Participants:** Group (experts) and Facilitator **Process:** Multiple steps (issue definition, grouping, matrix, narra-tive, indicators, etc.) **Methods:** Discussion, text (lists, etc.), visualisation (table - two key drivers), monitor (indicators)
	Multiple Scenarios Generation	High	**Prerequisites:** None **Participants:** Group (experts) and Facilitator **Process:** Multiple steps (issue definition, grouping, matrix, narra-tive, indicators, etc.) **Methods:** Discussion, text (lists, etc.), visualisation (table - multiple drivers), monitor (indicators)
	Indicators	Low/Moderate	**Prerequisites:** Specific situation, topic or issue in need of monitoring **Participants:** Group **Process:** Multiple steps (identify indicators - via brainstorming, sce-nario or hypothesis devel-opment, etc.) **Methods:** Discussion, text (list), visualisation (from other tech-nique(s) used to identify indica-tors)
	Indicators Validator	Low	**Prerequisites:** Use in development of indicators for alternative sce-narios or competing hypoth-eses **Participants:** Individual or Group **Process:** Multiple steps (matrix, likelihood assessment, re-sort, etc.) **Methods:** Thought or discussion, visualisation (table)

CATEGORY	TECHNIQUES	SKILL/TRAINING/TIME	ADDITIONAL INFORMATION
Hypothesis Generation & Testing	**Simple Hypotheses**	Moderate	**Prerequisites:** Defined issue and expected use of hypotheses **Participants:** Group (diverse expertise) **Process:** Multiple steps (brainstorm, list, group, problem restate-ment, starbursting, etc.) **Methods:** Discussion, text (list), visualisation (diagram)
	Multiple Hypotheses Generator	Low/Moderate	**Prerequisites:** None **Participants:** Group **Process:** Multiple steps (issue definition, lists, score, re-sort, etc.) **Methods:** Discussion, text (lists), visualisation (diagram)
	Diagnostic Reasoning	Moderate	**Prerequisites:** New information, development, or source with un-certain reliability **Participants:** Individual or Group **Process:** Multiple steps (brainstorm, list, question, tentative judge-ment, etc.) **Methods:** Thought or discussion, text (list)
	Analysis of Competing Hypotheses	High	**Prerequisites:** Data to be reviewed and evaluated **Participants:** Individual or Group (ideal) with Facilitator **Process:** Multiple steps (hypothesize, narratives, lists, evidence di-agnosticity analysis, etc.) **Methods:** Thought or discussion, text (lists), visualisation (table), calculation (inconsistency score)
	Argument Mapping	High	**Prerequisites:** Single hypothesis or tentative analytical judgement to test, prior use of ACH rec-ommended **Participants:** Individual or Group (training and practice required) **Process:** Multiple steps (statement, evidence, reasoning, etc.) **Methods:** Thought or discussion, visualisation (diagram)
	Six Thinking Hats	Moderate	**Prerequisites:** Single hypothesis, idea or data to examine **Participants:** Group and Facilitator **Process:** Multiple steps (hat selection, discussion, exchange, etc.) **Methods:** Discussion (role-play)

CATEGORY	TECHNIQUES	SKILL/TRAINING/TIME	ADDITIONAL INFORMATION
Assessment of Cause & Effect	Key Assumptions Check	Moderate	**Prerequisites:** Defined issue, information or analysis that has been reviewed and interpreted **Participants:** Group (including a few "outsiders") **Process:** Multiple steps (list, brainstorm, question, categorize, etc.) **Methods:** Thought, discussion, text (list)
	Role Playing	Low/Moderate	**Prerequisites:** Defined issue or situation, synopsis from leader, re-search on assigned role from participants **Participants:** Group (different organizations/agencies), Control Team and Leader **Process:** Multiple steps (review, discuss, message, etc.) **Methods:** Discussion (role-play and after-action review), text (notes)
	Outside-In Thinking	High	**Prerequisites:** Defined issue **Participants:** Group **Process:** Multiple steps (brainstorm, list, assess, etc.) **Methods:** Discussion, text (list)
	Fishbone Analysis	Low/Moderate	**Prerequisites:** Defined issue **Participants:** Individual or Group **Process:** Multiple steps (list, categorize, diagram, etc.) **Methods:** Thought or discussion, text (list), visualisation (diagram)
Challenge Analysis	Structured Self-Critique	Moderate/High	**Prerequisites:** Analysis to review **Participants:** Group **Process:** Multiple steps (topics, questions, reassess, etc.) **Methods:** Discussion, text (notes)
	Devil's Advocacy	Moderate/High	**Prerequisites:** Analysis, plan, or potential decision **Participants:** Individual ("outsider") **Process:** Single step or multiple steps (varies by technique) **Methods:** Diverse approaches (no single procedure)
	Delphi Method	High	**Prerequisites:** Analysis, plan, or potential decision **Participants:** Group (experts - often anonymous) and Moderator **Process:** Multiple steps (iterative questions, response, feedback cycle, etc.) **Methods:** Thought, text (questionnaire)
Conflict Management	Adversarial Collaboration	High	**Prerequisites:** Both parties agree on having a discussion **Participants:** Group (two parties with opposing views) **Process:** Multiple steps (varies by technique) **Methods:** Diverse approaches (key assumptions check, argument mapping, etc.)

