Concept Development and Experimentation

NATO CD&E Handbook

A Concept Developer's Toolbox

NATO OTAN

Allied Command Transformation

Norfolk, Virginia | USA

ALLIED COMMAND TRANSFORMATION

NATO'S WARFARE DEVELOPMENT COMMAND

NOTES ON VERSION 2.00 (February 2021)

Although this handbook is 'NATO UNCLASSIFIED – Publicly Disclosed', some references and additional support are not accessible to the public.

The Allied Command Transformation (ACT) Transformation Network Portal (TRANSNET) is an unclassified network environment enabling experts to work collaboratively to further transformation within NATO and among its member nations. The TRANSNET is open to NATO members and affiliates, partners, and International Organizations (IO). Although an open environment, access is controlled and requires the assignment of a Login ID and password. Sub-communities (**such as CDE365 for Concept Development & Experimentation**) are established within the portal requiring additional permissions to ensure security and fidelity of information.

Additional information is available at https://transnetportal.act.nato.int.

You can find an electronic copy (pdf format) of this handbook on https://www.act.nato.int/publications.

Please send issues you identify (e.g., erroneous or outdated information, inactive links) and your comments or suggestion to the Concept Development Branch, Allied Command Transformation (conceptdevelopment@act.nato.int).

NOTES ON VERSION 2.01 (March 2021)

Some URLs changed in the last month and were updated in this version. For easier access, we added QR codes linking to the URLs in Annex E.

NOTES ON VERSION 2.10 (August 2021)

Due to its increasing importance, an introduction to Modelling & Simulation was added and the handbook was aligned with the M&S terminology.

Foreword

Concept Development is a fundamental tool that enables transformation activities. The HQ SACT Concept Development Branch, supported by the Operational Experimentation and Analysis of Alternatives Branches, makes a continuous effort to keep this handbook, based on recent experience and feedback from practitioners, 'alive' by quickly responding to customer feedback in an agile manner.

The current version of the handbook continues along the lines of the previous versions and seeks to provide the reader with a functional toolbox. Every chapter contains the information you need to develop each element of a concept. In the revised version, we expanded the part on experimentation and analysis in support of concept development. In this edition, we added an introduction on Modelling and Simulation underlining the growing importance of this approach for CD&E. All these are significant updates, which, I believe, will improve NATO's Concept Development efforts, and support the efficient and effective allocation of resources to support transformation.

This handbook provides information for you, the concept developer, based on approved NATO guidance and policy as well as best practices 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 the applicability of the method 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 truly a "living document" and as demonstrated by the recent revision and updates. The Concept Development Branch is the handbook's custodian. They will welcome your questions and recommendations.

Guy Robinson OBE
Vice Admiral, GBR N
Chief of Staff
Allied Command Transformation

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CHAPTER 1 - INTRODUCTION

Concept Development & Experimentation as a tool for transformation

Concept Development & Experimentation (CD&E) is a combination of methods and tools that drives NATO's transformation by enabling the structured development of creative and innovative ideas into viable solutions. Since there might be a cyclic dependency of concepts being spirally improved by experimentation, their development will normally be conducted in an iterative manner.

CD&E tries to capture, inclusively and iteratively, the best ideas by thoroughly exploring potential solutions, either within NATO or collaboratively with nations, through Concept Development combined with testing and validating these through Experimentation supported by Operational Analysis[1].

a. The primary purpose of CD&E is to provide credible solutions to capability <u>shortfalls and gaps</u>[2];

b. A new concept may also be developed to propose a better solution than <u>currently exists</u>. This solution may be delivered through technological, organizational, tactical, societal, or other developments that did not exist before or do not exist yet. Alternatively, it may be required due to the failure of existing but sometimes obsolete concepts;

c. <u>Future problems or opportunities</u> may be brought about by some expected combination of political, social, economic, technological or doctrinal factors, or by the introduction of new objectives to a pre-existing situation. A concept could explore solutions to (future) issues, capability shortfalls, or gaps; or exploit future opportunities.

Background

The Military Committee (MC) recognizes 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"[3]. HQ Supreme Allied Commander Transformation (HQ SACT) has evolved CD&E, integrating it into all aspects of transformation. HQ SACT developed CD&E in line with the Policy for NATO Concept Development and Experimentation (Ref A&B) and the NATO CD&E Process (Ref C). 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

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[1] MC-0583, NATO CD&E Policy, September 2009 (Ref A).
[2] Capability gap refers to a non-existing or not available capability.
[3] MCM-0133-2000, NATO Concept Development and Experimentation, 7 September 2000.

stakeholders[4]. This publication was developed with input from the NATO CD&E community and builds on previous NATO policy, direction, and guidance.

Aim of this handbook

This publication outlines the NATO method and related tools for developing concepts from initial tasking to final approval. This NATO Concept Development (CD) Method (illustrated in Figure 1) is neither dogmatic nor prescriptive; you tailor its application to your specific concept development needs. This includes knowing which activities you should conduct and when, with whom to engage, what supporting resources to draw on, and what key outputs are required to express your concept.
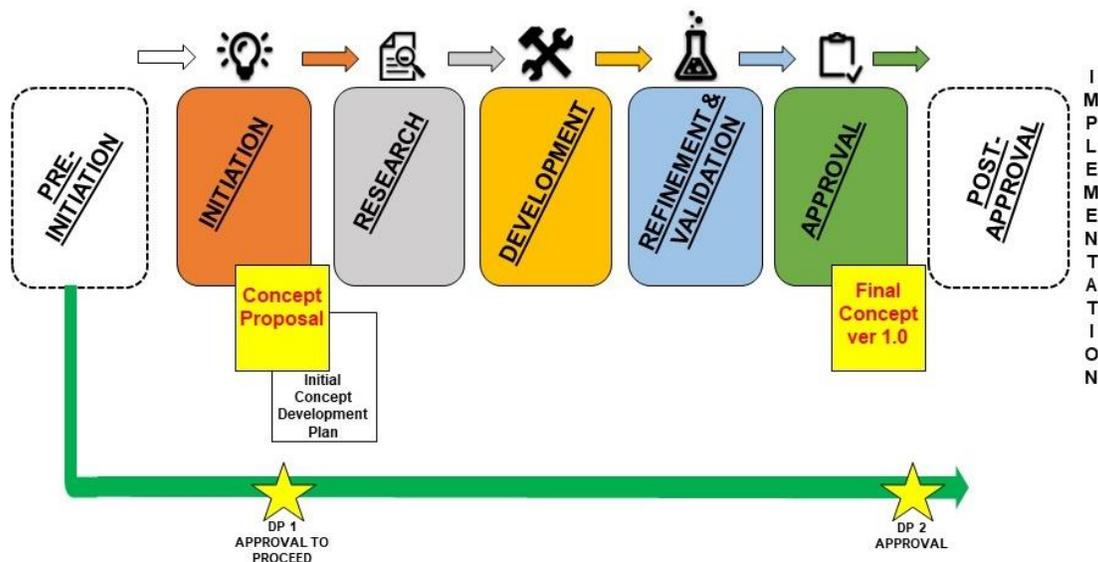
Figure 1: Outline of the Concept Development Method.

NATO Concept Development practitioners are the main audience for this handbook. By reading and applying this handbook, you will understand what a concept is and how to develop one using the NATO CD Method.

If you are not leading the development of a concept but participating in one as a Subject Matter Expert (SME), experimenter, analyst… and playing a key role in the project, you are part of our secondary audience. If you are a staff member managing CD&E functions, or a CD&E practitioner in a NATO nation, partner nation, or the wider community, you are also part of our secondary target group for this handbook.

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4   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." (Ref K). Primary Stakeholders for NATO Programmes are identified at Annex 2 to NATO AAP-20 (NATO Programme Management Framework), Ed 3, October 2014 (Ref G). Though not an exhaustive list, this provides a start point to identify stakeholders for CD&E projects.

Scope

This handbook provides an overview of key enablers such as experimentation, analysis, modelling and simulation and project management. Links and references are provided throughout to provide you with additional information. When printed as a hard copy, it should be recognised that this limit functionalities designed for electronic use.

Additional Support

We understand that this handbook may not answer all your question regarding CD&E, or even concept development. We provide other ways to support you (not all are available to the public):

a. You can find announcements and additional information on our CD&E website on https://transnet.act.nato.int/COI/cde365https://cde365.transnet.act.nato.int/[5].

b. You can get an introduction to CD&E by taking the 'ADL 201 Introduction to Concept Development & Experimentation' module on the JADL portal.

c. You can attend the in-house NATO Concept Development and Experimentation Course (ETE-ET-21371) at NATO School Oberammergau, or request a session by our mobile training team. We have adapted the CD&E course to provide you with hands-on experience during the many syndicate workshops based on a case study.

d. You can exchange views and ideas with other attendees during our annual CD&E Conference in October/November.

e. You can ask us for advice, an introduction, or support:

   (1) On concept development via ConceptDevelopment@act.nato.int;

   (2) On operational experimentation branch via OPEX@act.nato.int;

   (3) On Operational Analysis via AOA@act.nato.int.

f. You can send us a request via your national mission to NATO.

