Concept Development and Experimentation

CD&E Handbook

A Concept Developer’s Guide to Transformation

ALLIED COMMAND TRANSFORMATION

IMPROVING TODAY, SHAPING TOMORROW, BRIDGING THE TWO
NOTE

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NOTE

In the online version of this Handbook, embedded links provide additional information or guide the reader to information or training expanding upon the concept or ideas presented. These are indicated by blue text. Issues identified (i.e. erroneous or outdated information or inactive links) should be reported to the Concept Development Branch, Allied Command Transformation. Comments should be provided on the TRANSNET/CDE365 site: TRANSNET CDE365.

NOTE FOR THIS VERSION

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If you have no access to TRANSNET, you can mail issues comments or suggestions to the Concept Development Branch, Allied Command Transformation (conceptdevelopment@act.nato.int). This is also the address you can ask to add you to our mailing list to keep you informed about CD&E and revisions of this handbook.
Foreword

Concept Development and Experimentation is a fundamental process which enables transformation activities. The ACT Concept Development Branch recently undertook a comprehensive review of the processes, procedures and methodologies encompassed in the Concept Development and Experimentation process. The result of this work has been collected in this handbook.

The 2018 Handbook is a significant departure from earlier versions in that every effort has been taken to provide the reader with a functional tool rather than a reference or guide. Our team has incorporated tested programme and project management principles to align Concept Development and Experimentation activities across five primary phases, as well as preceding and follow-on activities. This is an important addition which, I believe, will improve Concept Development and Experimentation efforts and support efficient and effective allocation of resources to support transformation.

This Handbook provides basic information for the concept developer based on approved NATO guidance and policy as well as best practice derived from a rich history of CD&E experience. Although designed to address Alliance CD&E activities it has been developed with a vision of informing NATO nations, our partners and other nations and organizations. Accordingly, significant effort has been taken to ensure applicability of the methodology across the broadest user community; however, certain aspects may require tailoring to fit national or cultural needs. I hope that this will prove a significant benefit and assist in broadening the community of interest.

The Handbook is a “living document” and will be updated periodically. The Concept Development Branch is the Handbook’s custodian and questions or recommendations should be referred to them.

Paul M. Bennett CB OBE
Vice Admiral, GBR N
Chief of Staff
Allied Command Transformation
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CHAPTER 1 – INTRODUCTION

Concept Development

Concepts provide a foundation for NATO's transformation, maintaining NATO’s relevance in the security environment and enabling it to effectively carry out its roles and missions. Concept Development and Experimentation (CD&E) provides a basis for developing credible solutions to identified capability shortfalls by capturing the best ideas and enabling potential solutions to be explored via experimentation and validated.¹

Background

Since 2000, the Military Committee (MC) has recognized the importance of concept development to the Alliance. The MC adopted CD&E as “an Alliance tool to explore, demonstrate and evaluate…concepts that will drive change” (Ref MCM-0133-2000, NATO Concept Development and Experimentation 7 September 2000). From that time, Allied Command Transformation (ACT) has continued to evolve CD&E, integrating it into transformation as envisioned by the MC. ACT has current policy with the Policy for NATO Concept Development and Experimentation (Reference A) and developed the NATO CD&E Process (Reference C) supporting integration of concept development and supporting development of capabilities and transformation. To facilitate standardisation and communication of both the policy and the process, the NATO MC encouraged ACT to develop and maintain a CD&E Handbook for use by all stakeholders involved in NATO CD&E activities.² This publication is the latest version of the CD&E Handbook, developed with input from the NATO CD&E Community of Practice. This Handbook builds on NATO policy, direction and guidance defined Reference C and Reference A.

Aim

This publication outlines a methodology for developing concepts from initial tasking to final approval. By reading this handbook and applying it, you will understand what a concept is and how to develop one using the NATO CD&E methodology (Figure 1). The methodology is neither dogmatic nor prescriptive, it is recognised that it should be tailored to your specific concept development needs. This includes knowing which activities should be conducted and when, with whom to engage, what supporting resources to draw on, and what key outputs are required to express your concept. This handbook also provides senior leadership with guidance for the management of CD&E functions within NATO organisations.

¹ MC 0583.
² The Project Management Institute (PMI) defines a stakeholder as “an individual, group or organization who may affect, be affected by, or perceive itself affected by a decision, activity, or outcome of a project.” (PMBOK 5th Edition). Primary Stakeholders for NATO Programmes are identified at Annex 2 to NATO AAP-20 (NATO Programme Management Framework), Ed 3, October 2014. Though not an exhaustive list, this provides a point of departure to identify stakeholders for CD&E projects.
Figure 1. Programmatic Approach to Concept Development

Scope

This handbook reflects current CD&E structures and processes supporting NATO transformation. However, every concept is different, varying in complexity, timescales and resources and consequently each one may require a unique application of the CD&E approach. Guidance and methodology in this handbook is a framework, tailorable to a concept’s specific needs and an organisation’s processes.

Primary users of this handbook are anticipated to be concept developers within NATO, its partner nations, and CD&E practitioners in the wider community. Other users include experimenters and analysts playing key roles within the process, as well as staff who manage CD&E functions. While this handbook provides overviews of enablers such as project management, experimentation and analysis, it does not describe detailed techniques. Links and references are provided throughout to provide the user with additional information.

The handbook is designed for use in an online format (via TRANSNET_CDE365), which includes online education and training elements to enhance the experience and facilitate the CD&E process. It may also be printed as a hard copy with references and links provided as end notes; however, it should be recognised that this might limit functionalities designed for online use.
CHAPTER 2 – CD&E SUPPORT TO CAPABILITY DEVELOPMENT

**Purpose of CD&E**

Continuous transformation ensures NATO’s relevance in the security environment and assures its ability to effectively carry out its roles. Key elements of NATO transformation are conceptual and organisational agility and the development of robust deployable, sustainable, interoperable capabilities suitable for both current and future operations and missions. The primary purpose of CD&E is to provide credible solutions to capability shortfalls or gaps. The inclusive and iterative nature of CD&E aims at capturing the best ideas and enabling potential solutions to be thoroughly explored, tested and validated. CD&E is conducted within NATO or collaboratively with nations and considers solutions across the DOTMLPFI spectrum.\(^3\)

**Spheres of CD&E**

CD&E is integral to development of required capabilities. CD&E breaks down into three broad areas (Figure 2) based on purpose or function:

**Transformation-Oriented CD&E** supports the identification of required capabilities and needs. Transformation-orientated CD&E is likely to use insights and guidance emanating from academia and industry. It brings lessons identified, technologies, discovery experimentation, and emerging and innovative ideas to the defence planning process to identify new strategic or operational concepts. It is generally focused on the development of intellectual or theoretical ideas, typically describing how to do things in a broader context, often encompassing multiple capability areas.

**Solution-Oriented CD&E** finds and develops solutions to specific capability shortfalls/gaps or the exploitation of new opportunities to address capability requirements not yet identified. Solution-orientated CD&E is developed across all DOTMLPFI lines of development.

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\(^3\) Doctrine, Organisation, Training, Material, Leadership, Personnel, Facilities, Interoperability

**Figure 2. Three “Spheres” of CD&E**

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MC 0538 (Policy for NATO CD&E)
Test and Validation-Oriented CD&E focuses on specific solutions and works to confirm its suitability and completeness. It uses supporting analysis and experimentation to undertake verification and validation ensuring the viability of solutions and typically occurs later in the capability development process. Examples include analysis and experimentation to select between solutions; prototype testing to reduce risk; user demonstrations in operational environments; validation activities to ensure the solution meets the designed intent.

CD&E Support to Capability Development

NATO’s Capability Development process and the NATO Defence Planning Process (NDPP) ensure NATO has capabilities to meet future operational requirements. The NDPP makes use of a number of NATO sources including the Strategic Foresight Analysis (SFA) and the Framework for Future Alliance Operations (FFAO). Lessons Learned, Operational Requirements, and other Research activities, including CD&E. The five-step NDPP framework (Figure 3) enables timely identification, documentation and delivery of military capabilities of which concept development is a critical component. A full discussion of the NDPP is beyond the scope of this Handbook. CD&E is particularly important in steps 2 (determine requirements), 3 (apportion requirements and set targets) and 4 (facilitate implementation) as input to the development of the Capability Requirements Review (CRR) and courses of action and prioritisation of critical shortfalls or gaps.

Capability development addresses NDPP-identified requirements not addressed through targets for nations, or provided by nations under the NATO Force Structure (NFS). The capability development process consisting of six steps which facilitated by CD&E as depicted in Figure 4. It should be noted that the CD&E process does not encompass implementation. It supports existing implementation methods; it does not create new paths for implementation to the NATO structure. When a concept reaches sufficient maturity, it becomes a solution option for the Concept Development Plan (CDP). In some instances, a mature concept may be forwarded to the appropriate NATO authority or taken directly to implementation by appropriate NATO authorities.

Figure 3. NATO Defence Planning Process

4 Additional information is available in NATO PO (2009)0042, Outline for a NATO Defence Planning Process (April 2009).
5 Six steps of the capability development process: 1-Analyze Strategic Environment; 2-Identify Capability Need(s); 3-Develop Capability Requirements; 4-Conduct Gap Analysis; 5-Identify and Select Solutions; and 6-Implement Solutions.
Although not part of the formal capability development process, CD&E should expect to support its implementation, if required. Implementation will likely require experimentation, which can serve downstream capability solution development.
CHAPTER 3 – CONCEPT INITIATION, PROJECT ELEMENTS AND PRINCIPLES

Concept Hierarchy

NATO’s hierarchy of concepts recognises three levels: strategic, operational and functional. The hierarchy progresses through increasing levels of fidelity indicated at Figure 5 based on relevance to the NDPP. Concepts may be defined as either “strategic” or “capability” based on their intended scope and purpose. This “ends-focused” alignment is depicted in Figure 6. NATO policy defines concepts as either strategic, operational or functional. This hierarchy helps with determining the aim, scope, planning the level of effort, content or output for the concept.

Strategic level or “capstone” concepts contain political or high level politico-military assessments, objectives and guidance. They outline NATO’s purpose, nature and fundamental security tasks, identify central features of the security environment and provide guidelines for the adaptation of its military forces. In addition to the NATO Strategic Concept outlining the broad political-military strategy for the Alliance, certain supporting concepts may have strategic perspectives. These prepare the Alliance for security challenges and guide its future political and military development. As such, they consider broad strategies for military operations with a long-term vision for the Alliance for the mid to long-term future. A strategic level concept will typically influence force development and employment, provide a broad description of military activities across significant portions of the spectrum of operations and describe what is required to meet strategic objectives. This type of concept usually does not consider the concept’s implementation as a specific capability. Examples include: the NATO Capstone Concept for Joint Military Operations in Urban Environments (Urbanisation) and NATO’s Concept for Countering Hybrid Threats.

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6 Annex B to MC-0583, NATO CDE Policy, September 2009.
Operational Concepts, those governing planning and conduct of campaigns and joint operations are planned. Functional Concepts, those which inform development of solutions to explicit or practical problems and what solutions, tactics, techniques or procedures (TTP) may be employed. Collectively, these comprise the broad category of Capability Concepts. Examples include NATO Joint Sea-based Logistic Support (NJSBLS) Concept or the NATO CBRN/CIED Exploitation Functional Concept.

Sources for Concept Initiation

Concepts are initiated through identification of a problem to be solved or an opportunity to be exploited. Problems may be current (e.g. an operational need) or anticipated in the future (e.g. in response to potential capability shortfall / gap or an emerging trend). Opportunities include better ways of using existing capabilities or new solutions that may improve or deliver new capabilities.

NATO concepts can be initiated in response to:

- **Direct Guidance from the Military Committee (MC).** This may originate from a range of sources including the NDPP Capability Requirements Review (CRR), the Priority Shortfall Areas (PSAs), SACT’s Five-Year Plan, ideas generated by individuals/teams to address unidentified capability gaps, needs derived from the lessons-identified process, ideas emerging from experimentation, or from the impact of emerging technologies on traditional methods of carrying out military operations.

- **Operational Requests from Allied Command Operations (ACO).** Emerging requirements from an operational theatre are submitted via the chain of command to Supreme Headquarters Allied Powers Europe (SHAPE). NATO defines concepts that apply to both Strategic Commanders (SCs) as Bi-SC Concepts, which are authorised by both Chiefs of Staff for SHAPE and ACT.