CATEGORY	TECHNIQUES	SKILL/TRAINING/TIME	ADDITIONAL INFORMATION
Decision Support	Force Field Analysis	Low/Moderate	**Prerequisites:** Defined issue, change, or goal **Participants:** Individual or Group **Process:** Multiple steps (brainstorm, list, score, etc.) **Methods:** Thought or discussion, text (list), calculation
	Pros-Cons-Faults-and-Fixes	Low	**Prerequisites:** New idea or choice between two options **Participants:** Group **Process:** Multiple steps (define, list, review, etc.) **Methods:** Discussion, text (list), visualisation (table)
	SWOT Analysis	Low	**Prerequisites:** Analysis, plan, or potential decision **Participants:** Individual or Group **Process:** Multiple steps (define, list, question, etc.) **Methods:** Thought or discussion, text (list), visualisation (table)

Annex II

Relationships between Joint Structured Analysis Techniques, by categories and techniques

CATEGORY	TECHNIQUES	USE	RELATED TECHNIQUES
Decomposition & Visualisation	Issue Redefinition	With	• Getting Started Checklist • Customer Checklist
	Ranking, Scoring, Prioritising	After	• Brainstorming SATs
	Matrices	With	• Ranking, Scoring, Prioritizing • Cross-Impact Matrix • Analysis of Compet-ing Hypotheses
	Mind Maps & Concept Maps	To visualise results of	• Cross-Impact Matrix • Brainstorming SATs • Many other SATs
Idea Generation	Structured Brainstorming	With	• Many other SATs
		To generate	• Simple Hypotheses
	Starbursting	With	• Getting Started Checklist • Issue Redefinition • Ranking, Scoring, Prioritizing
		To generate	• Simple Hypotheses
	Cross-Impact Matrix	After	• Brainstorming SATs
Scenarios & Indicator	Scenarios Analysis	Before	• Cross-Impact Matrix
		With	• Indicators
		To generate	• Simple Hypotheses
	Indicators	As evidence in	• Analysis of Competing Hypotheses
		With	• Brainstorming SATs
	Indicators Validator	After	• Indicators

CATEGORY	TECHNIQUES	USE	RELATED TECHNIQUES
Hypothesis Generation & Testing	Simple Hypotheses	Before	• Scenarios Analysis
	Diagnostic Reasoning	With	• Indicators Validator • Analysis of Compet-ing Hypotheses
	Analysis of Competing Hypotheses	With	• Structured Brain-storming • Nominal Group Technique • Hypothesis Genera-tor • Diagnostic Reason-ing • Argument Mapping • Delphi Method
Assessment of Cause & Effect	Key Assumptions Check	With	• All other SATs (ACH in particular)
	Fishbone Analysis	With	• Brainstorming SATs
Challenge Analysis	Delphi Method	To generate	• Simple Hypotheses
		With	• Ranking, Scoring, Prioritizing • Virtual Brainstorm-ing
Conflict Management	Adversarial Collaboration	With	• Analysis of Compet-ing Hypotheses • Argument Mapping • Key Assumptions Check
Decision Support	SWOT Analysis	Same factors as	• Outside-In Thinking