Definitions

CD&E: A tool that provides a structure for the development of creative and innovative ideas into viable solutions.

Concept. An agreed notion or idea normally set out in a document that provides guidance for different working domains and which may lead to the development of a policy

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[5] The ACT Transformation Network Portal (TRANSNET) is an open, unclassified network environment requiring additional permissions https://transnetportal.act.nato.int.

(Ref F). With a focus on capability development, a concept is a solution-oriented transformational idea that addresses a capability shortfall or gap[6].

Remarks:

a.   An approved concept is not a policy.

b.   The term 'concept' has come to be applied loosely to any description of military (or even non-military) activity or capability. Intermediate outputs and results of the CD method are sometimes called 'concepts' leading to unfulfilled expectations of the value of the offered product. Although not fully developed concepts may have value, their nature should be clear, as not to lead to a misunderstanding about their validity.

c.   A concept explains: why the idea is needed, what the idea is, and suggests who, where, when, and how the idea might be developed or implemented. Another way to look at concepts is through the strategic lens of 'ends, ways, and means', of which a concept generally corresponds to the 'ways', of how things are or can be done.

d.   Most concepts developed through the NATO CD&E process will articulate how a proposal could be applied in a future context. A future concept evolves, following the CD Method, from an untested hypothesis to a more assertive, but not necessarily fully validated, conclusion. Only after the concepts have been experimentally examined to the point that it has been validated with reasonable confidence can it guide the capability requirements process. Many concepts cannot be fully tested in peacetime. By definition, future concepts cannot be deduced from past practice or observed in current practice, they must be stated explicitly to be understood, debated, and tested.

Concept Development. Activities aimed at capturing the best ideas and exploring solutions to current and future issues, capability shortfalls, or gaps; or approaches to exploit future opportunities resulting in the publication of a concept. Sometimes concept development may prove that an idea or solution will not work.

Experimentation. A controlled investigation to discover information, confirm or disprove a hypothesis, or formally validate (part of) a solution.

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

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[6]   A CONOPS (concept of operations) is not considered a concept in the sense of CD&E.

CHAPTER 2 - PROJECT SOURCES, ELEMENTS AND PRINCIPLES

CD&E Process[7]

Figure 2 provides an overview of the elements and their relationships within the CD&E Process. These elements are:

a. **CD&E Management** covers:

(1) Management of project proposals to include coordination with the Capability Development Leaders, other concept proposal fields, and existing on-going and future projects run by nations;

(2) HQ SACT Management of the process, to include prioritization, initiation, integration in capability development plans, reporting, justification for, validation and approval of activities;

(3) Resource allocation;

(4) Quality Assurance to include a CD&E process custodianship, concept coherence, and adherence to scientific rigour.

b. **CD&E Engagement** disseminates and socialises results, to spread and share knowledge on CD methods, processes, and projects, promoting collaboration and best practices amongst NATO nations and partners.

c. **CD&E projects** start, research, develop, assess, validate, and complete concepts.
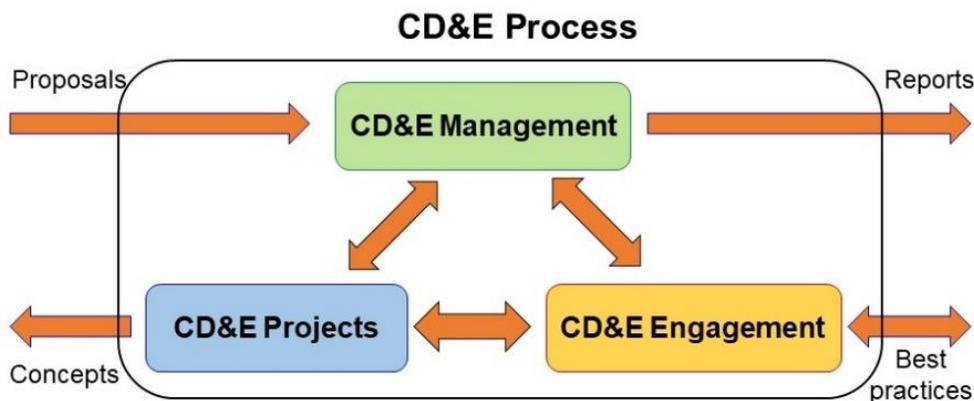
Figure 2: Elements and Relationships within the CD&E Process.

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[7] This chapter summarizes the CD&E Policy to what you need to know as a concept lead for your project. The current policy is under revision. **This chapter will be revised once the revised policy is approved**. We have integrated some of the proposals in this chapter for your information. However, if you need to work at the policy level, you should follow the current CD&E Policy as written in MC-0583 (Ref A) and MCM-0056 (Ref C).

Although you will work in the portion 'CD&E Projects', it is good to know and understand the function of the two other parts of the process.

Sources of Projects Proposals

The sources of proposals to address capability shortfalls through a CD&E project lay outside the CD&E Process. The proposal is made after a thorough analysis of the capability shortfall wherein the military problem is clearly stated and then injected into the CD&E Process. The following are external sources for proposals or may provide insights into what constitutes a Minimum Capability Requirement (MCR):

a.   The NATO Defence Planning Process (NDPP) is the process which dominates the determination of capability shortfalls, including the overall Capability Requirement Review (CRR) analytical process;

b.   National and NATO Programmes of Work and transformation priorities;

c.   Needs identified through the Lessons Learned (LL) processes;

d.   Operational requirements;

e.   Innovation;

f.   Future-oriented and creative activities.
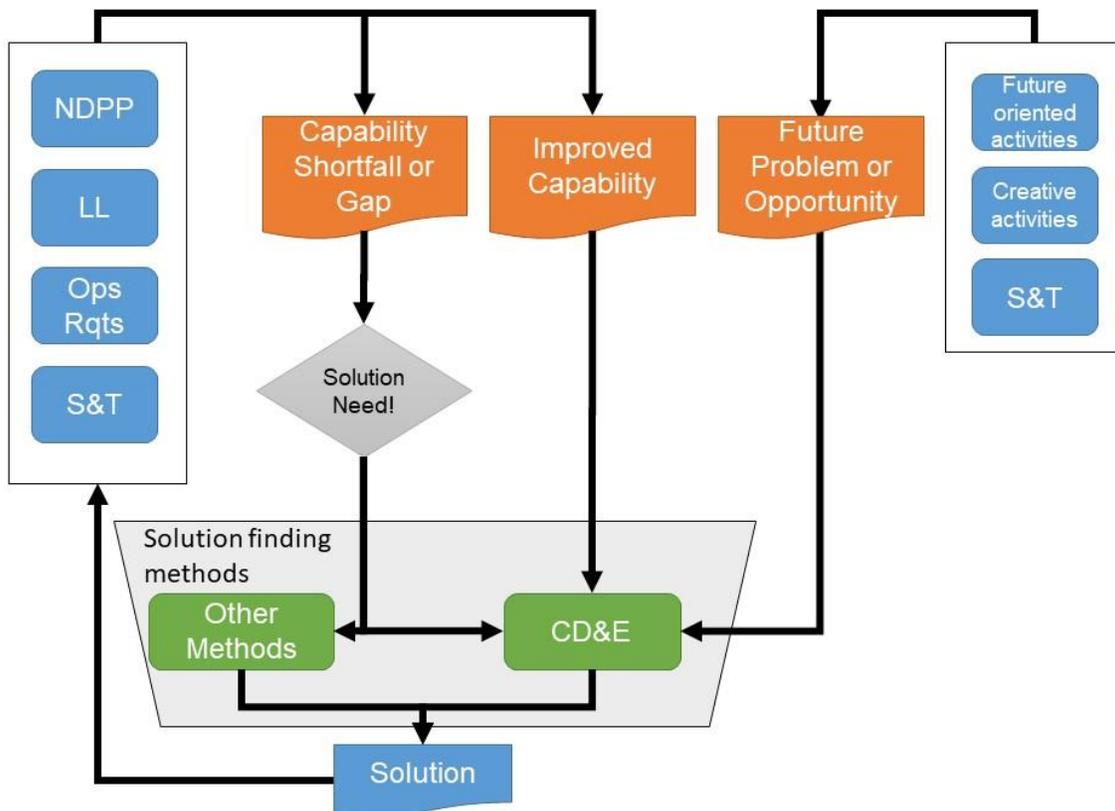
Figure 3: Sources of Proposals for Concepts.

Concept Hierarchy

You can follow one of the two orientations while developing a concept: to transform or to find a solution.

- With a **transformation orientation,** you use insights and guidance emanating from academia and industry. You integrate lessons identified, technologies, discovery experimentations, and emerging and innovative ideas in new strategic or operational concepts. You generally focus your effort on the development of intellectual or theoretical ideas, typically describing how to do things in a broader context, often encompassing multiple (capability) areas. This orientation may support the identification of required capabilities and needs.

- Through a **solution orientation**, you find and develop solutions to specific capability shortfalls/gaps or the exploitation of new opportunities to address capability requirements not yet identified. You will develop the solution across all DOTMLPFI[8] lines of development.