- **Internal Direction from SACT.** The SACT exercises his responsibility for concept development through the Campaign Steering Board (CSB). SACT may delegate this authority to the COS or Deputy Chiefs of Staff (DCOS) within HQ SACT. Even if tasked by the chain of command within HQ SACT, concepts, depending on their scope and level, may be endorsed by the MC and adopted throughout NATO. Concepts are also developed from ideas generated within HQ SACT such as from the Strategic, Policy and Plans (SPP) Directorate or from within Centres of Excellence (CoEs), Joint Warfare Centre (JWC), Joint Force Training Centre (JFTC) and the Joint Analysis & Lessons Learned Centre (JALLC).
Request from Nations & Individuals. Nations and individuals may propose ideas for concepts to address capability gaps or exploit new solutions to meet future requirements. These are submitted via TRANSNET CDE365 for consideration by NATO’s CD&E Working Group, which sits twice per year in the spring and autumn.

Responsibility for prioritising concept development within NATO is led by HQ SACT’s Campaign Steering Board (CSB) and the CD&E Working Group, depending on the type of direction or request. For example, formal MC Guidance for a new concept will be prioritised and tasked within the CSB whereas requests from nations are normally reviewed within the Working Group. These bodies decide whether a concept should be developed, who should be designated as sponsor of the concept and who should be responsible for its development. In many instances HQ SACT leads on a concept’s development, with support from other organisations e.g. COEs.

CD&E Key Elements

Every CD&E project begins with a statement of a military problem to be solved or the opportunity to be exploited. Analysis of the problem or opportunity may indicate some shortfall in DOTMLFPI or may indicate a need for additional conceptual foundations to address the situation. A CD&E project team typically comprises three components: Concept Development, Experimentation and Operational Analysis (OA).

Concept Development: Process aimed at identifying conceptual solutions to capability shortfalls or gaps.

Experimentation: Controlled investigation to discover information, confirm or disprove a hypothesis or formally validate a concept.

Operational Analysis (OA): Application of scientific methods to assist executive decision-makers.

These components can be visualized as strands in a rope or cable (Figure 7): each beneficial in its own right but when interleaved, they create a stronger capability. Each component of the project serves a specific purpose: experimentation investigates the issue; operational analysis generates actionable knowledge to support decisions to shape the project; results of these activities feed back into capability development. This process of “spiral development” creates a robust and rigorous concept necessary to inform development of national efforts, which is evidence-based to support planning. This capitalises on the inclusive and iterative nature of CD&E as defined in NATO Policy.
Concept development is an important driver for identification, development and experimentation of potential solutions. It includes activities such as conducting research, writing up the concept, engaging with stakeholders and coordinating analysis and experimentation support as required. Sufficient project management skills are essential and enable the concept developer to form the concept within time, resource and budget constraints.

OA and Experimentation are key enablers to the process and are used to provide robust, evidence-based methods of exploring the problem. In many instances there are likely to be multiple OA techniques and experimentation approaches that can be applied in support of CD&E. Project timescales, budgets and skill sets will influence how these techniques and approaches are selected and applied.

OA and Experimentation often support one another. For example, experiments help provide evidence to evaluate a concept as part of a wider analysis program. Similarly, OA can be used to support the design of experiments and analyse the outputs. OA and Experimentation staff should be part of the core team. Further details can be found in Chapter 5 (Key Enablers for Concept Development).

**CD&E Principles**

A concept explains: *why* the idea is needed, *what* the idea is, and suggests *how* the idea might be developed or implemented. Whilst not comprehensive, the following principles are fundamental to CD&E:

- **Objectivity** – Clearly define the problem or opportunity your concept will address or exploit. Be open-minded and take time to explore the problem space and agree the scope within a capability development context. This will help confirm whether your concept is relevant.
Evidence-Based – Ensure that you have a clear logical evidence-basis to justify your concept's development i.e. that there is a need. Do your research and use analysis and experimentation to support you. Be prepared to review and revise your concept as new evidence becomes available.

Engagement – Identify, engage and manage stakeholders. Use internal and external subject matter experts (SMEs) and end-users to shape and provide feedback on your concept. Socialising your work will strengthen and encourage buy-in to your concept, which will aid a concept’s implementation into a capability.

Flexibility – There is no single “right” way to develop a concept so be prepared to be flexible with your approach. Produce a concept development plan that adheres to these principles, but reflects a project’s unique time, budget and resource constraints. Tailor the principles of project management to fulfil the requirements of your concept.

“Failure” – Fail (fast) is not a pattern we are familiar with, however, in the context of CD&E it is not only possible, it is often desirable. Not all concepts will succeed: capability gaps change, technologies become obsolete, alternative solutions are developed and concepts may work in theory but not in practice. Keep asking whether your concept is still relevant. Identifying a failed course of action early can enable the reallocation of resources and effort. Failing fast, for these right reasons, helps you learn and ensures you can better focus.
Project Management in Concept Development

This chapter will introduce you to the basic principles of project management applied to the CD&E Methodology discussed in Chapter 4. It is not intended as a full treatment of the topic of project management, nor is it prescriptive. This chapter will focus on the phases and processes identified in CD&E and provide considerations in each phase that the concept developer should address to ensure his CD&E project is on track. Managing execution of the processes and phases is critical to timely and successful development of the concept and alignment of resources necessary to accomplish each of the phases. NATO prescribes use of methods for managing Project in Controlled Environments, commonly known as “PRINCE2”. Formal training in this project management methodology is available from a number of sources and the ACT Deputy Chief of Staff for Resources and Management (DCOS RM) Strategy Management Branch conducts a regular course on Portfolio, Programme and Project Management (P3M) addressing the principles of project management applied to capability development under the NATO Defence Planning Process (NDPP).

To facilitate discussion it is important to address some basic project management terms and concepts. These will help to place the discussion in context and enhance understanding. First, it is important to understand that a project is “a temporary construct created to delivery one or more outputs.” It is, implying that it is time bound and of a specific brief duration. This is an important factor in concept development requiring disciplined progress through the CD&E phases to ensure relevance of the concept.

Basic relevant characteristics of a project are that:

- It has a tangible output.
- Its scope is limited, it has a specific, limited objective;
- It has a relatively short timeline;
- It has a relatively limited number of stakeholders; and
- Its problem space can be identified and managed.

If you find your CD&E project begins to “push” these boundaries, you should review the basis for the concept and assess its validity.
Six constraints bind projects, even concept development projects: Time, Scope, Resources, Quality, Benefit and Risk. These factors are essential to success in the CD&E and cannot be ignored, to do so places the project manager (i.e. concept developer) at risk of failure.

- **Time:** How much time is required or available?
- **Scope:** What are the characteristics required of the concept? To what level should address the problem at hand? What level of fidelity is required? What is the work or level of effort required to deliver the concept?
- **Resources:** What tools, people and processes/technology are required? How much funding is needed to secure required resources?
- **Quality:** How does the concept address the problem/requirement?
- **Benefit:** Does the concept contribute appreciably to the body of knowledge and/or does it improve operational or strategic capabilities?
- **Risk:** Does the concept create potentially negative impact? How and to what level does the concept impact current or projected strategic development or operational requirements?

Successful CD&E is a function of good management as a project with a defined end and goal. Effective project management of the CD&E processes acknowledge that it is a conditions-based process while enabling the Concept Developer to maintain momentum throughout the CD&E process. This is paramount to ensure relevance of the concept upon completion, ensuring Alliance and national resources are not squandered and that maximum effect may be achieved. The remainder of this chapter will address considerations for project management and discussions of processes and activities which enable concept development.

**CD&E Project Management Processes and Activities**

Several specific processes and activities facilitate a project management approach for a CD&E process. These processes and activities may occur throughout the development and experimentation process. They are identified below to provide emphasis and context for discussion of the CD&E methodology. Processes and Activities discussed are:

- Reviews and Decision Processes
- Evaluation Processes
- Revision Processes, and
- Approval Processes
Reviews and Decisions

Various reviews and decision processes are executed throughout the process. The concept developer may wish to establish internal checkpoints and milestones at critical points throughout the development process. Checkpoints and milestones serve to define key elements or activities and assist in managing tasks and alignment to components of the concept. The primary function of reviews and decisions include:

- Assess concept relevance: ensuring the problem or gap, scope and approach remain relevant to the task and consistent with Alliance goals.
- Approve further effort or resources: ensuring availability of resources and aligning allocation based on continued relevance of the project.
- Assign or adjust project roles: this may include designation of the project lead, sponsor or other key personnel as well as assignment of staff to the project.
- Assess linkage or relevance to other projects or efforts: addressing potential linkage to other concepts, experimentation or analysis activities or Alliance goals.

Evaluations

Evaluation is a constant process punctuated by a formal “Red Team” review of the Initial Concept at the end of the Research phase and an in-stride evaluation of the Detailed Concept at the end of the Development Phase. Initial research should focus on gathering material from which to form the concept. As the concept evolves, discussions with the experts will increasingly focus on evaluating the ideas that define it. This informal front-end evaluation is key to the development of a concept that will withstand review. The more expert feedback you incorporate into the first draft of the concept, the stronger it will be.

Red Teams. Red Teams can provide evaluations as a viability check for the concept. If the Red Team review is the first time the concept gets an external look, it can be a significant event with the potential to cause your team to restart the effort. If you have already considered input from a wide audience during the research and writing of the first draft, then it is likely the Red Team review will help refine rather than reorient the effort. The concept cannot be written in a vacuum. Eventually, it must gain acceptance as being viable and worthy of further testing and evaluation. The Red Team can be an initial gate to the wider NATO community.

In-Stride Evaluations. In-stride evaluations are conducted throughout the development process by SMEs or other parties providing review and comment to the development project team. Such evaluations enhance exactness in development and provide qualitative and quantitative elements designed to provide an objective assessment of the concept’s viability. Often and in-stride evaluation will be conducted as a war game wherein the concept need not “win”, but the results should provide evidence to support

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8 Four components of the concept are: 1) motivation for the concept; 2) intention, aim or purpose of the concept; 3) the proposition or premise of the concept; and 4) the actual proposed idea or approach recommended by the concept.
further investment in all or part of the concept. Remember, the concept is simply a proposed solution that, even after approval, could be subject to testing and evaluation.

**Revisions**

The revision process for capability development is a constant, iterative process. Planning sufficient time for revisions will enhance the relevance of the concept and serve to gain increased support for its development. After each evaluation, it is advisable to allow a sufficient window for comment. Generally, at least three weeks to revise the concept in response to the feedback is recommended. The evaluate-and-revise cycle may be repeated several times, as different aspects of the concept evolve and are tested.

**Approvals**

Approvals signal indicate progress on development of the concept. More formal approval processes include milestone briefings and status updates, however informal approval processes may be used as a means of maintaining momentum of the project. Generally, approvals will result in two decisions or directions for the project:

- Approved for continued staffing: If sufficient experimentation has already been completed, or if the concept does not require experimentation (typical for Capstone Concepts), the approving authority is confirming that the concept is mature enough for staffing and progress to the next stage.

- Further work required: additional work may be necessary. This decision should be accompanied by specific guidance and direction on what to address or identification of signal deficiencies in the concept or process.
CHAPTER 5 – CONCEPT DEVELOPMENT METHODOLOGY

The methodology presented in this handbook (depicted in Figure 9) is a condition-based process consisting of five primary phases. This methodology provides a context and process for maturation of the concept from an initial idea or concept proposal to an approved final concept, prior to capability implementation. The methodology is preceded by a “pre-initiation phase” and followed by a “post-approval phase” to capture activities, which, though essential to the successful development and implementation, are not directly associated with the development of the concept.

Figure 9. Concept Development Methodology

The methodology is designed to be flexible and as such is tailorable to a concept’s or organisation’s specific needs. For example, depending on the scope of the concept and its constraints, CD&E activities and timescales for each stage will vary. The methodology prescribes concept reviews at the end of each stage to review progress and facilitate decisions on whether to progress, rework, defer or stop a development.

Figure 9 “maps” the methodology into distinct phases, each resulting in defined products. This enables integration of the integrated multi-discipline team by depicting specific tasks, processes and outcomes. These are described in detail later in this chapter. Phase products facilitate involvement of higher authority levels, which may be determined based on the scope, scale and impact of the CD&E effort.

Successful employment of this methodology is enabled by managing the capability project in execution. Effective project management is essential to concept development and it is highly recommended that a concept be managed like a project. This enables the concept developer to plan, monitor and control activities, resources and risks required to develop a concept within budget and timescale constraints with a dedicated project manager and budget articulated in a Concept Development Plan that is regularly reviewed and updated.
This chapter decomposes each phase of the concept methodology to describe the purpose and outcomes of the phase and its relationship to preceding and successive phases. Within the discussion, activities will be presented as Management or Development related. Separation of management and development activities may not be clearly defined based on CD&E project topic, scope, scale and approval level, however, activities depicted are nonetheless necessary to support the CD&E process. It is beneficial for concept developers and managers of CD&E projects to understand the work done in each area to generate synergy and enhance the effectiveness and efficiency of CD&E processes.