Although there could be a complex hierarchy of concepts, NATO policy defines concepts as either strategic, operating, or functional[9].

a. **Strategic Concepts** contain political or high-level politico-military assessments, objectives, and guidance. They outline NATO's purpose, nature, and fundamental security tasks and identify central features of the security environment and provide guidelines for the adaptation of its military forces[10]. 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 implementation of a specific capability.

b. **Operating Concepts** are the articulation in broad terms of the application of military art and science within some defined set of parameters. In simplest terms, operational concepts describe how military forces operate. They affect the level where campaigns and joint operations are planned.

c. **Functional Concepts** inform the development of solutions to explicit or practical problems and what solutions, Tactics, Techniques, and Procedures (TTP) may be employed.

This simple hierarchy combined with your orientation (see Figure 4) helps you with determining the aim, scope, planning the level of effort, content, or output for the concept.

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[8] DOTMLPFI: Doctrine, Organisation, (Education &) Training, Materiel, Leadership, Personnel, Facilities, and Interoperability.
[9] Annex B to MC-0583, NATO CDE Policy, September 2009 (Ref A).
[10] Overview – NATO Strategic Concepts, https://www.nato.int/cps/en/natohq/topics_56626.htm.

Figure 4: Hierarchy of Concept Combined with the Two Orientations

Project Initiation

A project can be initiated by SACT based on:

(1)   An MC tasking;

(2)   An operational request from a commander, via SHAPE to HQ SACT;

(3)   ACT's internal directions.

Each envisaged concept will be carefully scrutinised before any formal decision on starting Concept Development. The assessment should include:

- The problem to be solved;
- The reasons for a new concept;
- The concept scope;
- The operational benefit expected;
- The experimentation possibly needed;
- The risks to be considered;
- The resource considerations for developing the concept;
- The identification of appropriate authority to officially initiate concept development and to approve the final concept.

In most cases, Allied Command Operations (ACO) is the primary user of HQ SACT's products. Therefore, the Bi-Strategic Commands (Bi-SC) should achieve a mutual understanding before embarking on the drafting of a new concept.

Responsibility for prioritising concept development projects within NATO is led by ACT's Campaign Steering Board (CSB) and the CD&E Working Group, depending on the

type of direction or request. These bodies decide on the development of a concept, who should be its sponsor and which entity should be responsible for its development.

A positive decision by the MC or SACT initiates a NATO CD&E project.

The Project Team

A Concept Development project team typically comprises three components: (1) Concept Development, (2) Experimentation and (3) Operational Analysis (OA). You should engage analysis and experimentation staff 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. Depending on the available resources and the size of your project, the necessary expertise may come in the form of one or more persons.

Depending on the size of your project, your team may also include a resources manager, SMEs, your sponsor... If your project is rather small, you may be alone ad hoc supported by different specialists.

Principles

The following principles are fundamental to the CD Method (which will be explained in the next chapter):

a. **Innovation**. You should endeavour to apply an innovation-oriented and flexible method to ensure innovative solutions.

b. **Transparency**. You should transparently develop the concept (e.g., involve and engage stakeholders, use internal and external SMEs, ask end-users to provide feedback on your concept. Socialising your work will strengthen and encourage buy-in to your concept aiding the concept's implementation). Only a cooperative approach will ensure the mutual trust and the principles of cost-effectiveness, efficient use of resources, and coherent actions are observed.

c. **Flexibility.** There is no single right way to develop a concept, so stay flexible with your approach. Produce a concept development plan that adheres to the principles, but reflects a project's unique time, budget, and resource constraints. Tailor your management activities to fulfil the requirements of your project.

d. **Objectivity and Evidence-Based.** Clearly define the problem or opportunity your concept will address or exploit. Be open-minded and take time to explore the problem space. Get agreement on the scope. 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.

e. **Scientific Rigour**. Try to ensure the CD Method is scientifically supported, the rigour with which this support is applied determines greatly the quality of the concept, its validity, feasibility, and applicability.

(1)   During all conceptual phases of the CD&E project, the application of sound scientific and analytical methods guarantees that development rests on a solid foundation. Critical views embedded within accepted scientific culture and practice will provide the project with a thorough understanding of why the project is undertaken, for whom, and what is its content.

(2)   During experimentation, the scientific methods applied will allow for the well-founded test plans, proper establishment of acceptance or rejection of hypotheses, valid and useful discovery, and true validation.

Although not a principle as such, the notion of 'failing' plays an important role in the CD&E Process. Failing is not a notion most military organizations are comfortable with; however, in the context of CD&E it is not only possible but also often essential. Without it, only sure-win projects based on non-transformational ideas will be initiated, promising but innovative solutions will be put aside, discovery experimentations will be considered a waste of time… Not all (parts of) concepts must succeed: capability gaps change, technologies become obsolete, alternative solutions are developed, experimentations may prove that the idea is not valid, concepts may work in theory but not in practice... Identifying a non-valid idea, a failed course of action early is not only valuable it also can enable the reallocation of resources and efforts. Failing fast, for the right reasons, supports the development of the right concepts. Confirming how not to do certain things is a valuable message that should be included in the concept.

The failing fast approach is at the heart of the down selection of ideas to an approved concept. Although CD&E Management must work on the generation and collection of ideas, not all will make it to a conceptual idea and even less will finally be used to develop a concept (Figure 5). However, to have the possibility to select good ideas for initiating a concept, we need many ideas at the start.
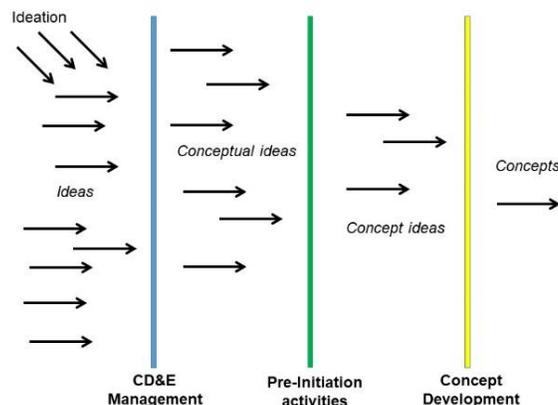
Figure 5: Down Selection of Ideas to a Concept.

CHAPTER 3 - CONCEPT DEVELOPMENT METHOD

The method presented in this handbook (depicted in Figure 6) is a condition-based project approach consisting of five primary phases. This method provides a context and an approach for the maturation of the concept from an initial idea or proposal for a concept development project to an approved final concept, prior to capability implementation. The method is preceded by Pre-Initiation and followed by Post-Approval activities to capture actions, which, though essential to the successful development and implementation, are not directly associated with the development of the concept.
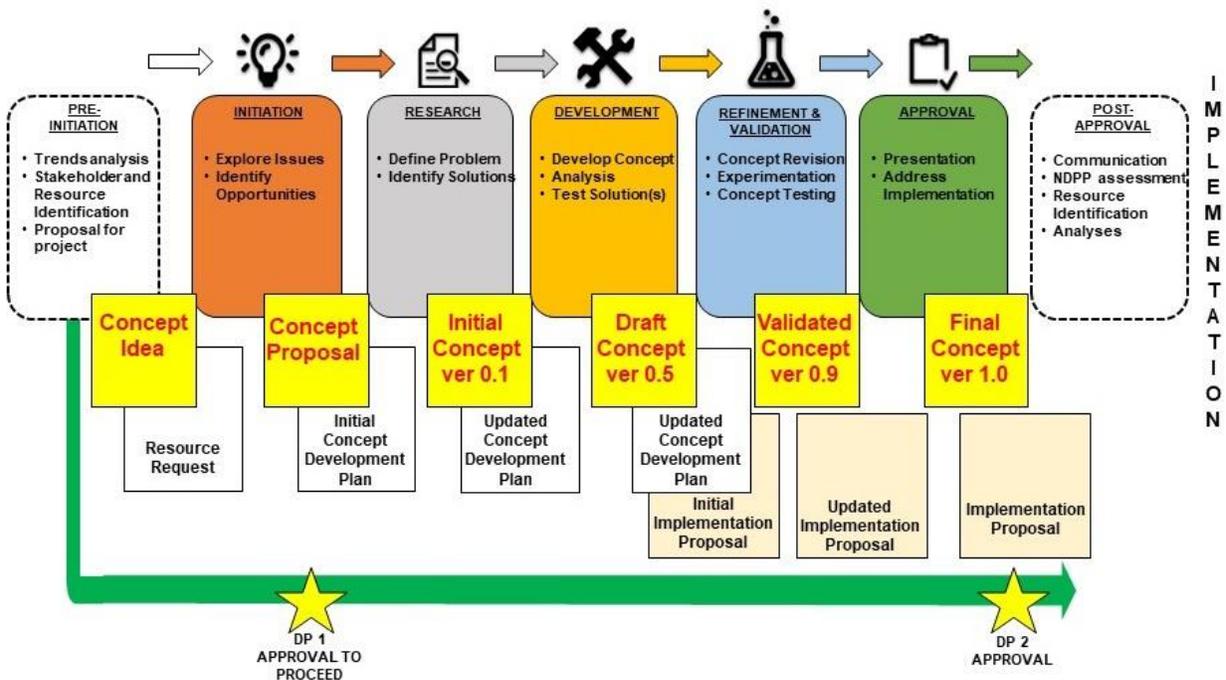
Figure 6: Concept Development Method.

The method is designed to be flexible and as such 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 phase may vary. The method prescribes concept reviews at the end of each phase to review progress and facilitate decisions on whether to progress, rework, defer, or stop the development project.

Figure 6 maps the method into distinct phases, each resulting in defined products. This enables the integration of the multi-discipline team by depicting specific tasks, activities, and products. Phase products facilitate the involvement of higher authority levels, which may be determined based on the scope, scale, and impact of the CD&E effort.

Although the illustration depicts the method as a collection of distinctly, separated phases, this is not exactly the case. The different phases and certainly their activities are interrelated and, in some cases, overlap.

Following the different phases, the CD Method spirals towards the final concept by increasing knowledge gained through a combination of research, regular assessment, and refinement of the problem space. This is an evolution of progressive elaboration whereby knowledge gained through the execution of the CD Method serves to refine further requirements, solutions, and approaches.
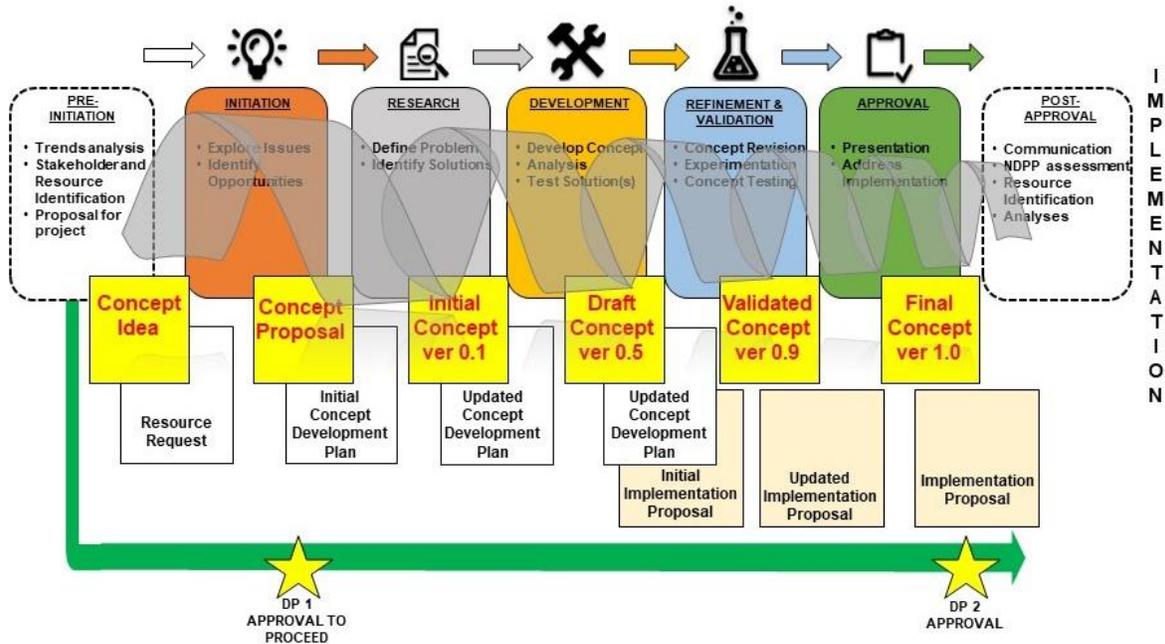
Figure 7: Spiralling Towards the Final Concept.

The chapters 5 to 11 decompose the method to describe, for each phase, the purpose, outputs, and relationship to preceding and successive phases. You can take out a chapter to use during meetings and workshops, as every chapter should include all the info you need for that specific phase. These chapters follow the same layout as shown below:

a.   Objective.

b.   Activities:

(1)   Activities to manage your project. This part focuses on the specific activities you must perform to manage your resources. Although these activities will not result in the production of a concept, they are key to success and may require significant effort from the Concept Development Leader.

(2)   Activities to develop the concept. These activities are directly related to the concept development work of your team and are core to the project. It is beneficial for you to understand the work done in each area to generate synergy and enhance the effectiveness and efficiency of the activities.

(3)   Experimentation and Analysis Activities.

      (4)   Schematic overview of major activities. These schematics provide a quick overview of the major activities in the phase. Although they give you a sense of a project work breakdown structure, these informative schematics should not necessarily be viewed as a rigid template for time management of the project.

      (5)   List of Activities. A list of activities, including those above, provides additional insights, which may clarify 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 lessons obtained from past projects.

c.   Possible Questions. These questions can assist you in acquiring sufficient relevant information. There is no particular significance to the relative order of the questions. Not all questions are pertinent for every project or phase. The list is not exhaustive.

d.   Developing the output. More details about the outputs you need to deliver at the end of the phase.

e.   Next. Explains what follows the delivery of your outputs.

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CHAPTER 4 - EXPERIMENTATION AND ANALYSIS AS KEY ENABLERS

While concept development is an important driver for the identification and development of potential solutions, analysis and experimentation are key enablers for its application. These two provide the ability to iteratively explore, test, refine, and validate concepts. Experimentation and OA (Operational Analysis) 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, level of complexity, budgets, and skillsets influence how these techniques and approaches are selected and applied. The application of analysis and experimentation techniques is not uniform and specific to each project.

The strands in a rope visualize the interaction of these three components (Figure 8): each beneficial in its own right but when interleaved, they create a stronger whole. Each component serves a specific purpose: experimentation investigates the issue; operational analysis generates actionable knowledge to support decisions to shape the project; results of these activities feedback into concept development.
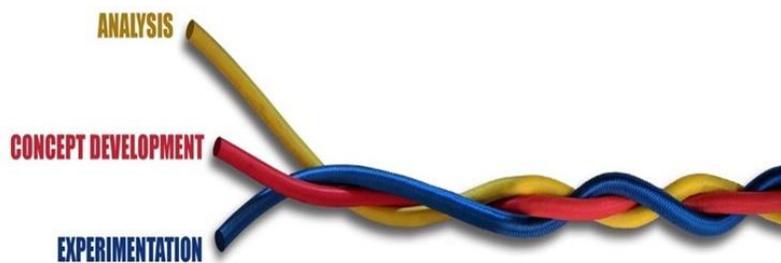
Figure 8: Analysis and Experimentation as Enablers of a CD Project.

Experimentation and OA often support one another. For example, simulation based experiments help provide evidence to evaluate a concept as part of a wider analysis program. Similarly, OA can support the design of experiments and analyse the outputs.

However, while experimentation and OA may support other types of work outside the realm of concept development, concepts cannot be developed without some sort of experimentation or the use of OA.

Concept development includes activities such as conducting research, writing up the concept, engaging with stakeholders and coordinating analysis and experimentation support as required. Project management skills are an enabler that will allow you to develop the concept within time, resource, and budget constraints.

Chapters 4 & 5 introduce you to the basics of experimentations, OA, and project management with respect to how they are applied to the CD Method. For further information

and support, especially on analysis and experimentation, see CHAPTER 1 - Additional Support page 3.