**Pre-Initiation Phase**

Prior to initiation, the concept developer must establish conditions upon which to begin CD&E. This is a dynamic period in which the developer assesses trends in technology, military science, economics and political events impacting the Alliance. Several sources are available to the developer to aid in identification of potential shortfalls, gaps or inadequacies in the library of NATO concepts. These can include but are not limited to:

- NDPP output;
- NATO Summit Declarations and supporting comments or papers;
- Schedules, reports and analyses of NATO exercises and evaluations;
- Reports by the NATO Joint Analysis Lessons Learned Centre (JALLC);
- NATO Defence College (NDC) initiatives and insights;
- Supreme Allied Commander Europe (SACEUR) guidance such as the SACEUR Annual Guidance for Education, Training, Exercise and Evaluation (SAGE);
- NATO analyses and guidance such as the Strategic Foresight Analysis (SFA) and Framework for Future Alliance Operations (FFAO);
- NATO Science and Technology Office (STO) and NATO Industrial Advisory Group (NIAG) research documents, and
- National analytical and assessment reports.

**Management Activities:** The extent of Management involvement in the Pre-Initiation Phase depends on the specific areas for investigation, it can be very minimal or it may be very engaged and directive. An essential aspect of management in this phase is the necessity to maintain awareness on resourcing and budgetary processes, an aspect which continues throughout the process. Management’s efforts develop understanding of the CD&E processes, and timings and resourcing, will ensure supportability and sustainment of the project.
**Development Activities:** Activities in this phase focus on the concept developer addressing any perceived shortfalls in the body of knowledge. In the pre-initiation phase the concept developer must:

- Maintain visibility on related activities and relevant trends in the Alliance and member nations. Actively identifying current and future operational trends will help to establish context for concept development work and will help determine potential shortfalls or gaps that may benefit from additional conceptual thinking.

- Research and study the existing body of knowledge. This should include reviewing Joint Analysis and Lesson Learned Centre (JALLC) reports and feedback or direction and guidance from NATO operational commands, as well as concept development centres within NATO and partner nations. The concept developer should actively conduct inquiries and analyses of technological and sociological trends which could influence the Alliance or create opportunities today or in the future.

- Understand the roles and relationships of the NATO Command Structure (NCS)\(^9\) and NATO Force Structure (NFS)\(^10\) as they relate to the overall processes for defence planning and capability development. This can assist in the identification of stakeholders. Strategic and operational communities can provide relevant insights on potential shortfalls and solutions.

- Build a community of interest consisting of subject matter experts, staff officers, industry and academia. Where possible consider accessing expertise both internal and external to the Alliance. The community will serve as a nucleus for concept development efforts. Create relationships with those individuals and organizations who will help in developing the CD&E project such as: COEs; the Joint Warfare Centre (JWC) and Joint Force Training Centre (JFT), NATO's JALLC; and national concept and capability development centres.

- Use OA and Experimentation staff to advise you on potential analysis and experimentation support requirements. At this stage, defining the levels of support and engagement and articulating these to senior leadership in order to secure key resources is a proven key to success.

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\(^10\) [https://www.nato.int/cps/en/natohq/topics_69718.htm](https://www.nato.int/cps/en/natohq/topics_69718.htm)
Developing the Concept Plan and Resource Request

For NATO Concepts, the Pre-Initiation Phase results in the development of a CONCEPT PLAN and RESOURCE REQUEST (CP&R) and presentation to the ACT Concept Development Branch Head. The CP&R clearly lays out the following key elements to inform the decision whether to proceed and allocation of resources to initiate the process. The CP&R includes the following information:

- Statement of the problem or purpose
- Justification for the CD&E project
- Identification of stakeholders and recommendations on sponsorship
- Timeline for development
- Initial resource estimate

**Outcome: The Concept Plan and Resource Request**: The Concept Development Branch Head can provide access to or authorize initial resourcing for CD&E based on their understanding of the requirement and potential for benefit to NATO. The CP&R is not developed to the level required for the Concept Proposal; however, effort spent on developing the plan and analysing resource requirements support the Initiation Phase and signal greater potential for a successful CD&E project. A more complete and detailed CP&R better informs the Branch Head’s decision process. Based on clear understanding of the requirement, a defined way ahead and a Rough Order of Magnitude (ROM) level cost estimate, the Branch Head may authorize initial resourcing to move to Initiation. Approval of the Concept Plan and Resource Request triggers formal Initiation Phase.

**A NOTE ON RESOURCE ESTIMATION**

In the Pre-Initiation Phase, resource requirements are given at a “Rough Order of Magnitude” (ROM), generally accepted as an estimate in the range of -25% to +75% of the estimated cost.\(^\text{11}\) As more information becomes available in execution, this estimate is refined to narrow the margin and increase accuracy. Often the best sources for estimates at this level are projects of similar scope. The ACT Concept Development Branch can assist the concept developer in identifying similar projects and costs for this purpose.

Approval of the Concept Plan and Resourcing Request by the Branch Head may release initial planning resources under the control of the Branch Head and triggers the next phase: INITIATION.

Initiation Phase

The Initiation Phase explores the problems or opportunities the concept will address or exploit and develops the plan for concept development. This is expressed within a CONCEPT PROPOSAL, the output of this phase, which triggers the Research Phase.

Figure 10. Initiation Phase Activities

Figure 10 depicts the Initiation Phase and its key processes. The formal initiation process expands upon the pre-initiation work providing greater fidelity to the project. Work in this phase is captured in interim products that feed into the Concept Proposal at the end of the phase:

1. Stakeholder Analysis
2. Problem Statement
3. Concept Development Resource Proposal

The Concept Proposal is reviewed electronically by the CD&E Working Group which can advise the Campaign Steering Board (CSB) in its consideration. The CSB assesses the proposal and determines its priority and allocates resources required. If the CSB concurs with the proposal, it may be necessary to forwarded to the NATO International Military Staff (IMS) where it may be formally accepted into the NATO programme of work. Strategic or Capstone Concepts are the most likely candidates for IMS approval while Operational or Functional Concepts are most likely to form part of a Capability Development Programme. Typically, if Concept Development is encompassed in a broader Capability Development Programme.
Development programme already authorised by the Military Committee, IMS approval is not necessary.

**Management Activities:** During the initiation stage, Management should be focused on engaging leadership, developing the overarching programme and properly scoping the project. This is done in coordination with the concept developer. A project manager/concept developer then engages with the CD&E Working Group which assesses the CP&R and other information on the project to identify opportunities to address Alliance high-value CD&E requirements and harmonise the project with related Alliance and National projects. Input from the CD&E WG informs development of a Resourcing Plan which is included in the Concept Proposal presented to the ACT Campaign Steering Board (CSB) at the completion of the Initiation Phase.

### THE CONCEPT DEVELOPMENT AND EXPERIMENTATION WORKING GROUP (CD&E WG)
Reference: ACT Directive 10-1, 9 March 2018

Governed by Terms of Reference established in March 2018, the CD&E WG organized under the HQ SACT and supported by SHAPE and National CD&E representatives. The CD&E WG provides a clearing house function to identify Alliance high-value CD&E requirements and to harmonise and coordinate NATO CD&E requirements and activities. The CD&E WG reviews past and monitors current CD&E activities and assesses CD&E project proposals for technical validity, identifying opportunities for synergy with national and multinational activities and providing recommendations to the ACT Campaign Steering Board (CSB) for inclusion in the ACT and, when appropriate, NATO programme of work.

### ALLIED COMMAND TRANSFORMATION BOARDS AND DECISION FORUMS
Reference: ACT Chief of Staff Order for ACT’s Battle Rhythm, 3 August 2016

ACT employs two primary boards to manage NATO’s transformation programme of work. A key aspect of this is determining need for and resourcing of CD&E efforts. The **Campaign Steering Board** (CSB) reviews strategic aspects for ACT work, assessing effectiveness and sustainability of output. It is a decision-making forum which actions recommendations provided through the CD&E WG. The **Executive Decision Board** (EDB) actions recommendations of the CSB, identifies topics for joint SACT/SACEUR/CMC consideration, and validation of the ACT Campaign Management Plan (CMP).

Within ACT, the concept may be associated with one of the six ACT Focus Areas\(^\text{12}\) and a Flag Officer of Primary Responsibility (OPR) is assigned accordingly. The OPR becomes the Concept Senior Sponsor/Champion throughout the development process he will confirm or assign an individual to develop the Concept Proposal.

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\(^{12}\) The Supreme Allied Commander Transformation (SACT) identified 6 Focus Areas: Command and Control (C2), Logistics and Sustainability, Collective Training and Exercises, Partnerships, Capabilities and Human Capital. (SACT Commander’s Intent and Vision, 17 February 2017)
**Development Activities:** Explore the problem or opportunity to be addressed by the concept. Annex A to this handbook provides several example questions to assist in the exploratory process, understand why the problem or opportunity exists, define its scope, nature and impact and understand its significance.

Conduct preliminary research to review the origins of the Concept Request including Capability Shortfall, Operational Issues and Lessons Learned reports. Use the Community of Interest\(^{13}\) and stakeholders to identify related concepts and existing solutions; this will help define the scope of the concept. It is possible a new concept is not required.

Set up an Initiation Meeting to review these questions and identify stakeholders or SMEs to help. Invite Concept Development, analysis and experimentation representatives to this meeting to provide advice. These will help form the core team.

Identify stakeholders (those who may affect, be affected by, or perceive themselves affected by development of the concept) and champions (i.e. proponents for the project). This is important to understanding the boundaries of the project and identifying synergies and relationships that can have an impact on the concept development process.

Engage with stakeholders and SMEs through interviews, surveys and workshops to help understand the problem. Stakeholders can be drawn from NATO organisations (e.g. COEs, Nations, Industry and Academia) who may already be working in this field or can provide support. Establishing this network or COI enables them to provide advice and support throughout the CD&E process.

Develop or refine initial resource requirements. While these may not be firm enough to apply definitive resourcing to the project, continued refinement of requirements (e.g. personnel, time, and funding) is essential to maintaining support for the project as well as ensuring effective and efficient utilization of Alliance and supporting national resources.

Develop and submit a formal proposal for review and approval to the Branch Head. Based on the level, scope and potential impact of the concept, formal approval (and resourcing) decisions may be made at various levels managed by HQ SACT via the CSB.\(^{14}\)

- Assistant Chief of Staff (ACOS)
- Chief of Staff (CoS)
- Bi-Strategic Command (Bi-SC)
- Senior NATO Body (i.e. MC)

Approval of the Concept Proposal triggers formal initiation and progress to the Research Phase. Annex A to this Handbook provides practical examples and considerations for developing the Concept Proposal. Considerations for development of the Concept Proposal are elaborated below.

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\(^{13}\) A Community of Interest or COI is an informal network of individuals (or possibly organizations) operating in association with one another to address a common goal, share information and knowledge to interactively pursue a common goal or end.

\(^{14}\) MCM-0056-2010
Developing the Concept Proposal

The Proposal is a clear statement of the challenge the concept is to address, a clear outline of the problem, the scope of the concept (what is and what is not within the purview of the concept), a high-level outline of a solution, and a plan of action to include resource requirements. In developing the Concept Proposal, the concept developer should:

- Create deeper understanding of the problem space.
- Link the concept proposal to current NATO doctrine, concepts, defence planning and capability development activities, and to national concept and capability development activities.
- Solidify the community of interest (COI) and network for CD&E with regard to the proposed concept.
- Continue to develop the stakeholder analysis\(^{15}\) to identify and refine nations, organizations, agencies, inter alia who may have a vested interest in the project and, through the analysis assigns levels interest to each.
- Identify a sponsor for the CD&E project and engage their support.
- Identify the core team for the CD&E project.
- Formalize the initial Concept Plan as a CD&E project plan indicating:
  - Key milestones and decision points.
  - Proposed product delivery dates.
  - Key resourcing requirements.
  - Initial plans for COI engagement (i.e. workshops, conferences, etc.)
  - Synchronization with key events necessary for successful implementation including but not limited to: key meetings of NATO approval bodies, inter alia, MC; key decision or information events (e.g. NATO Summits or conferences); significant exercise or modelling and simulation events
- Prepare for review. This is the essential step in gaining approval of the concept Proposal.
  - Pre-brief key stakeholders on the concept's viability and importance. The best way to do this is by engaging each individual.
  - Have a senior member of your chain of command engage a peer within the staff responsible for concepts in each of the stakeholder organizations to solidify acceptance of the Proposal.
  - The key to success is to make the case with a fact-based description of the current or future problem (capability gap) that cannot be solved using current methods.

\(^{15}\) The ACT Office of Strategic Management (STRATMAN) has developed stakeholder management methodologies that may be used to facilitate this process.
Review and approval of the Concept Proposal constitutes **Decision Point (DP) 1** (Approval to Proceed) of the CD&E Process and triggers the Research Phase.

**Experimentation and Analysis Activities:** Use methods identified in the [NATO Alternative Analysis (AltA) Handbook](#) such as concept mapping, brainstorming, and star-bursting to engage with stakeholders and help explore and define the problem space the concept will address. In existing areas or topics which are being reviewed or ideas that may have been previously explored, this may be complimented by early discovery experimentation.

**Outcome: The Concept Proposal:** The Initiation Phase results in the **Concept Proposal** (see Annex A). The Concept Proposal clearly and concisely describes the problem the concept will address, its scope, and includes the initial project plan. The use of diagrams is encouraged to help articulate this information. The proposal should be vetted with the stakeholder community to ensure key points are consistent with the views of the community. The Concept Proposal is briefed successively to the Concept Development Branch Head and the CSB. Approval by the CSB and allocation of resources to the project triggers initiation of the **RESEARCH PHASE**.
Research Phase

The objective of the Research Phase is to produce an **INITIAL CONCEPT** by refining the problem and identifying potential solutions. It builds upon the Concept Proposal and project plan to develop a formal project plan, which is a living document to guide the CD&E process. As a living document, the project plan will be updated throughout the project ensuring relevance and consideration of external factors impacting the CD&E project.

**Figure 11. Research Phase Activities**

Figure 11 shows recommended activities associated with the Research Phase discussed below. Work in this phase is captured in interim products that feed into the Concept Proposal at the end of the phase:

- Concept Development Plan
- Experimentation and Analysis Support Plan

**Management Activities:** Although some level of research incorporated into the pre-initiation and initiation process, the dedication of a prescribed phased in the CD&E methodology acknowledges its dependence on disciplined research. Through approval of the Concept Proposal, leadership acknowledges and agrees the need for the CD&E project. Activities in the research phase inform development of the solution. They ensure sufficient rigor is applied to developing potential solutions that define the Initial Concept, the primary output of this phase.
Beginning with the Research Phase, the CD&E project can be seen as a “spiral” through which increasing knowledge gained through research requires regular assessment and refinement of the problem space. This is a process of “progressive elaboration” whereby knowledge gained through execution of the CD&E methodology itself serves to further refine requirements, solutions and approaches. This is graphically demonstrated in Figure 12 below.

Figure 12. Spiral Development through Concept Development Phases

During this phase, the concept developer must be prepared to make decisions to down-select solutions, by discarding those identified to be too complex, too expensive, or unrealistic given identified constraints and assumptions. The CD&E project lead should make every effort to maintain progress and to avoid “paralysis by analysis”. The most valuable concepts are those delivered in a timely manner with sufficient details as to be relevant to the task; a “perfect” concept delivered late is of little value. Major Issues should be brought to the attention of the appropriate oversight body, which may be BH CD, Capability Development Programme Manager, CSB, or the MC.

Progress on the project is facilitated through iterative review informed by the research and development activities. There are essentially three possible decisions based on the Initial Concept Document and Campaign Plan:

- **Approval to Proceed**: If approved, the concept moves to the Development Stage. Appropriate resources are assigned.

- **Cancel or Hold**: A “Cancel” decision should be made if the research has shown a new concept is not required. A “Hold” decision should be issued if development should be postponed (e.g., lack of resources). Periodically, the concept status should be re-evaluated.

- **More Information Required**: This would require the Concept Team to do additional research, or further elaborate on the Initial Concept Document and Campaign Plan. The revised documents are submitted for reconsideration.
These decisions are also reflected on a higher level in the processes for approval at Decision Point 1 and Decision Point 2.

**Development Activities:** Conduct a Kick-off Workshop bringing together the COI and establish the Core team\(^ {16} \). During the workshop, review the Concept Proposal and consider feedback from the Initiation Phase review. Encourage the team to ask questions, identify issues for consideration, and ensure there is a common understanding of the aims. Review the Concept Proposal, project plan, check timescales, resource availability and agree what support is needed.

Review the problem definition. It can help if the definition is broken down into more manageable parts with defined aims or objectives. Seek further information on the problem and potential solutions by conducting research and a literature review using sources such as: NATO policies, public declarations, military professional journals, national concepts, academia, research and technology (R&T) assessments, intelligence estimates, and open source publications. This research should be ongoing throughout the process.

Continue stakeholder engagement and expansion. This will help reinforce the COI and identify linkages with other activities that have relevance to your work.

Use a literature review and stakeholder engagement to help identify potential solutions. Consider solutions to the problem from across the DOTMLPFI spectrum. Document research and justifications for why potential ideas or solutions were rejected or accepted. This will support arguments and provide the evidence to support the concept’s development and implementation.

Arrive at a detailed definition of the problem space and viable DOTMLPFI solutions through progressive elaboration. Results of this work are combined into an Initial Concept that describes the problem, identifying potential solutions, presenting initial recommendations and outlining initial thoughts on implementation of the concept. Use insights gained through the Research Phase to refine the scope of the concept and resource requirements resulting in improvement to the CD&E project plan. Essential tasks include:

- Refinement of project scope and resource requirements;
- Expansion of the COI and Stakeholders;
- Assessment of exercise and experimentation requirements and opportunities based on review of ETEE plans;
- Identification and engagement with SMEs; and
- Management and control of resources (funding, personnel, time, etc.).

Prepare the formal CDP (see Annex A) identifying key activities, milestones, outputs, resources and risks. Use analysis and experimentation, leveraging their respective specialisms to inform planning and consider the need for any ongoing working groups to support concept development. Ensure the CDP is consistent and includes

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\(^ {16} \) Concept Champion, Concept Sponsor, Concept Developer, Program Manager, Project Manager, OA and OPEX representatives, Subject Matter Experts (SMEs)
activities and resources that will properly develop and test the solutions. Socialize the Initial Concept with the core team and COI through running regular progress meetings and staffing

**Experimentation and Analysis Activities:** Use analysis and experimentation communities to help explore the concept’s analysis and experimentation requirements. This includes:

- Applying AltA techniques to refine the problem and identify possible solutions.
- Using option analysis methods to compare solutions.
- Developing metrics (e.g. Measures of Performance (MoPs), Measures of Effectiveness (MoEs)) to support future analysis and experimentation activities.
- Running a discovery experiment to better understand the problem, explore the capability gaps, define the operating environment, or outline potential solutions.
- Identifying future exercises and/or other venues that could be used to conduct experimentation.
- Considering analysis and experimentation approaches that could be used to further test and validate the concept, which may include models or simulations.

**Outcome: The Initial Concept:** Describe the concept design concisely and logically with a clear problem description, scope, evidence and the potential solutions within the Initial Concept document (see Annex A). An Initial Concept should be presented to the Branch Head Concept Development who can assesses the concept for validity and review the approach outlined in the CDP. Acceptance of the Initial Concept triggers the **DEVELOPMENT PHASE**.
Development Phase

The Development Phase evolves further ideas laid out in the Initial Concept document and matures them into viable solutions. The main aim in this phase is to determine how a specific solution could address the problem or exploit the opportunity. This must include evidence justifying the selected solution. Further research and assessment activities are conducted throughout this phase, maturing the concept sufficiently in preparation for formal staffing (DRAFT CONCEPT version 0.5). Figure 13 shows recommended activities associated with the Development Phase. Development of the concept will also drive update to the CDP. Several workshops and conferences are identified, acknowledging the need for integration across development, experimentation, and analysis. Key to success is an “experiment event” that provides critical feedback for the process. It is also in this phase that initial consideration is given to implementation with the development of an initial Concept Implementation Plan.

![Diagram showing Development Phase Activities]

Figure 13. Development Phase Activities

Figure 13 shows recommended activities associated with the Development Phase discussed below. Work in this phase is captured in interim products that feed into the Draft Concept, version 0.5 at the end of the phase:

- **6** Concept Development Plan (Update)
- **7** Concept Implementation Proposal incorporated into concept as DOTMLPF elements of the concept
Management Activities: Throughout the Development Phase, the concept should undergo analysis and testing of solutions. As in the Research Phase, the concept developer must be prepared to down-select solutions, discarding those deemed unsuitable. Early qualification of solutions in this phase will enhance the effectiveness and efficiency of the Refinement and Validation Phase.

Activities in the Development Phase result in the Draft Concept. This is prepared for socialization and staffing within the COI and with SMEs who provide a detailed review and critique of the Draft Concept.

Development Activities: Allocate writing and research assignments across the CD&E project team. This can be facilitated through workshops; however, resource requirements may place restrictions on the project. Make maximum use of technology to conduct virtual meetings or engage the project team through collaboration platforms such as Microsoft SharePoint®. Information sharing and collaboration are essential to timely development of a comprehensive concept. The ACT Concept Development Branch can assist the concept developer in identifying collaboration resources to facilitate execution of this phase.

Maintain situational awareness on time and resources available to the CD&E project. This is particularly important to ensure alignment to experimentation opportunities and events, which will be engaged in the Refinement and Validation Phase.

Further develop potential solutions described in the Initial Concept by conducting additional research, literature reviews and further stakeholder engagement. Record evidence that strengthens or weakens potential solutions, to help you prioritize solutions for further development and testing. Based on the scope of the concept, this is a likely opportunity to conduct stakeholder workshops to review the research, refine the concept and agree the solutions for evaluation.

Maintain good communication and engagement with stakeholders promoting the concept, seeking feedback on solutions and identifying collaboration opportunities. For example, there may be activities in other areas or projects such as conferences, workshops or exercises that may be used to support your concept's development.

Develop scenarios and vignettes, which will provide a representative environment to test the concept within any analysis and experimentation activities. This will help ensure the solutions are tested against the problem the concept was designed to address. NATO defence planning, the Strategic Foresight Analysis Framework for Future Alliance Operations reports, NATO Exercises, and other CD&E activities can be a source of scenarios. Consider using a Scenario Workshop with the COI to develop and review material for its relevance to the problem.

At this point, the CD&E project team starts to develop proposals for concept implementation. Although implementation is beyond the scope of the CD&E methodology, the project team is nonetheless in the best position to identify potential synergies, issues and processes either facilitating or inhibiting successful implementation of the concept. Development of the concept implementation proposal may prove useful in development of
the DRAFT Concept by enabling advance identification of potential issues which may be avoided or mitigated through the development process itself.

Essential tasks in this phase include:

- Concept development (i.e. writing);
- Exploration, assessment, and down-selection of solutions;
- Limited experimentation and analysis focused on solutions;
- Benefits and Risk assessment;
- Initiation of a Strategic Communication Plan;
- Engagement with SMEs;
- Coordination of interim concept staffing; and
- Management and control of resources (funding, personnel, time, etc.).

**Experimentation and Analysis Activities**: Test solutions by implementing any analysis and experimentation activities that were planned. This will require the support of the appropriate staff including:

- Solution Analysis – use option analysis methods (e.g. multi-criteria decision analysis) or models and simulations to compare solution effectiveness.
- Hypothesis Experimentation – hypothesis testing experiment(s) to compare solutions against a baseline. This activity can involve significant planning and resources; Planning Conferences are usually necessary to design and review experimentation plans. Key documents including the Experiment Design Document (EDD) and Data Collection & Analysis Plan (DCAP) support experiment execution.

Outcomes from these activities typically consists of both quantitative\(^{17}\) and qualitative\(^{18}\) measures demonstrating how well the solutions address the problem. Outcomes provide evidence justifying or validating the need for the concept, evidence to support further refinement, and help the concept developer to express the concept’s overall benefits and risks.

Outcome: The Draft Concept, version 0.5: Developing the DRAFT CONCEPT document (see Annex A) is an on-going effort throughout this phase. The concept developer should ensure clear definition of the problem, and identify and discuss potential solutions. Solutions should be analyzed through experimentation to “down-select” or refine to those most relevant,

\(^{17}\) Relating to, measuring, or measured by the quantity of something rather than its quality. (OED, https://en.oxforddictionaries.com/definition/quantitative)

\(^{18}\) Relating to, measuring, or measured by the quality of something rather than its quantity. (OED, https://en.oxforddictionaries.com/definition/qualitative)
realistic and employable. Results are structured as the concept and presented to highlight benefits, risks and issues that may need to be addressed in follow-on testing, evaluation and development.