To aid in your understanding of the alignment of these enablers to the concept development method, Figure 9 depicts the alignment in response to important considerations of you and your team. More Info on the tools can be found via the hyperlinks in Annex E.
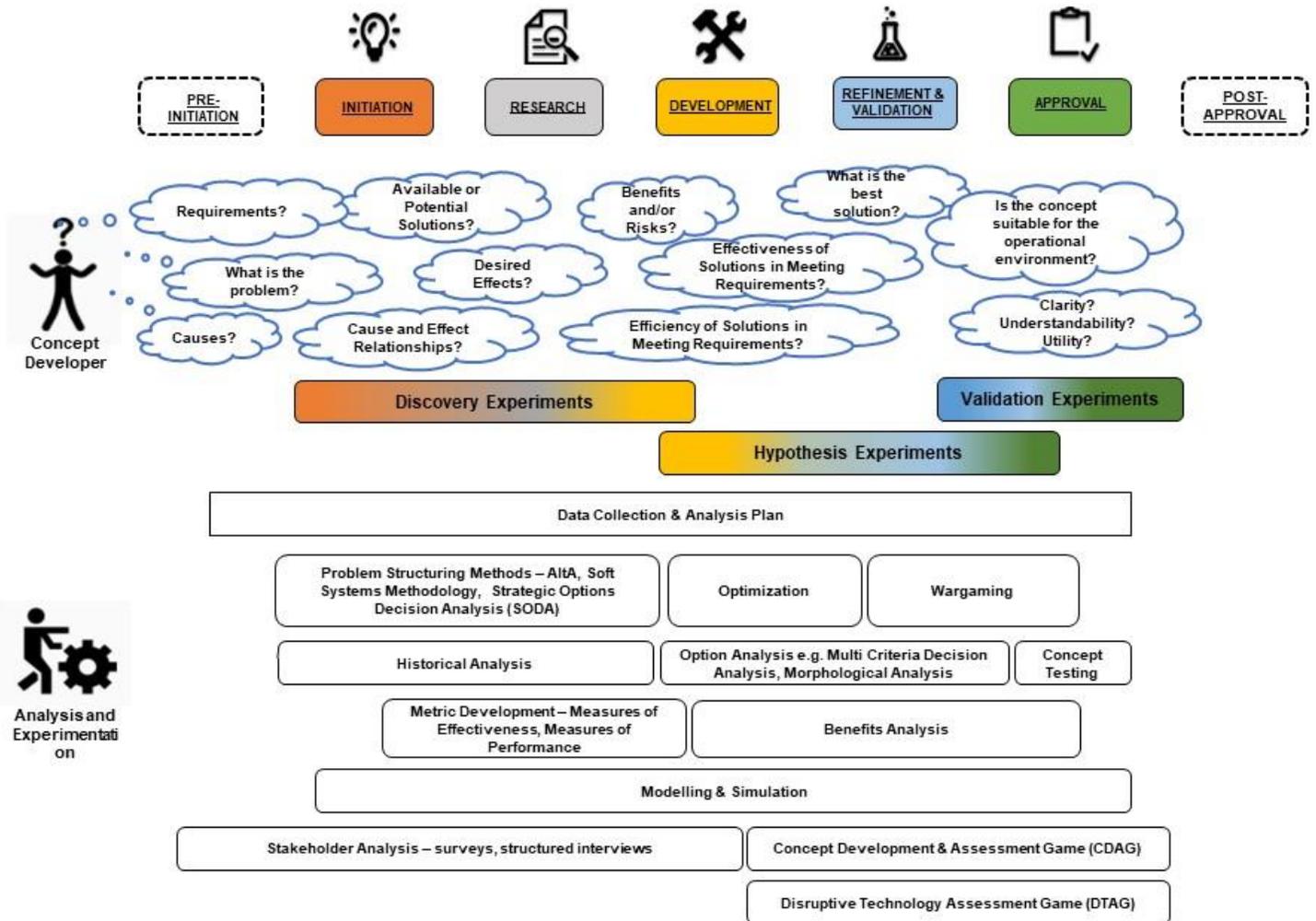
Figure 9: Analysis and Experimentation Enabling Concept Development.

Figure 9 above provides some questions a concept developer may want to consider as they embark on concept development with a snapshot of how analysis and experimentation may support.

Integrating Analysis and Experimentation into a CD Project

The application of experimentation and analysis techniques in support of concept development is not uniform and specific to each situation. However, a critical aspect of all integration of experimentation and analysis support is early engagement. Experimentation and analysis staff should be consulted early in concept development to help select the most appropriate method(s) given the concept under evaluation, the maturity of the concept, and any programmatic constraints and limitations.

For this early engagement to be most useful, a concept owner must be able to articulate the overall aim and expected use of the concept as well as how they anticipate experiment and analysis outputs will contribute to their concept development. With this understanding, experiment and analysis staff can work with the concept owner to outline specific aims and objectives for experiment and analysis activities.

As stated above, the use of experimentation and analysis in support of concept development is not uniform, so the personnel and resources required will vary. At the outset, it is ideal to have both experiment designers and analysts to outline the plan of support to ensure the concept owner can plan for sufficient financial and human resources to fulfil the experiment and analysis activities. Early engagement with experiment designers and analysts ensures they understand the concept developer's aims and the project's budgetary, resource and timescale constraints. Upon conclusion of an initial consultation, where a plan of support is developed, experimentation and analysis staff will seek appropriate resourcing depending upon the size and scale of the activities to be executed; not all experiment and analysis methods require the same amount of preparation time and/or the same number of staff to support. It is important to note, that for experiment and analysis staff to support concept development, it is not a requirement to be fully dedicated to the concept development project from start to finish, but rather, be consulted at the outset and at identified milestones of the concept development project to design specific experiment or analysis activities. More impartial experiment design and analysis can often elicit more useful results.

Analysis

Analysis plays a central role throughout a concept's lifespan by bringing structure and analytical rigour to the CD method. Analysis aims to support the concept developer through the provision of precise, impartial, evidence-based advice to:

- 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 through analysis helps to demonstrate whether the concept improves operational effectiveness, which in turn increases the likelihood of successful concept endorsement and eventual capability implementation.

Operational analysts use a variety of analysis techniques to understand the problem and provide evidence to demonstrate the effectiveness of potential solutions (Ref H). These techniques are broadly categorized as: soft methods; optimization; modelling and simulation; statistics and analytics and options analysis, with each category containing multiple techniques. The analyst selects the most appropriate analysis technique based on his/her skills and experience, the needs of the concept, and project management constraints.
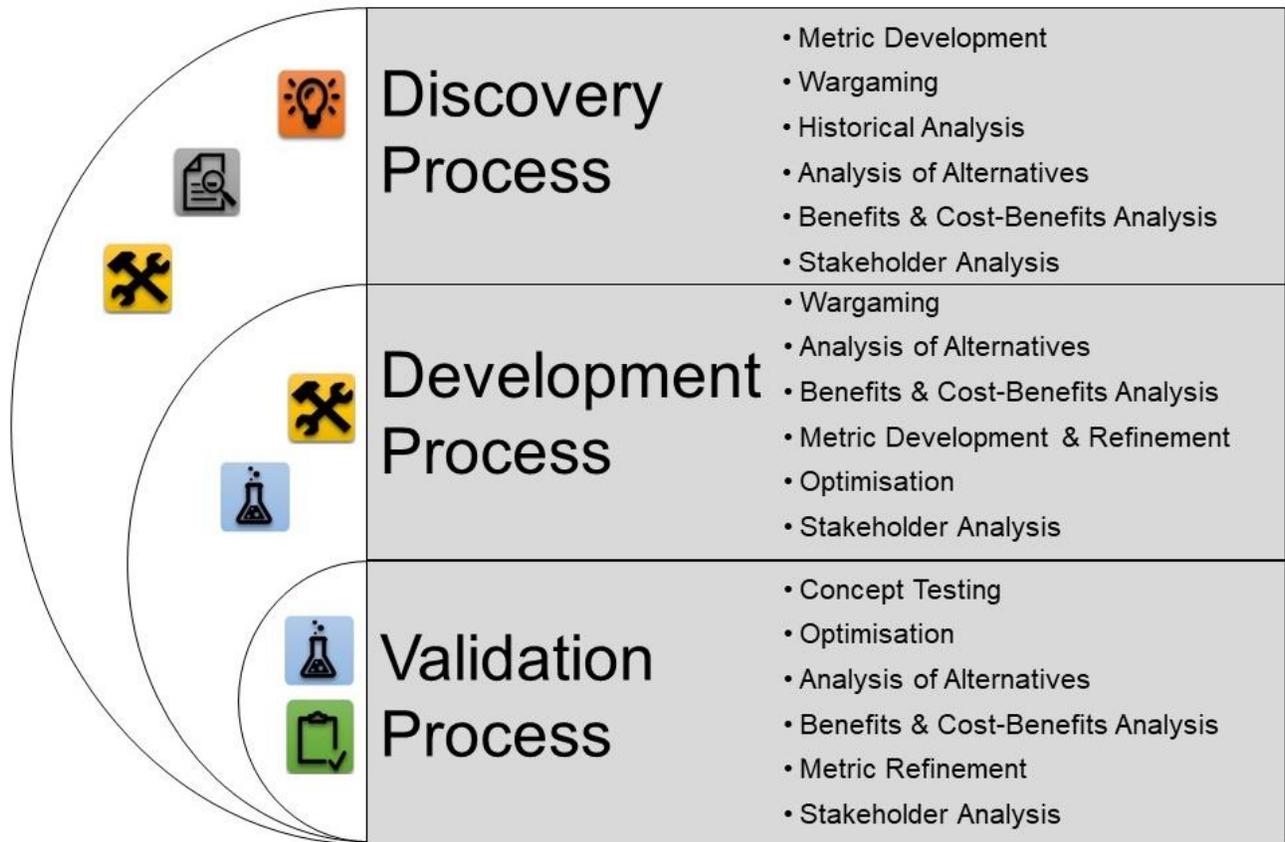
Figure 10: Analysis Activities Enabling Concept Development.

In the Initiation and Research phases, less exacting analytical 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 the 'Refinement & Validation' phases, analysts explore potential solutions and assess how well the solutions meet the concept's requirements. Analysis techniques may include various analysis approach options (e.g., Multi Criteria Decision Analysis), -modelling and simulation, and support to hypothesis-testing experiments. Analysts use wargaming, simulation, and support to exercise-based experiments as the concept is tested in more representative operational environments.