In developing the DRAFT CONCEPT, think carefully about the structure, length and content as it will be reviewed by stakeholders (including other Nations) who may not have been part of the COI. At this point, consider using a Writing Workshop and critical analysis techniques (e.g. Concept Testing) to help plan, write and review the document and review of drafts with the COI.

Throughout the Development Phase, the Concept, Concept Development Plan and Concept Implementation Plan are evaluated “In-Stride” assessing the need for and quality of the concept as well as to determine the credibility of the development and implementation plans. Successful approval will ensure progress to the REFINEMENT and VALIDATION PHASE.
Refinement and Validation Phase

The aim of the Refinement and Validation Phase is to revise the concept until it is sufficiently mature that it can be formally tested in a representative operational environment. This results in a VALIDATED CONCEPT, version 0.9 with evidence demonstrating the concept effectively addresses the problem and presents a plan for its implementation as a capability. Development, refinement and validation of the concept are supported by reviews and updates to the CDP and the Concept Implementation Plan. As in the Development Phase, workshops, conferences and exercises support refinement by providing feedback into the process. Figure 14 shows recommended activities associated with the Refine and Validate Phase.

Figure 14. Refinement and Validation Phase Activities

Figure 14 shows recommended activities associated with the Refinement & Validation Phase discussed below. Work in this phase is captured in interim products that feed into the validated Concept at the end of the phase:

8 Concept Development Plan (Update)
9 Concept Implementation Proposal Update incorporated into concept as DOTMLPFI elements of the concept
Management Activities: Through the Refinement and Validation Phase, Management focuses on facilitating additional staffing with experts and key leadership. Consideration should be given to formally presenting the concept to staff involved in validation through a workshop or other event. This provides an opportunity to orient staffing proponents to the problem space. Understanding the context enables detailed discussion addressing concerns over solutions identified, fidelity of the concept or the development process itself.

Later in this phase, implementation of the Strategic Communication Plan may be an important management task. By effectively communicating the purpose, intent and progress of the concept to stakeholders and interested parties should positively influence resourcing decisions.

Development Activities: The activities conducted are similar to those conducted during the Develop Phase with ongoing research, solution development and testing being conducted via analysis and experimentation. However, the concept’s solutions now be more refined and mature and the testing is likely to be more extensive due to the need to demonstrate it within a representative operational environment.

Conduct reviews of the problem statement and context for the concept with the core team ensuring continued validity and relevance and check whether any underlying assumptions have changed. Feedback from Development Phase activities, including In-Stride evaluation help identify weaknesses within the concept and inform refinements to better address the problem. Continue research (focusing on identifying and addressing any concept limitations or identifying enhanced solutions to the problems. Revisions to the concept at this stage focus on clarity of solutions and specific responses to identified issues.

Prepare for formal concept testing part of the validation process in conjunction with operational analysts participating in the development. The process for concept testing is addressed below.

Experimentation and Analysis Activities: Experimentation and analytical activities in this phase focus on testing and validating solutions against the defined problem set. These activities may include:

- Exercise-based experiments
- Concept Development Assessment Game (CDAG) or
- Models, simulations or wargames.

Due to the technical nature of these activities, the experimentation and analysis communities have an important role in their successful execution. Specific considerations for experimentation and analysis involvement are addressed in Chapter 6 (Key Enablers for Concept Development: Analysis & Experimentation).

Typically, experimentation must be planned and coordinated well in advance and may require significant resource commitment. If you wish to use exercise to support to concept development then this will need to be de-conflicted with exercise planners through
their Initial and Main Planning Conferences. For larger NATO exercises, this can require 1-2 year’s notice, so this should be considered within the earlier concept development phases. Other validation methods such as models, simulations, and wargames will require planning. Experimentation for concepts directly influencing operational capabilities will very often require validation through exercises or wargames; however, validation of some concepts may suffice with simpler experimentation and analytical approaches. Experimentation and analysis subject matter experts are well-positioned to assist in these areas.

Valid experiments are dependent on development of scenarios and vignettes used to represent the operational environment. Again, experimentation and analysis expertise is a critical enabler to success. The concept developer should engage the stakeholder community to support scenario and vignette development to ensure sufficient rigor in the validation process. This will help ensure the concept is tested objectively and that evidence is generated demonstrates the achievement of objectives in an objective manner. In this phase, the Concept Implementation Plan is reviewed and updated to reflect:

- Integration – Links the concept into existing DOTMLPFI capabilities. Identifies how the implementation will have impact capability development and in-service. And determines associated risks.

- Approval Body Engagement – Determines who needs to be engaged and what information they need to endorse a concept’s implementation.

**Concept Testing** is a structured technique aimed to improve and strength the concept document by maximising the potential of its ideas, ensuring consistency in logic and flow, and ensuring alignment to other DOTMLPFI lines of development. Concept Testing consists of four analytical phases: context analysis, fracking analysis, concept mapping and combined analysis. Through each of these phases the construct and logical development of the concept is tested against each of its four components described in Figure 15 below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>Reason or reasons for acting or behaving in a particular manner</td>
<td>“Sea levels will rise. Coastal populations will be displaced. Government have a responsibility to their citizens.”</td>
</tr>
<tr>
<td>Intention</td>
<td>Aim or Purpose</td>
<td>“Mitigate the effects of sea level rises.”</td>
</tr>
<tr>
<td>Proposition or Solution</td>
<td>A statement or assertion that expresses a judgement or opinion</td>
<td>“Create artificial islands.”</td>
</tr>
<tr>
<td>Proposal</td>
<td>A idea, approach or theory put forward for consideration</td>
<td>“Identify areas of high population density. Raise the ground level. Adapt infrastructure and allow sea level rise to create islands.”</td>
</tr>
</tbody>
</table>

**Figure 15. Components of Concepts for Testing**
Context Analysis provides a broad analysis of the environment in which the product resides. Context analysis starts by ‘grounding’ the concept by understanding the aim and motivation of the author. The aim helps ‘target’ the concept to the information environment while the motivation explains the environment in which the concept sits. This initial broad analysis can be achieved by drawing on the intuition and existing knowledge of the concept team.

Fracking Analysis “fractures” the concept chapter-by-chapter to extract and capture the individual ideas contained within a product to deconstruct the concepts into its basic components. This enables identification of arguments, assumptions and assertions within the product to identify potential weaknesses in the concept and ensuring it is well-argued, logical, orderly, and properly evidenced. This step is important to maintaining the fidelity of the concept as an authoritative document upon which to base strategic, operational and capability development efforts.

Concept Mapping uses results of the fracking exercise to develop a conceptual “mind map” of the relationships between the key ideas within the product. Mapping is a good tool to help reduce complexity and communicating relationships or lack of relationships, visually. The act of mapping also assists in generating findings and insights. A map is not the same as analysis; it simply offers an additional way to interpret a product’s information.

Finally, all testing results are brought together in a Combined Analysis to assist building other aspects of the argument that are missing or to assist in adding to the evidence base of the product. The testing team also confirms the problem space identified is sufficiently address by the developed concept. During this stage, the test team may be augmented with additional Subject Matter Experts (SME) or use additional workshops or brainstorming sessions with the development team to ensure sufficiency of the final concept for validation.

Outcome: The Validated Concept, version 0.9: The Refinement and Validation Phase results in the VALIDATED CONCEPT, version 0.9. This is a detailed version of the concept, which has been validated through thorough experimentation and analysis. This includes any necessary modifications to the concept and the findings from the analysis and experimentation activities. Benefits are identified as well as risks and risk mitigation strategies, where applicable. Depending on its character and scope the concept should be ready for formal staffing. Formal staffing of the concept at this stage will trigger initiation of the final formal phase of the CD&E methodology, APPROVAL.
Approval Phase

Initiated by finalization of the Validated Concept, the Approval Phase focuses on the staffing and final editorial processes required to obtain appropriate level of approval to enter the concept into NATO’s formal body of knowledge. As the final formal phase of the CD&E methodology, this phase also focuses on formal closeout of the CD&E project. It is designed to formally endorse the concept prior to its implementation as a NATO capability. Figure 16 shows recommended activities associated with the Approval Phase discussed below. Included in this phase is the development of project close out documentation and archival of the project information to inform future concept development activities.

At this point, the concept has been developed and thoroughly assessed to ensure it addresses the requirements, appropriately responds to the problem statement and is supportable by the Alliance and its member nations. Indeed, rigor applied in the Refinement and Validation Phase is important to gaining approval of the final product.

Management Activities: Following staffing of the Validated Concept, the CD&E project team will address substantive comments and proceed to finalizing the concept. The concept developer/project lead presents the Final Concept for approval, signaling attainment of DP 2 (Approval and Implementation):
• **Approved for Staffing to the Military Committee:** If sufficient experimentation has already been completed or if the concept does not require experimentation (typical of many Capstone Concepts), the approving authority is confirming that the concept is mature enough for staffing and final endorsement.

• **Further Work Required:** The approving authority may require additional work on the concept before approval or forwarding to the NATO Headquarters. This decision effectively returns the concept back to “Refine Concept” phase.

Coordination begins with the first meetings on the Proposal and continues until final concept approval. It is a constant process of educating stakeholders and process participants on the concept’s benefits.

Management tasks for the Approval Phase include:

- Management of the staffing of the Concept through the NATO Tasker Tracker Enterprise (TTE) other formal programme of record;
- Finalization and presentation of the Concept Implementation Plan (CIP);
- Implementation of Risk Mitigation strategies;
- Engagement and communication with SMEs and key staff;
- Management and control of resources (funding, personnel, time, etc.) and
- Initiation of Project Close-out.

Project Close-out is a significant aspect of the Approval Phase. Formal project close-out cannot be neglected as it sets the conditions for successful implementation and ensures continuity for future concept development activities. Close-out focused tasks include but are not limited to:

- Finalizing resource accounts (i.e. funding and personnel);
- Capturing CD&E project management observations, insights and lessons (OIL);
- Archiving concept and project artefacts including, inter alia:
  - Meeting and workshop information;
  - Draft and interim products;
  - Experimentation and Analysis documentation; and
  - Staffing comments and feedback
  - Stakeholder information.
- Close-out of collaboration sites (i.e. SharePoint® portals, web pages, etc.)
- Presentation of project closure briefing to Sponsor and/or Concept Development Branch Head; and
- Releasing the CD&E project team.
**Development Activities:** Prepare for final staffing of the concept. Focus on any changes to conditions (e.g. strategic environment, operational conditions, technical evolution, etc.) which could influence or delay approval. A final scrub of stakeholders and confirmation of staffing requirements will help identify potential roadblocks to be addressed.

Conduct workshops including the core development team, key stakeholders and the Concept Sponsor. Review feedback from previous Approval Review activities and modify the concept appropriately. Plan what internal and external, national approvals are required, what staff are required to achieve this and how the concept will be promoted to these stakeholders. Upon conclusion of the workshop or other final preparation process, the concept enters formal staffing in accordance with appropriate NATO and subordinate command administrative procedures.

Seek senior approval authority depending on the type and level of applicability of the concept, and to the overall level of effort necessary to implement the concept. Concepts, which require broad transformational changes to NATO’s military capability, are likely to require endorsement by the North Atlantic Council (NAC). Concepts with a narrower focus may have significantly lower level of endorsement. These are considerations, which, if not addressed at the outset of the project, should be addressed at some point in the development process. The Concept Sponsor and ACT Concept Development staff can provide advice in this area.

Engage with national concept developers to ensure national views are identified and addressed in the Final Concept and Concept Implementation Proposal as appropriate. While formal approval for concepts occurs in a NATO committee, individual Nations approve and, more importantly, adopt them for use in development of capabilities or other means. Active involvement with national representatives, therefore, can be an essential “leverage point” in facilitating the final approval process. The Concept Developer and core team may also be required to prepare and deliver papers, briefings and engagements with Alliance leaders at various levels to respond to queries or provided necessary explanations for consideration in the final approval process.

Finalize and implement a **Strategic Communication Plan** to promote the Final Concept to stakeholders from the NATO Nations and external approval authorities. Consider how best to communicate and promote the concept to these parties e.g. websites or formal briefings with review deadlines. The communication and engagement plan should include a mechanism to capture feedback and considerations for addressing issues or comments as identified.

Remain engaged throughout this final phase to ensure timely action to address any potential blocks to approval. Be prepared for the concept to be rejected. In some instances, it may be possible to make minor amendments to address any concerns and re-submit the concept for endorsement. However, if these concerns cannot be addressed, ensure the rationale is captured and can be used to inform future work.

Prepare to close the CD&E project once the concept is endorsed or rejected. Share the final approval authority feedback with the core development team and facilitate a workshop to identify good practice and areas for improvement. Share these lessons and
any key concept documents with the TRANSNET CDE365 community and other interested stakeholders. Update databases and archives with the final concept as well as all data, models, scenarios and reports. Observations, insights and lessons (OIL) as well as actual artifacts (papers, briefings, notes, analyses, etc.) from the project are important elements of the concept development body of knowledge and will be used to inform future CD&E activities.

Outcome: The Final Concept, version 1.0: The Approval Phase results in the FINAL CONCEPT, version 1.0. Secondary outcomes of this phase are a Project Close-Out Report and archived products as discussed above. Approval of the concept triggers a last, informal process encompassing POST-APPROVAL activities. The concept developer should take actions to support the “transition to implementation”.
Post-Approval Phase

Although outside the formal phases of the CD&E methodology, POST-APPROVAL activities are important to supporting transition to and successful execution of the IMPLEMENTATION PHASE. In Post-Approval, the concept developer, in cooperation with the Implementation Authority may refine or develop the Strategic Communication Plan to inform NATO and Nations of the new concept and its relevance to NATO’s mission and goals. The developer and team should also be prepared to assist other offices and agencies involved in adoption of the concept (e.g. NATO defence planning staff, NATO Communications and Information (NCI) Agency, national entities, et al) by providing insights or elaboration on the concept or development process.

It is likely the Implementation Authority will use the developer’s recommendations in the Capability Implementation Plan developed in the course of the CD&E project as a foundation. In this Post-Approval Phase, the concept developer and core team should be prepared to assist by promoting or even further developing this plan to support implementation.

Finally, the concept developer should provide an overall assessment of the adequacy of resourcing levels throughout the project. While the Project Close-Out Report should finalize all resource accounts the overall assessment of resource adequacy may benefit from additional analysis taking into account any time or staff requirements required in the Post-Approval Phase.

Endorsement of the concept by the Senior NATO Body triggers Implementation. Implementation is not part of CD&E process and is usually the responsibility of an operational entity, or more usually the Nations (typically the Concept Sponsor’s responsibility). Implementation is usually undertaken by NATO’s and/or nations defence planners, doctrine developers, trainers etc. across the DOTMLPFI spectrum. These staff should have been identified as stakeholders and exposed to the concept throughout its development and helped provide input to the Concept Implementation Plan.

Implementation authorities may need to develop more detailed implementation plans of their own. The concept developer should be prepared to provide additional support and monitor the concept’s implementation. Further support may also be required from NATO Defence Planners to assist in the concept’s implementation by the Nations. For these reasons, the concept developer should maintain close contact with core development team members and stakeholders and ensure completeness of and access to CD&E project archives.
CHAPTER 6 – KEY ENABLERS FOR CONCEPT DEVELOPMENT: ANALYSIS & EXPERIMENTATION

**Analysis and Experimentation** are key enablers for the application of the concept development methodology, providing the ability to iteratively explore, test, refine, and validate concepts. Analysis and experimentation staff should be engaged early in concept development to help select the most appropriate method(s) given the subject under evaluation, the concept maturity level, and any programmatic constraints and limitations. The application of analysis and experimentation techniques is not uniform and is specific to each situation. Figure 17 includes a representative sample of the types of questions concept developers may have along the development process and how analysis and experimentation may be able to support. Details of techniques and methods and further topics of interest are provided as links.

### Analysis

Analysis plays a key role in CD&E activities throughout the concept’s lifespan by bringing structure and analytical rigor to the CD&E methodology. The primary aim of analysis is to support concept developers by providing precise, impartial, evidence-based advice. Within CD&E, this advice is typically used to:

- Help explore the problem,
- Define the requirements for the concept,
- Identify and assess potential solutions, and
- Evaluate the concept’s benefits and risks.

The evidence provided helps to demonstrate whether the concept improves operational effectiveness, improving the likelihood of successful concept endorsement and eventual capability implementation.
Operational analysts use a variety of analysis techniques to help concept developers better understand the problem and provide evidence to demonstrate the effectiveness of potential solutions. These techniques can be very broadly categorized as soft methods; optimization; simulation modelling; statistics and analytics; options analysis and domain modelling with each category containing multiple techniques. The analyst will select the most appropriate analysis technique based on their skills and experience, the concept’s specific needs and project management constraints.

In the Initiation and Research phases, less exacting analysis approaches tend to be used to explore and define the problem, engage with stakeholders and conduct initial research. This includes supporting the design of the concept and determining specific requirements and metrics that the concept should meet.

As the concept matures in the Development and Refinement & Validation phases, analysis techniques are used to explore potential solutions and assess how well they meet the concept’s requirements. Analysis techniques may include options analysis approaches (e.g. Multi Criteria Decision Analysis), simulation approaches and support to hypothesis testing experiments. As the concept is tested in more representative operational environments techniques such as wargaming, virtual simulation, and support to exercise-based experiments will typically be used.

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19 For example, simulation includes techniques such as discrete event, monte-carlo, agent based, process mapping, system dynamics and many other techniques.
Later phases of concept development may also use Concept Development Assessment Games (CDAGs) and Concept Testing approaches to engage with stakeholders to test the effectiveness of the concept and supporting documentation. OA techniques should be applied as part of a wider Analysis and Experimentation plan within the context of the broader Concept Development Plan.

**Experimentation**

Experimentation is a key part of the CD&E process used to support the development and validation of a concept. Similar to analysis, it aims to provide evidence to inform concept development and validation. Experimentation reduces risk to the concept’s development by providing an objective approach to explore problems and assess potential solutions. The evidence generated from experimentation is used to inform and justify the concept’s development and can eventually support its approval and application as a capability.

At its core, experimentation in support of concept development uses controlled investigation to address causes (independent variable), effects (dependent variable), and the relationship between the two as they relate to a problem space. Experiments can help understand and refine causes, they can explore potential expected and unexpected effects, and they can refine and validate cause and effect relationships. To satisfy the investigation of causes, effects, and their relationship, experiments vary in scale from small table-top based experiments or games, lab based virtual simulations to large scale exercise-based experiments. Regardless of the experiment type and environment, a valid experiment should include a clearly stated aim, objective(s) and associated data collection and analysis plan designed to evaluate results.

A well designed experiment will meet the following experiment validity requirements addressing the cause-effect relationship under investigation:

- Ability to use the cause;
- Ability to detect a change in the effect;
- Ability to isolate the reason for change in the effect;
- Ability to relate the results to actual operations.

Experimentation supports the entire concept development methodology through the application of three types of experimentation: discovery, hypothesis, and validation.
Good design and planning is essential to a successful experiment. Experimentation and analysis requirements should be identified early in the concept development process, drawn from the Concept Proposal and reflected in the Concept Development Plan. Clear aims and objectives should be established for experimentation and analysis to ensure they support one another. Experiments should have their aim(s), objective(s), scope, plans and outputs described in an Experiment Proposal for review and approval by the concept developer, sponsor and senior experimentation representative.

If the Experiment Proposal is endorsed, an Experiment Design Document (EDD) should be produced, which is a living planning document that describes the design and execution of the experiment. The EDD should include the experiment aim and objectives (including hypotheses to be tested, if applicable), the links to the overall concept, execution plans, resources required (participants, systems, equipment), test environment, risks and mitigations, supporting tasks and administration aspects. The EDD should include a Data Collection and Analysis Plan (DCAP), which describes the data requirements (including metrics to be measured) and how the data will be collected and analyzed to support the experiment objectives. For smaller scale experiments (e.g. table-top experiment or games), particularly in early stages of concept development, an Experiment Design and Analysis Document (EDAD), a focused version of the EDD, should be considered. Both the EDD and EDAD are drafted by the experiment designer in collaboration with any analytical support.

Every experiment will require planning meetings or conferences with key concept and experiment stakeholders to develop, review and revise the EDD. Larger scale experiments will require more planning, so will require more conferences and larger planning-to-execution lead times. For exercise-based experiments experiment planning needs to be integrated with exercise planning, which can be as early as 1-2 years before the exercise due to the size and significant preparation required. This helps ensure alignment of experiment aims with exercise goals. For more detail on experimenting in

Figure 18. Types of Experimentation Enabling Concept Development
exercises, please see a short ‘GUIDE’ here as well as a link to the ‘Experimenting in Exercises’ page within CDE365, found here.

It is strongly recommended you include analysis and experimentation specialists within your core concept development team from the project’s initiation. For further analysis and experimentation information and support please see:

- NATO Concept Development & Experimentation Collaboration Portal - CDE365
- SACT Analysis staff at Operations Research, Analysis & Assessment Collaboration Portal
- SACT OPEX staff at opex@act.nato.int
- Education:
  - NATO Concept Development & Experimentation Course
  - NATO Alternative Analysis Training Course
ANNEX A – SUPPORTING RESOURCES & STAKEHOLDERS

Supporting Resources

The following are CD&E support resources:

- HQ SACT
  - Concept Development Branch
  - Operational Experimentation Branch
  - Operational Analysis Branch
  - CD&E Annual Conference
  - OA Annual Conference

- Online via TRANSNET
  - TRANSNET-CDE365
  - TRANSNET-Operational Analysis

- Training
  - CD&E Training Course
  - AltA Training Course
  - Portfolio, Programme and Project Management (P3) Course

- Suggestions for Further Reading
  - Guide for Understanding and Implementing Defence Experimentation (GUIDEx)
  - Alternative Analysis (AltA) Handbook

- Conferences
  - Annual NATO CD&E Conference
  - EU Military Staff annual CD & E Conference

Stakeholder Engagement

Good stakeholder engagement is key to good concept development and requires good planning. Use stakeholders throughout the concept development process to help: define the problem; identify and assess potential solutions; develop and review the concept; support the concept’s implementation.

Use the NATO CDE365 community to help identify and engage interested stakeholders. Consider using stakeholder analysis techniques (e.g. brainstorming, influence v interest mapping) to identify and determine how best to engage with them. The concept development team\(^{20}\) should consider engaging with the following stakeholders:

\(^{20}\) Concept Sponsor, Concept Developer, Project Manager, Operational Analyst, Experimenter
NATO

- Allied Command Transformation – advice on CD&E best practice, analysis, experimentation, future strategic trends, scenarios, trends, academia, and industry / COE engagement.
  - Joint Analysis & Lessons Learned Centre (JALLC) – analytical support of operations, training, exercises and experiments. ([http://www.jallc.nato.int/](http://www.jallc.nato.int/))
  - Centres of Excellence (COEs) – specialized expertise and experience to support concept development and assessment. HQ SACT’s Transformation Network Branch (TNB) can be used to engage. A complete listing of accredited NATO COEs may be found at: [https://www.nato.int/cps/en/natohq/topics_68372.htm#](https://www.nato.int/cps/en/natohq/topics_68372.htm#)

- Allied Command Operations – concept sponsors, defence planners, operational feedback, concept review and implementation.
  - Supreme Headquarters Allied Powers Europe (SHAPE) ([https://shape.nato.int/](https://shape.nato.int/))
  - Allied Maritime Command (MARCOM) ([https://mc.nato.int/](https://mc.nato.int/))
  - Allied Land Command (LANDCOM) ([https://www.lc.nato.int/](https://www.lc.nato.int/))
  - Allied Air Command (AIRCOM) ([https://ac.nato.int/](https://ac.nato.int/))
  - Joint Force Command Brunssum ([https://jfcbs.nato.int/](https://jfcbs.nato.int/))
  - Joint Force Command Naples ([https://jfcnaples.nato.int/](https://jfcnaples.nato.int/))

- NATO Agencies
  - NATO Communications & Information Agency (NCIA) ([https://www.ncia.nato.int/Pages/homepage.aspx](https://www.ncia.nato.int/Pages/homepage.aspx))

- NATO HQ
  - NATO Science and Technology Organization (STO) ([https://www.sto.nato.int/Pages/default.aspx](https://www.sto.nato.int/Pages/default.aspx))
  - Centre for Maritime Research and Experimentation (CMRE) ([http://www.cmre.nato.int/](http://www.cmre.nato.int/))
  - NATO Standardization Office (NSO) ([http://nso.nato.int/nso/](http://nso.nato.int/nso/))
  - NATO Training and Education Facilities (NTEFs)
NATIONS

- National CD&E communities – use National Liaison Representatives (NLRs) and Partner Nation Liaison Representatives (PNLRs) to help access these stakeholders and explore if similar concepts are being developed, what lessons they have learnt or what support they could offer. (via TRANSNET CDE365)
- National Lessons Learned Centres

RESEARCH and TECHNOLOGY ORGANISATIONS

- Industry - NIAG
- Academia - STO
- Think Tanks
- IO/NGO
Appendix 1 (CONCEPT DOCUMENTS) to ANNEX A

This Annex presents supporting details and templates relating to concept development.