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

Purpose and Basics

Experimentation aims to lower the risk to capability development as well as help the development of innovative and effective operational capabilities (Ref I). In the context of CD&E, experimentation is used to support the development of concepts or the validation of new solutions. Experimentation provides 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, simulation-based experiments 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. It is best practice for a concept owner to have a clear idea of their concept aim, the intended audience, and an initial expectation of how and where experimentation can support concept development. At the initial consultation, between the concept owner and experimentation and analysis staff, the group will work together to establish experiment aims and objectives.

Aim	• Developed in collaboration with sponsor • Concise statement expressing overarching goal and all aspects • Verb usage helps selection of experiment type and subsequent objectives • *explore, investigate, identify, outline…; if…then; confirm, prove, determine, validate*
Objectives	• Encompass specific aspects of aim • Each objective captures a single idea derived from the aim • What you need to observe - *measure* and collect data against - in experiment
Method	• Selected to support aim • Heavily influenced by constraints (time, money, personnel) • Learn from past experiences

Figure 11: Aim, Objectives, and Method of an Experiment.

The experiment aim provides the high-level guidance for the experiment and can be related either to the solution or to providing data to support a recommendation to justify the adoption or continued development of the capability or concept; or, conversely, its rejection/abandonment. The aim forms a short, concise, and well-focused statement, one sentence or two, defining what the experiment will accomplish and its measurable elements. Good aims often include words such as "assess," "validate" or "discover" and avoid words such as "improve" or "enhance."

An experiment's objectives derive from the aim and are themselves measurable. Achievement of the objectives allows the definition of the required outputs to meet the aim. Each objective must be stated in clear and simple terms in such a way that an experiment can be designed to meet the objective, and it is possible to analyse the results of the experiment to show that the objective has been satisfied. In other words, the goals and objectives must be measurable to a level that will allow a decision to be made based on the results.

The data collection and analysis plan clearly outline which observations must be made, and associated data collected, to satisfy experiment objectives. This plan includes the detailed matrix of experiment objectives, to analysis questions, and data collection points and methods. Additionally, the plan will include the analysis strategy and any assessment values to be considered in the achievement of the stated experiment objectives. A common practice is to include measures of performance (things to be

observed) and measures of effect (impact of those observations) that relate to aspects of the stated objectives.

A well-designed experiment will meet the following experiment validity requirements addressing the cause-effect relationship under investigation, while also being measurable and verifiable:

- Ability to use the cause (e.g., treatment);

- Ability to detect a change in the effect;

- Ability to isolate the reason for the change in the effect;

- Ability to relate the results to actual operations.

Ultimately, the experiment and analysis staff retain the expertise to design experiments and analyse results to meet the stated needs of a concept owner. It is therefore critical that a concept owner provides the overarching context for their concept work, the aim of their concept, and who the intended users are. This is a critical aspect of ensuring sufficient operational relevance when making the best use of experiment and analysis outputs.

Types and Venues

Experimentation supports the entire concept development method through the application of three types of experimentation: discovery, hypothesis, and validation.

Discovery experiments are designed to determine new information, seek potential solutions, and introduce potential solutions for observation. It is often applied early in concept development during initiation and research phases, but also through the development phase. A discovery experiment is not intended to prove or disprove an experiment aim, and as a result, it is the most flexible experiment type. This type of experiment can be executed using a wide variety of methods that are selected based on the concept under development, and the associated concept development project limitations and constraints.

Hypothesis experiments are specifically designed to prove or disprove a hypothesis statement. The hypothesis statement is a clear connection between the cause and effect (if CAUSE then EFFECT). It is important not to merely link, correlate, two things together in hypothesis experiments, but rather, with a degree of confidence and certainty, proving or disproving that the cause is the reason for the effect. To garner evidence to make this proof, a very structured and rigorous data collection and analysis plan is required. In concept development, hypothesis experiments are useful during development and validation. In development, they can help prove and disprove the proposed problem and solution (cause and effect) relationships. During validation, hypothesis experiments can be used to validate the selected problem and solution (cause and effect) relationship.

Validation experiments aim to validate that a proposed solution provides the desired capability. In the case of concept development, validation aims to validate that the proposed

concept satisfies its intended aim and is also usable by the expected users. Validation experiments are most likely in the refinement and validation phases of concept development. In validation experiments, there is a need to gather evidence to articulate, with a degree of certainty, that the solution and/or concept being evaluated does, in fact, do what it proposes to do in an operational context. With that in mind, validation experiments are ideal for exercise venues.
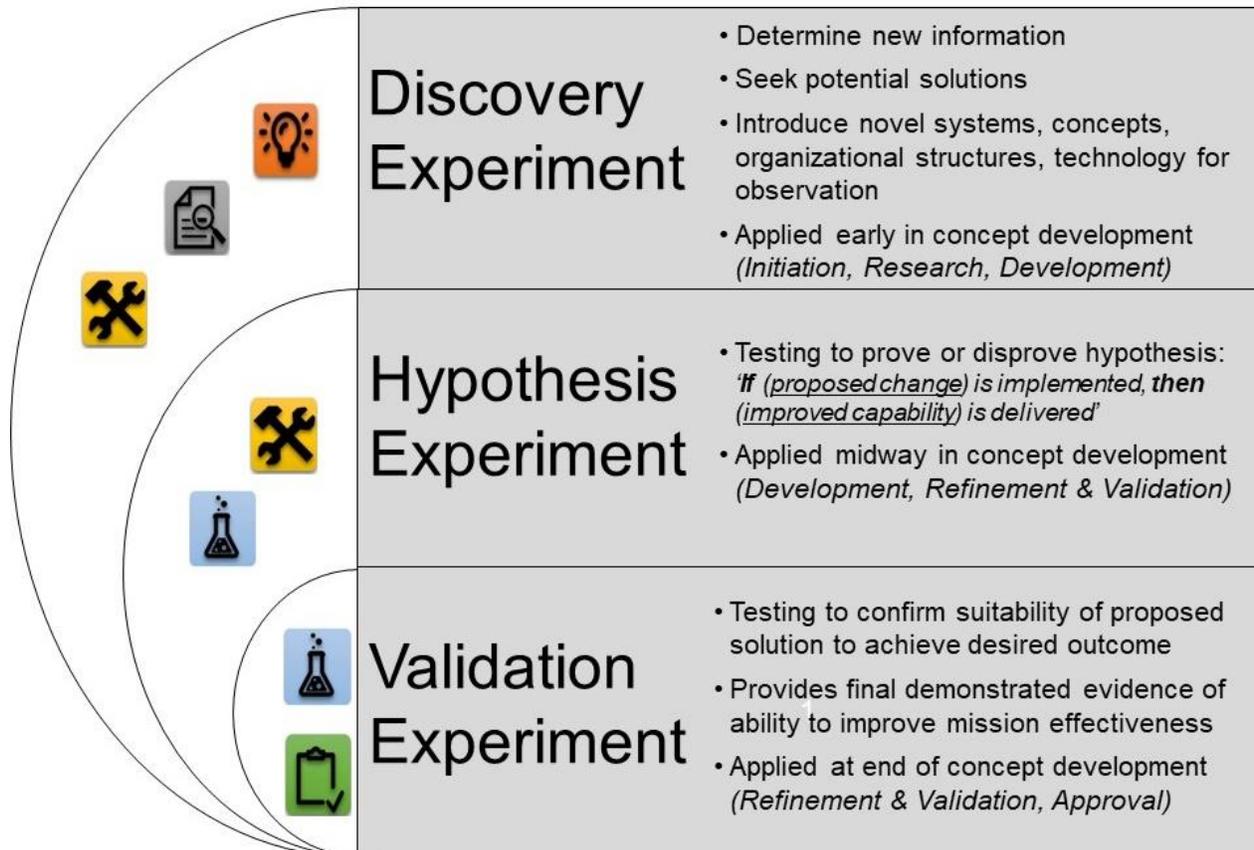
Figure 12: Types of Experimentation Enabling Concept Development.

Experimentation takes place in three different venue types: stand-alone event, integrated into an exercise, and lastly, the least common, a live operation. Stand-alone events are desirable because they allow for complete control of all aspects to ensure the most structured evaluation of the subject in review. However, stand-alone events also require sufficient amounts of work to simulate the operational environment (e.g., scenario, operational tasks). In contrast, integrating an experiment into an exercise hampers the amount of control over the experiment due to exercise requirements. At the same time, however, the experiment can benefit from the operational environment in use during the exercise. Experiments in live operations are very uncommon and often not desirable. It is suggested to use this venue only when conducting passive observation-based data collection to establish understanding and baselines.

Planning, Documentation and Responsibilities

Every experiment will require planning meetings or conferences with key concept and experiment stakeholders to develop, review and revise the experiment plan. The specific organisation of these experiment planning meetings is contingent upon the concept development project they are supporting and the specific event(s) to be executed. With that in mind, a common practice is to hold three key meetings/conferences: Initial Planning Conference, Main Planning Conference and Final Coordination Conference. During the initial consultation with the concept developer, it is customary to outline a plan for these events, with emphasis on the Initial Planning Conference (IPC). To establish this plan, the concept developer should provide their understanding of any key events and timelines associated with the concept development project.