- Concept Plan and Resource Request (CP&R)
- Concept Proposal
- Initial Concept
- The Concept Document (including DOTMLPFI Implementation Proposal)
- Concept Development Plan

CONCEPT PLAN and RESOURCE REQUEST (CP&R)

Developed by the concept developer for consideration by the Concept Development Branch Head (see Chapter 5), the CP&R is an unstructured document clearly outlining key elements of the concept development plan. It also identifies potential resource requirements on a ROM scale. Based on assessment of viability and potential, the Branch Head may approve initial resourcing and/or authorization to pursue the development effort. Key elements of the CP&R are:

- Statement of the problem or purpose,
- Justification for the CD&E project,
- Identification of stakeholders and recommendations on sponsorship,
- Timeline for development, and Initial resource estimates.

CONCEPT PROPOSAL

The Concept Proposal is a point paper stressing the need for the conceptual idea. Its purpose is to gain the necessary initial approvals for concept development to proceed. It articulates the problem statement and the rough conceptual idea of how to solve the problem. The Concept proposal puts forth a general idea of how to proceed with the development of the concept.
The Concept Proposal should include the following:

- Title
- Motivation - the problem to be solved, requirement to be satisfied, capability to be improved or effect to be delivered and justification for a new approach
- Intention - Description and scope of the concept
- Suggestion of where concept might fit in relation to other NATO concepts
- Initial plan of action and milestones - rough idea of likely development path toward capability

**NOTE**
The “Components of Concepts for Testing” depicted at Figure 15 of the CD&E Handbook provide a valuable framework which the concept developer may wish to consider in developing the Concept Proposal.

**INITIAL CONCEPT DOCUMENT**

The Initial Concept is a starting point, which should present the foundational outline required to develop the mature concept document (Detailed Concept). The Initial Concept Document’s purpose is to provide the foundational outline for the development process and to facilitate senior leadership approval for the concept’s inclusion in the CD&E Campaign Plan. It accompanies the Outline CD Plan. The format of the Initial Concept Document should include, but is not limited to, the following:

- Preface - will later become Executive Summary - one page only
- Introduction
- Concept Statement, Vision or Definition
  - Aim, Purpose & Objectives
  - Scope including limitations
- Background, to include:
  - The Military Problem, Shortfalls or Deficiencies
  - Future Operational Context or Missions or Operational Construct
- Summary of initial literature search
- Linkage to:
  - Strategic Vision and/or Strategic Guidance
  - Other Concepts (as appropriate)
- Principles, Central and Supporting Ideas
- Conclusions
SOME HELPFUL TIPS FOR THE CONCEPT WRITER

- Aim for brevity. A maximum length of fifty pages is a good limit, shorter is generally better.
- Write simple sentences and keep it clear and succinct.
- Avoid creating new words or terms.
- Write a cohesive and coherent paper that links implications of future operations, the challenge, proposed solution, and required capabilities.
- Start with an outline and build on it using easily followed transitions between paragraphs and sections.
- Reference strategic guidance or other concepts rather than restating or quoting unless a specific passage directly pertains to the concept. For example, use a reference as the baseline for the concept’s future operational environment section and amplify with details especially relevant to the concept.
- Use historical vignettes, “callout” boxes, and bold print sparingly. If the concept is new, it is unlikely that you will find a relevant historical example. Callout boxes can be useful to summarize a lengthy chapter or section, but are not necessary when the material spans less than ten paragraphs. Bold print loses its ability to draw the reader’s attention when used more than once per paragraph.
- Follow your structure - there is no single structure for a concept; however, there are generic parts that need to be addressed.
- Assign responsibility for writing the concept to one person to ensure uniform style and accountability.
- Establish a writing team for support which follow a structured approach particularly if a significant number of documents require collection, collating and analysis.
- Consider that staff diversity and turnover rates experienced within NATO could be critical.
The Concept Document is the focused objective of the CD&E project—the Concept. The concept is progressively developed through the life of the project, facilitated by execution of the CD&E Project Management Plan. It is the result of a process of progressive elaboration of the requirement informed through research and the development process itself. Through the life of the CD&E project, formal staffing of the concept results in delivery of interim versions leading to the final, validated and approved concept. The Initial Concept Document described above and approved by the CD&E WG and CSB is the start point for the Concept Document which benefits from the insights and knowledge gained through the iterative review process. Its main purpose is to present the mature concept. The CD&E Methodology indicates three iterative production versions of the Concept Document, version 0.5, version 0.9, and the Final Concept Document. These are the minimum recommended and are intended to assist in progressive elaboration of the concept. Depending upon the factors identified above, the concept developer may wish to insert additional staffing or production checks in the process.

Although planning for and executing implementation are not within the responsibilities of the CD&E effort, the concept developer and his team, will have acquired valuable insights during the development process which will be valuable to implementation. These should be developed into the DOTMLPFI lines of effort addressed in the concept. A proposal for implementing the concept across DOTMLPFI (or Implementation Proposal) is progressively developed through the life of the CD&E project and imbedded in the Final Concept, version 1.0. These considerations should be completed in their fullness within the Final Concept. If necessary, required or desired, they may be compiled into a separate document delivered in conjunction with the Concept Document, version 1.0.

Again, the ACT Concept Development Branch can provide assistance in this regard.

Format of the Concept Document will be dependent upon several factors including:

- Purpose,
- Intended use and audience,
- Scope, and
- Applicability.

The format of the Concept Document should include, but is not limited to:

- Executive Summary
  - Describes main features of the concept
  - Developed after the concept has gone through initial reviews
- Introduction
  - Concept Statement, Vision or Definition
  - Aim, Purpose & Objectives
  - Scope including limitations
• Background, to include:
  o Current state of play, availabilities, etc.
  o The Military Problem, Shortfalls or Deficiencies
  o Needs Statement or Rationale for a capability
  o Gap Analysis
  o Future Operational Context or Missions or Operational Construct
  o Illustrative Example, Scenarios

• Summary of literature search material and conclusions

• Linkage or Relevance to:
  o Strategic Vision and/or Strategic Guidance
  o Other Concepts (as appropriate)

• Principles, Central and Supporting Ideas

• Components, Elements, Characteristics, Attributes

• Necessary Capabilities, Capability Needs and/or Inferred or Derived Requirements

• Conclusions & Assessment to include Recommendations or The Way Ahead

• Review Schedule

• Appendices – as required, may include:
  o Definitions, Terminology, Glossary of Terms
  o Models, Flow Charts, Diagrams
  o Capability Attributes and Metrics
  o Detailed literature search

**CONCEPT DEVELOPMENT PLAN**

The Concept Development Plan presents the framework of the management for the concept development and is developed in conjunction with the Initial Concept Document. It includes proposed timelines, linkages to capability deliverables, resource requirements, and required activities. The Concept Development Plan will evolve with more detail added as the concept matures. This process of ‘progressive elaboration’ looks forward to de-conflict resourcing issues as well as rearward to capture changes. Updates throughout the life of the CD&E project result in the Detailed Concept Development Plan which is prepared in conjunction with version 0.9 of the Concept Document. The format of the Outline Concept Development Plan should include, but is not limited to, the following:

• Recipient(s) of the deliverable(s) and what he/she/they will do with it

• Proposed timelines associated with the development of the concept

• Interdependencies with other capability deliverables or concepts under development. These may be indicated as precursor or successor events to indicate alignment with or relationships between project elements.
Approvals required and proposed tasks to compile the data to support the operational justification of the concept

Information and knowledge necessary to refine the concept to sufficient maturity to handover to the implementation process

Required analysis (review the concept value and operational benefits)

Required research, experimentation and analysis activities

A clear statement of the deliverable(s)

Work Breakdown Structure (WBS) to achieve the output (can include activities such as analysis, case studies, research and technology, modelling and simulation, and experimentation contributing to overall concept development)

Statement of work (SOW) for each task in the WBS

Resources and skills sets to achieve each task in the WBS

Sequence diagram showing the logical dependencies of each activity

Timeline diagram for activity durations and milestones

Communication requirements and considerations to integrate activities both within the CD&E project team as well other project teams which may support or be supported by the project.
Appendix 2 (CONCEPT DEVELOPMENT ACTIVITIES) to ANNEX A

Concept development activities are discussed with in the context of the Concept Development Methodology in Chapter 5 of the CD&E Handbook. This appendix provides a listing of activities and greater fidelity providing additional insights which may be helpful in understanding the level of effort in each phase as well as identification of additional or phase-specific resourcing requirements. The activities identified are not prescriptive but are suggested activities gleaned from review of several past successful CD&E projects. As with the Handbook itself, this appendix is a living product which will be updated as additional information and insights are available.

### Initiation

- **Understand Problem.** Learn the context of the problem to gain a sense of direction.
- **Establish Community of Interest (COI).** Determine the Community of Interest - entities that may be interested in the work and enlist their involvement.
- **Identify Stakeholders.** Identify the entities directly affected by the outcome.
- **Prepare and Conduct Project Initiation Meeting.** Meeting of the individuals tasked or requested to develop the proposal.
- **Engage Centres of Excellence (COEs).** COEs may be doing similar work and are a source of workers.
- **Conduct Preliminary Research.** Type/level of concept and linkages to existing concepts.
- **Conduct Interviews and Surveys (Stakeholders/SMEs).** Best means to gain understanding.
- **Identify Available Resources.** Identify the internal and external resources available to support the work. May include but not limited to: time, funding, personnel, and logistical and technological support.
- **Study Existing Solutions.** What is already out there that may solve the problem?
- **Pre-Brief Stakeholders.** Inform the stakeholders of the content of the upcoming proposal to get their support.
Research

- **Identify Team.** The core team responsible for developing the concept documents.
- **Conduct Visits.** Visit operational commands, research organisations, individual SMEs to gain insights and knowledge.
- **Conduct Kick-off Workshop.** First formal workshop of the project. Outcome should be tasking agreements of the division of work and research assignments.
- **Conduct Information Search.** Multiple source search for information pertaining to the topic
- **Establish Network.** Establish communication links across the COI.
- **Conduct Discovery Experimentation.** May help establish context of the operating environment. May not be required during this phase.
- **Identify Linkages.** Identify how the project links to existing concepts, doctrine, etc., as well as any current/on-going projects across the COI.
- **Conduct Solution Workshop.** Workshop focused on identifying potential solutions or line of development.
- **Synchronize with Key Events.** Align effort with key events (e.g., summits) whose outcome relates to, or may influence, the project.
- **Identify Lessons Learned / Lessons Identified.** Search for any Lessons Learned / Lessons Identified that relate to the project.
- **Examine Modelling and Simulation (M&S) Requirements.** Identify if there is a need for M&S; if so, include in the Campaign Plan.
- **Examine Experimentation requirements.** Identify if there is a need for experimentation; if so, include in the Campaign Plan.
- **Identify Potential Exercises.** If there is a need for experimentation, identify upcoming exercises that may be a suitable venue.
- **Conduct Red Team Workshop.** SME workshop to assess the content and adequacy, and viability of the concept.
Development

- **Expand COI.** Bring additional members of the COI into the development work.
- **Communicate.** Keep the COI informed.
- **Continue Research.** Continue to investigate areas of interest as they arise.
- **Conduct Development Workshop(s).** Workshop to develop the content of the Concept and update Campaign Plan.
- **Conduct Experiment Initial Planning Conference(s).** May be tied to Exercise Initial Planning Conference
- **Conduct Experiment Main Planning Conference(s).** May be tied to Exercise Main Planning Conference
- **Conduct Experimentation Scenario/Vignette Workshop(s).** May be tied to Exercise Scenario Workshop
- **Conduct Experiment(s).** May be tied to an Exercise. Controlled investigation.
- **Conduct M&S.** Conduct M&S as appropriate.
- **Integrate.** Integrate the individual lines of effort into a cohesive package.
- **Actively Seek Opportunities to Collaborate.** Take advantage of opportunities to collaborate with other projects.
- **Conduct Writing Workshop.** Workshop to “Write” the detailed concept document.
- **Identify Benefit(s).** Identify how the concept provides benefit to the stakeholders. Justification for implementation.
- **Develop Initial Concept Implementation Plan.** Develop an initial draft of how the concept can be implemented.
- **Conduct In-Stride Evaluation(s).** A rigorous SME evaluation with qualitative and quantitative elements designed to provide an objective assessment of the concept’s viability.
Refinement and Validation

- **Exploit Opportunities.** Take advantage of opportunities to collaborate with other projects.
- **Explore Further Areas.** Investigate areas identified during the Develop Phase.
- **Conduct Refinement Workshop(s).** Workshop to refine the concept documents.
- **Conduct Experiment Initial Planning Conference(s).** May be tied to Exercise Initial Planning Conference.
- **Conduct Experiment Main Planning Conference(s).** May be tied to Exercise Main Planning Conference.
- **Conduct Experimentation Scenario/Vignette Workshop(s).** May be tied to Exercise Scenario Workshop.
- **Conduct Experiment(s).** May be tied to an Exercise. Controlled investigation.
- **Conduct M&S.** Conduct M&S as appropriate.
- **Integrate (Vertical and Horizontal).** Integrate the concept vertically and horizontally with related concepts.
- **Integrate Approval Bodies.** Include representatives of the approval bodies to get early buy-in.
- **Conduct Validation Workshop.** Workshop to examine and validate the content of the concept.
- **Review Elements of Concept Implementation Proposal.** Complete plans on how the concept can be implemented.
- **Conduct Writing Workshop(s).** Workshop to produce the final version of the concept and the associated Implementation plan.
- **Perform Concept Testing.**
- **Prepare to Seek Approval Decision.** Approved for staffing to the MC, or further work required.
Approval

- **Conduct Approval Workshop.** Workshop to assign tasks for taking the concept through the approval process.
- **Execute Management Process.** Organisation-dependent process for staffing the Validated Concept and Implementation Plan.
- **Facilitate Staffing.** Review of the Validated Concept and Implementation Plan through the organisation.
- **Communicate.** Communicate with all stakeholders and the COI.
- **Document Lessons Learned.** Document LLs from the concept development.
- **Close the CD&E Project.** Activities to close the project.
  - Database. Make appropriate entries into the CD&E database.
  - Archive. Archive all working materiel for future references.
- **Obtain Concept Approval.** Concept is approved; forwarded for endorsement.
- **Facilitate Concept Endorsement.** Final Endorsement may be by MC, Bi-SC, SACT, etc., depending on level of the concept.
- **Monitor/Support Implementation.** CD&E Team should monitor the implementation activities and provide support as appropriate.
Appendix 3 (EXPERIMENTATION AND ANALYSIS ALIGNMENT) to ANNEX A

Operational experimentation and analysis are discussed at Chapter 6 as “key enablers for concept development”. Throughout execution of the CD&E methodology, the concept developer had his team should leverage the disciplined processes for experimentation and analysis to establish authoritative bases for the concept, inform development and refinement, and test and validate the completed concept for accuracy, relevance and applicability to the original premises.

To aid in your understanding of the alignment of these enablers to the concept development process, Figure A-3-1 depicts the alignment in response to important considerations of the concept developer and team. Where practicable, key elements of information, policies, and expanded background products are provided as HTML links indicated by blue text. Full access to linked information may require a valid Transformation Network (TRANSNET) account. TRANSNET access may be requested at:
https://registration.act.nato.int/extranet/transnet/Lists/AccountRequest/Register.aspx

As additional information becomes available or current information is revised, updates will be provided through the proponent for this Handbook, the ACT Concept Development Branch.
Figure A-3.1. Analysis and Experimentation Enabling Concept Development

[Please double-click the diagram to open interactive graphic and enable hypertext links.]
Appendix 4 (QUESTIONS TO AID CONCEPT DEVELOPMENT) to ANNEX A

The following questions\(^\text{21}\) are designed to assist concept developers in acquiring sufficient relevant information. There is no particular significance to the relative order of the questions. Not all questions are pertinent in every case, however, possible alignment to the phases of the CD&E methodology is indicated. The list is not exhaustive and the intent is to update this list based on insight and lessons identified in execution. Recommendations on the list and addition questions or insights should be provided to the ACT Concept Development Branch.

### Initiation

- Who is the target audience for this concept?
- What are relevant sources of information?
  - Applicable international law;
  - NATO policy;
  - regulations, orders and directives promulgated by an appropriate authority in relation to the concept being developed;
  - Strategic assessments of current and future threats (i.e. SFA/FFAO);
  - Joint and Single-Service Lessons Learned databases; and
  - Operations and exercise after-action or post deployment reports?
- What technological advances have been made in the area(s) under consideration?
- What are the Observations, Insights and Lessons (OIL) relevant to the area(s) under consideration?
- What NATO or national SMEs (military or civilian) are available for consultation?

\(^{21}\) Adapted from “An Analytical Framework for Doctrine Writers” A Common Perspective: US Joint Forces Command Joint Warfighting Centre Doctrine Division’s Newsletter. Vol 10 No. 1 April 2002
Research

- Who is the target audience for this concept?
- What types of operational areas are involved in this concept, for example, joint operations area, area of operations, theatre, etc.?
- Would the conduct of interviews with experienced commanders and SMEs enhance the concept development?
- What tools are necessary to facilitate research and possible interview processes to elicit, capture and manage requirements?
  - Questionnaires
  - Surveys
  - Structured interviews
- What NATO or national exercises are available which may help to understand and identify issues and obtain a better understanding of current activities and concepts in relation to the subject area?
- What national, international or service military periodicals could be consulted that may contain information relating to the subject area?
- What civil periodicals or documentation are available to inform research on the subject area?
- What relevant concepts under development or undergoing experimentation?
- Are there legal considerations involved in this concept?
- What are the pertinent underlying assumptions?
- What terminology is relevant? Does approved terminology already exist? Is new terminology beneficial or required?
Development

- Who is the target audience for this concept?
- What are the essential components that need to be included in the concept?
- Are assumptions still valid?
- When developing drafts of the concept, review the following before distributing the document for review:
  - Clarity. Is that which is written sufficiently clear that the intended audience will understand the subject being discussed?
  - Accuracy. Has the information contained in the publication been verified to the extent practicable?
  - Relevance. Do all elements contained in the publication have relevance to the subject of the concept?
  - Depth. Have the elements contained in the concept been discussed to the appropriate depth?
  - Breadth. Have all necessary elements been included in the concept?
  - Logic. Does the concept make sense as written?
- What types of command and control arrangements should be considered?
- What types, and at what levels, of training will be required to employ this concept effectively?

Refinement and Validation

- What are the implications involved in using this concept in a multinational (i.e., beyond NATO) and interagency context?
- What unique planning considerations arise from this concept?
- What are the support considerations arising from this concept?
Approval

- If non-NATO concepts are consulted, what factors might inhibit adoption by NATO?
- Which agencies, commands, offices are necessary to coordinate approval?
- What processes and tools are available/required for processing the concept through approval? (e.g. Tasker Tracker)
- What events must be taken into consideration as part of the approval process?
  - Meetings of the IS, IMS and Military Committee
  - Bi-SC meetings and conferences
  - Other NATO bodies including:
    - NC3CG
    - Working Group of National Technical Experts (WGNTE)
    - Et al
### ANNEX B – ROLES AND RESPONSIBILITIES

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<thead>
<tr>
<th>Role</th>
<th>Function and Responsibilities</th>
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<tbody>
<tr>
<td>Concept Developer</td>
<td>Individual(s) responsible for development of the concept. It is generally accepted that the lead Concept Developer is also the Project Manager.</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Defined as “an individual, group or organization who may affect, be affected by, or perceive itself affected by a decision, activity, or outcome of a project.” Stakeholders aid the Concept Developer in defining the problem, scope and solutions. They may be either formal or informal members of the core team. Stakeholders are valuable to overall project success and should be engaged early and often. Annex 2 to NATO AAP-20 is an abbreviated listing of potential stakeholders for lifecycle capability development. Though not an exhaustive list, this provides a point of departure to identify stakeholders for CD&amp;E projects.</td>
</tr>
<tr>
<td>Champion</td>
<td>A Champion is any individual involved in the project who is passionate about the project and can bring that passion to advocate for the project. It is beneficial to have champions as every level of the project. Senior level champions can be powerful allies in identifying and obtaining resources as well as supporting cross-organization integration.</td>
</tr>
</tbody>
</table>
| Sponsor             | The concept project Sponsor is a person or group [providing] resources for the project and is accountable for enabling success. The Sponsor should:  
  * Have vested interest in the success of the project.  
  * Have access to resources necessary for the project.  
  * Be involved with the concept and be able to provide guidance, direction and lend authority to the developed concept. |
| Programme Manager   | Focuses on enabling the project and Project Manager by identifying alignment or potential conflicts between organisational strategies or other projects and working with the Project Manager to assess impact on the CD&E project. May have the ability to manage resources across several projects to facilitate an integrated concept development approach. |
| Project Manager     | The lead Concept Developer is also the Project Manager. The Project Manager is individual assigned by the organization initiating the concept to lead the team responsible for executing the phases of the concept development. |
| Project Team        | The set of individuals who support the Project Manager in performing work necessary to develop, test and validate the concept. |
| Experimentation Manager | A key member of the Project Team, the Experimentation Manager is responsible for experimentation design and development supporting development of the concept. The Experimentation Manager is the SME with regard to Discovery, Hypothesis and Validation experimentation and is the source for information and validation. |

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22 PMBOK, Ed 5.
| Analysis Manager | A key member of the Project Team, the Analysis Manager is responsible for designing and managing the analytical processes associated with analysis of alternatives and rationalisation of experiment outcomes. The Analysis Manager is the SME with regard to analytical methodologies and tools for analysis and is the source for information and expertise in preparing necessary documentation for successful analysis. | expertise in preparing necessary documentation for successful experiments. |
ANNEX C – ABBREVIATIONS

A
AAR – After Action Review
ACT – Allied Command Transformation
ACO – Allied Command Operations
AltA – Alternative Analysis

B
Bi:SC – Bi-Strategic Command; the commands ACO and ACT

C
C2 – Command and Control
CBRN – Chemical, Biological, Radiological and Nuclear
CCPlan – Comprehensive Campaign Plan
CD – Concept Development
CD&E – Concept Development and Experimentation
CIED – Counter Improvised Explosive Device
CIP – Capability Implementation Plan
CNDV – Concept Development Branch (at HQ SACT)
COEs – Centres of Excellence
COI – Community of Interest
COS – Chief of Staff
CP&R – Concept Plan and Resourcing Request
CRR – Capability Requirements Review
CSB – Campaign Steering Board

D
DCOS CD – Deputy COS Capability Development
DCOS JFT – Deputy COS Joint Force Training
DCOS SPP – Deputy COS Strategy, Plans and Policy
DOTMLPFI – Doctrine, Organisation, Training, Materiel, Leadership Development, Personnel, Facilities and Interoperability

E
EDB – Executive Decision Board
ETEE – Education, Training, Exercise and Evaluation
FOGO – Flag Officer / General Officer
FPC – Final Planning Conference
HITL – Human in the Loop
HQ – Headquarters
HTML – Hyper Text Mark-up Language
IPC – Initial Planning Conference
JALLC – Joint Analysis and Lessons Learned Centre
JFTC – Joint Force Training Centre
JWC – Joint Warfare Centre
LL – Lessons Learned
LVC – Live, Virtual and Constructive
M&S – Modelling and Simulation
MC – Military Committee
MPC – Main Planning Conference
NIAG – NATO Industrial Advisory Group
NLR – National Liaison Representative
OA – Operational Analysis / Operational Analyst
OPEX – Operational Experimentation
OPP – Operational Planning Process
OPR – Officer of Primary Responsibility
ORSA – Operations Research Support Analyst
POAM – Plan of Action and Milestone(s)
POC – Point of Contact
POW – Programme of Work
PSA – Priority Shortfall Areas
R
R&T – Research and Technology
S
SACEUR – Supreme Allied Commander Europe
SACT – Supreme Allied Commander Transformation
SC – Strategic Commander
SHAPE – Supreme Headquarters Allied Powers Europe
SME – Subject Matter Expert
SOP – Standing Operating Procedure
SOW – Statement of Work
STO – Science and Technology Office
T
TNB – Transformation Network Branch (at HQ SACT)
TOR – Terms of Reference
U, V, W
WBS – Work Breakdown Structure
WG – Working Group
WS – Workshop
X, Y, Z
REFERENCES

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### LINKS

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<td>(NU) DSG (2010)0528, Military Concept for NATO Strategic Communications, 18 August 2010</td>
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