The IPC is very early in the overall experiment plan. A key aspect of this event is focused on establishing the experiment aim and objectives. Additionally, initial discussions on venues and methods should be considered. Lastly, socialising the experiment plan with key stakeholders as early as possible will ensure sufficient participation.

The Main Planning Conference (MPC) is the critical planning meeting where primary outputs are a final, agreed experiment design, including aim, objective(s) selected method, identified venue, data collection and analysis plan, and experiment participants list. The ideal time between the MPC and event execution is dependent upon the particulars of the concept development project being supported as well as the size and scale of the experiment event being executed.

The last key planning event is the Final Coordination Conference (FCC). In advance of the FCC, experiment design details are finalised, and the FCC is focused on finalising logistic and administrative issues related to the experiment.

Apart from these three key planning meetings/conferences, especially when conducting a large-scale experiment, it is desirable to have a dry run ahead of the MPC. This allows for refinement as necessary in advance of experiment execution.

As already stated, the specific organisation of these experiment planning meetings is contingent upon the concept development project they are supporting and the specific event(s) to be executed. Planning meetings for a stand-alone event(s) will be established in accordance with the concept development project milestones and will be critical to ensuring the development of all the simulated operational environment aspects necessary to evaluate the concept. When integrating an experiment into and exercise aligning planning meetings to the exercise schedule is good practice, but it should be noted other exercise-driven workshops and events are likely to require experiment team participation. For exercise-based experiments, experiment planning is likely to start as early as 1-2 years before the exercise due to the size and significant preparation required. This helps ensure the alignment of experiment aims with exercise goals.

The key document for the execution of experimentation is the Experiment Design Document (EDD). This is a living planning document that describes the design and execution of the experiment. The EDD should include:

- Links to the overall concept;

- Experiment aim and objectives;

- Hypothesis statements, if applicable;

- Data collection and analysis plan;

- Execution plans;

- Resources required (participants, systems, equipment);

- Test environment;

- Risks and mitigations;

- Supporting tasks, experiment material and administration aspects.

Upon completion of the IPC, an initial EDD is drafted and refined and further developed as the planning progresses. As the EDD is a living document and primarily for use by the experiment team itself, the document does not usually get finalised until actual execution. However, it is best practice to have a robust EDD upon conclusion of the MPC.

The roles and responsibilities for the execution of experiments are related to the size and scale of the event. However, in all cases, there is an experiment lead who is responsible for designing and conducting the experiment. The experiment lead has responsibility for the overall management of an individual experiment including the specification, design, conduct, and reporting. The experiment lead is the primary interface with the concept developer and other supporting staff, as necessary. When the experiment is resourced with analysis support, there is commonly a lead analyst who has responsibility for producing the data collection and analysis plan aspect of the EDD, and, in most cases, leading the analysis activity before, during, and after the experiment.

Open dialogue between the concept owner and the experiment lead is important. In terms of experiment event(s), it is recommended that that concept owner work alongside the experiment lead to clearly articulate their needs but defer to the experiment lead who has the responsibility to design and execute the experiment event(s). Key points of dialogue for the experiment lead and the concept owner relate to conceptual overview and context as well as experiment participation. It is paramount the concept owners clearly articulate their overarching conceptual goal as well as specific goals related to discrete experiment events. The concept owner is a part of drafting the EDD regarding the overall links between the experiment and the concept. The experiment lead will ensure the aim and objectives of the experiment are agreed by the concept owner and continually inform the concept owner on developments to ensure it is still in line with the concept development owner's expectations. Regarding experiment stakeholders and participants, the concept owner is expected to work in support of the experiment lead to secure experiment participation which is critical and is best if started as soon as possible. The concept owner is the user of the

outputs, therefore, their specific role in the experiment event itself must be closely considered given the particulars of the concept under evaluation and the selected methods.

The experiment lead is also responsible for the delivery of the Final Experiment Report (FER). The FER is how the results, positive and negative, are made available to the community of interest, and in the case of CD&E, the concept owner specifically. The report typically includes: a brief description of the event; an assessment on the achievement of the aims and objectives; and associated recommendations for the way forward. It is best practice to keep the report results-focused and refer to other planning documentation for detailed information on the experiment design and annexes, if necessary, for detailed analysis results.

Modelling and Simulation integration in the CD&E project

Modelling and simulation (M&S) is a discipline that develops and/or uses models, simulations and simulation systems. A model is a physical, mathematical or otherwise logical representation of a system, entity, phenomenon, or process. Simulation is the execution of a system model over time and simulation system is a combination of interacting elements or components organised to provide a representation of a system or of a part of the real world for an intended use.

M&S creates a digital representation of the operational environment allowing failure and to learn while representing the forces, environment and operational context with the required fidelity. Moreover, M&S employs M&S specific resources like methodologies, methods, techniques and data to develop models and simulation systems. When M&S resources properly used it brings to any project transparency, objectivity and scientific rigour. As those belong to CD Method principles, M&S is well suited to support CD&E projects.

In accordance to NATO M&S Master Plan, M&S can be applied in Capability Development as being one of the critical NATO M&S application area. The Capability Development application area covers the M&S support to CD&E project.

Exploiting the efficiencies of M&S can lead to more efficient, viable, and feasible projects and increase overall project success. Applying M&S reduces reliance on live assets and their associated costs and availability constraints. The use of simulated environments with more controllable conditions provide opportunities to explore more of the problem space versus scoping out aspects that are expected to be infeasible due to limitations with live assets. M&S can provide more dedicated experimentation, not subject to the unpredictable events of exercises involving external organizations. Simulated environments can be reconfigured more easily to accommodate experimental designs versus de-conflicting trials with exercise planners during planning conferences. Simulations are also capable of generating an abundance of data to satisfy sample size requirements for both factor analysis and hypothesis testing, leading to more rigor and confidence in final conclusions. Data collection and data management are simpler and more automated for simulation environments, and don't require large human foot-prints, data collector training,

criteria for calculating and adjudicating measures, or complicated post-exercise trial reconstruction using manually-collected data from varying times and disparate locations.

CD method is composed of the five interrelated phases, each of them can be supported by M&S. M&S resources must be tailored to fit the unique demand of the Concept domain, CD&E project and each phase of CD method.

In the initiation phase of the CD method modelling can support understanding and development of a clear outline of the problem and the scope of the concept. Formal and informal modelling techniques can articulate the problem within the stakeholders. The NATO AltA Handbook contains a list of informal modelling techniques. The Unified Modelling Language (UML) or NATO Architecture Framework (NAF) can be taken as the formal modeling techniques example. M&S SMEs, consulted early in the CD&E Project, can assist with defining project scope to the fullest extent desired. Simulated environments can also assist with exploring the problem space and identifying gaps.

In the research phase, the initial concept is developed containing the refined problem statement and the identified compared solutions even with Measures of Performances (MoPs) that serves for the future experimentation. In this phase modelling is still playing the most important role in the problem domain refinement, however in the context of MoP development, a simulation can be consider to engineer the most relevant ones to the problem domain.

In the development phase, the concept becomes mature with a number of limited experiments that depend heavily on simulation whether in the form of a manual wargame or human in the loop simulation. Simulation based experimentation brings qualitative and quantitative results, therefore individual solutions can be easily compared and if deemed disregard from the concept. Simulated environments can also be more quickly provisioned and configured to 'test-fix-test' solutions, down-select alternatives, and identify optimal solutions.

In the refinement and validation phase, the concept is being tested and validated in the operational environment. This can happen in NATO exercises, where simulation systems are already used, or in a digital representation of the operational environment that is created on demand composed of a federation of simulation systems and functional services. This phase should generate more quantitative than qualitative results for the analysis.

In conclusion, it is strongly recommended to include an M&S SME within the Project Team from the very beginning of the project's initiation to reveal M&S applicability in the context of the CD&E project. An M&S SME can identify suitable M&S capabilities, develop service level agreements with vendors, develop cost estimates, and formally supplement the Concept Development Plans with additional M&S information.

Popular Experimentation and Analysis Techniques[11]

There are numerous and varied methods for the application of experimentation and analysis enablers. The key is to address subject matter experts early to help ensure the best method and approach is selected to serve the desired purpose of the activity. It is important to note, that there is a scientific rigour in the design and execution of each experiment and analysis activity, however, there is an art to selecting and applying the right methods. Once the goal and purpose of the experiment/analysis activity are understood, real-life constraints, in a particular venue, begin to inform the selection of methods. Figure 13 and Figure 14 help identify some tips on the application of various methods.
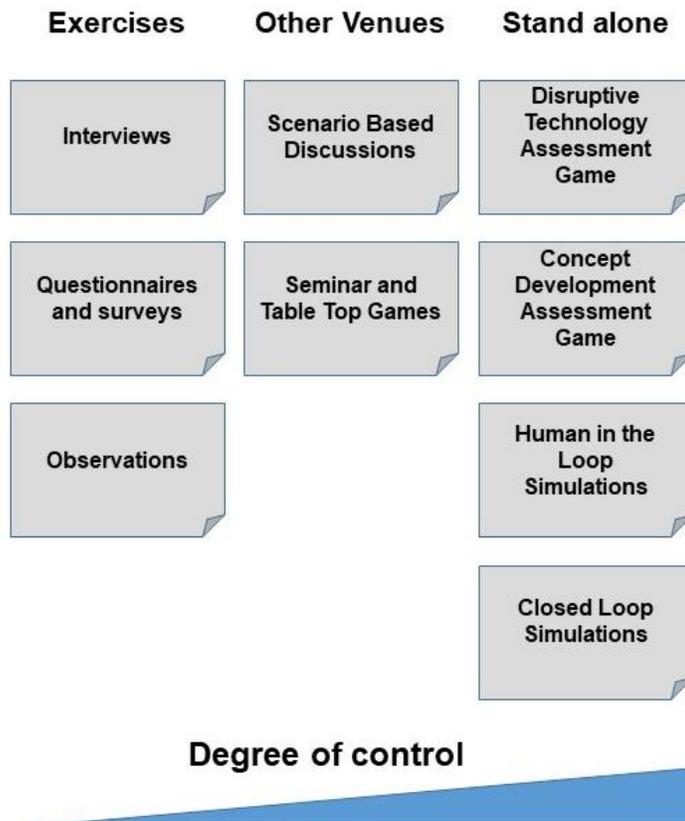
Figure 13: Methods in relation to venues.

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[11]   It is important to note this is not an exhaustive description of experiment and analysis techniques. These selected techniques are frequently used in CD&E work to date.

	Wargame Type			
	Seminar	Matrix	Turn-based (Free)	Turn-based (Rigid)
Creativity				
Predictability				
Rigour				
Understanding Required				
Potential for Automation				
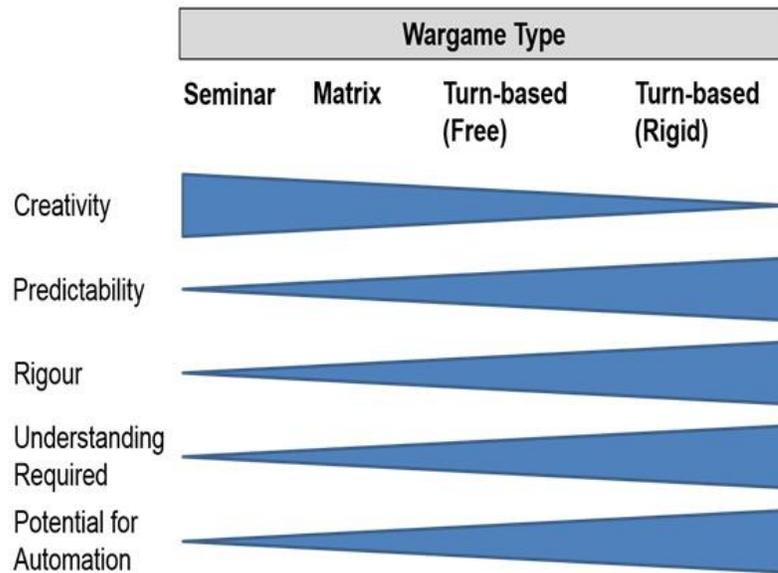
Figure 14: Wargame types.

Disruptive Technology Assessment Game

A Disruptive Technology Assessment Game (DTAG) is a war game-like experiment to stimulate thinking differently about a problem (Ref D). The term 'war game' refers to the method by which two teams are playing against each other based on a scenario or vignette. The game consists of two phases resulting in a Military Led and the second in a Technology Led Confrontation.

In the first phase, after explaining the scenario that puts the teams in a specific setting, the teams use the first period to plan according to current procedures using current technology. Because the military participants have the expertise, they lead this work. The confrontation of the two Courses of Actions (CoAs) are led by the military experts, hence the name. From this confrontation, the teams have an idea of what the opposing team's intentions.

The scenarios are critical to the game. Scenarios must be suited for the object of the DTAG and contain the right level of details, not too much nor too little. The scenarios should put the teams into specific settings to stimulate creativity and to combat boredom.

At the start of the second phase, the teams receive a bundle of Ideas of Systems (IoS) cards, which combine future technologies, sometimes combined with, or based on existing equipment, to create new systems. These systems are theoretical, but should be feasible within the considered timeframe, and have the potential to change the way for solving a situation when employed by the military or an adversary.

The teams can use a limited set of the IoS cards that the members assess as having the biggest impact on the CoAs or can come up with new IoS during the DTAG. They need

to pick those cards that fundamentally change the approach to the same scenario. There is no need to stick to the first CoA, they can change it completely.
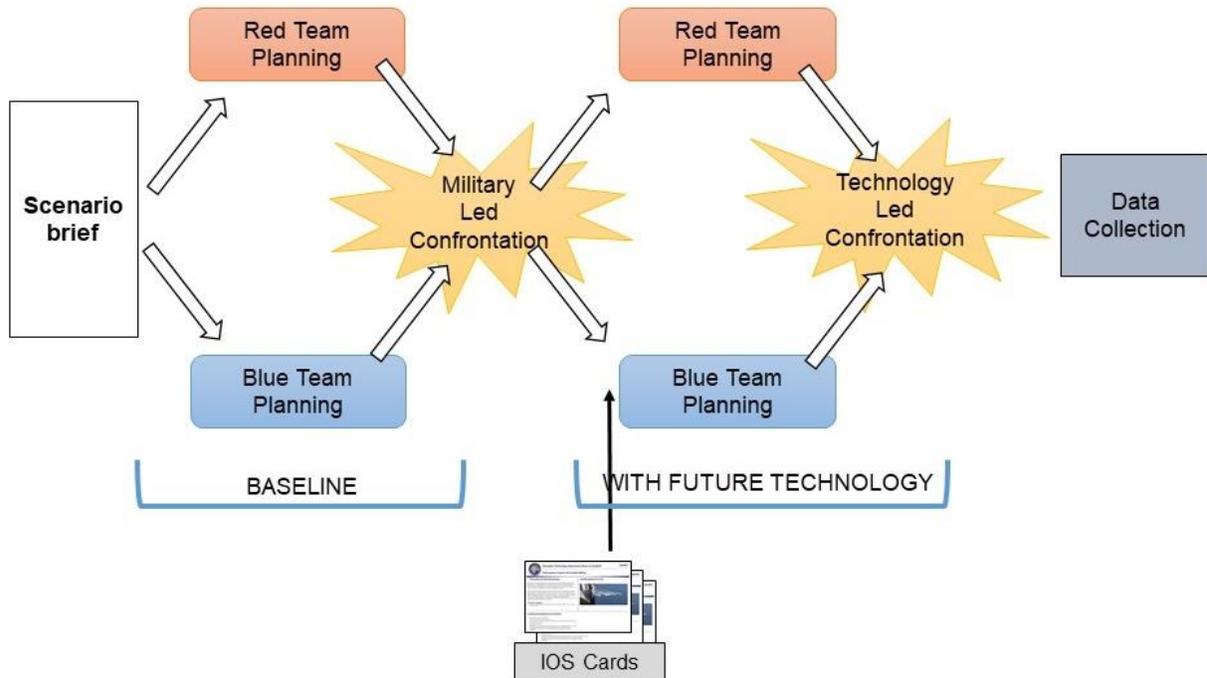
Figure 15: Two Phases of a DTAG.

As with the previous one, this phase ends with a confrontation of the two CoAs. The most important aspect here is to understand what changed in their approach and why that has changed. Technology in itself is not disruptive; the innovation lays in the way one uses it.

During the event, analysts follow the discussions to capture the whys and the hows technology is used in a disruptive way. The confrontations only show the technologies and approaches retained by the teams, but knowledge about the ones that did not make the final selection is equally important. After the event, all that data is collected and analysed into meaningful input for you.

Preparing a DTAG is useful on its own because of the need to develop technology and IoS cards, and the scenarios stimulate disruptive/innovative thinking. As a discovery experiment, it finds an ideal place at the start of the concept development method when there is a need for new approaches. However, organizing a DTAG demands many resources, you should not decide to organize one lightly.

Concept Development Assessment Game

The Concept Development Assessment Game (CDAG) is built on the basic premise of the DTAG, outlined above (Ref E). The CDAG was developed to focus specifically on the

development of concepts that may or may not have a technological component to them. The CDAG is a qualitative method employed to test and develop conceptual documents. It is a table-top game that focuses on the challenge and discussion of the document. It combines the intellectual freedom of brainstorming with the structured approach and control of a simulation and the challenge of red teaming.

The focus of CDAG is simplicity. To make a complex conceptual document simple and understandable, it is broken down into manageable elements and depicted on standardized concept cards. Players can be directed to use certain concept cards to focus them on particular areas of the document. Alternatively, players can choose which cards are relevant for a particular discussion, depending on the scenario.

The CDAG employs a standard modular design. The game is played over a series of rounds (see Figure 16). Each round is independent of the others and therefore the game has inherent flexibility. Roles, scenarios, or rules can be changed between rounds on a pre-planned or ad-hoc basis.
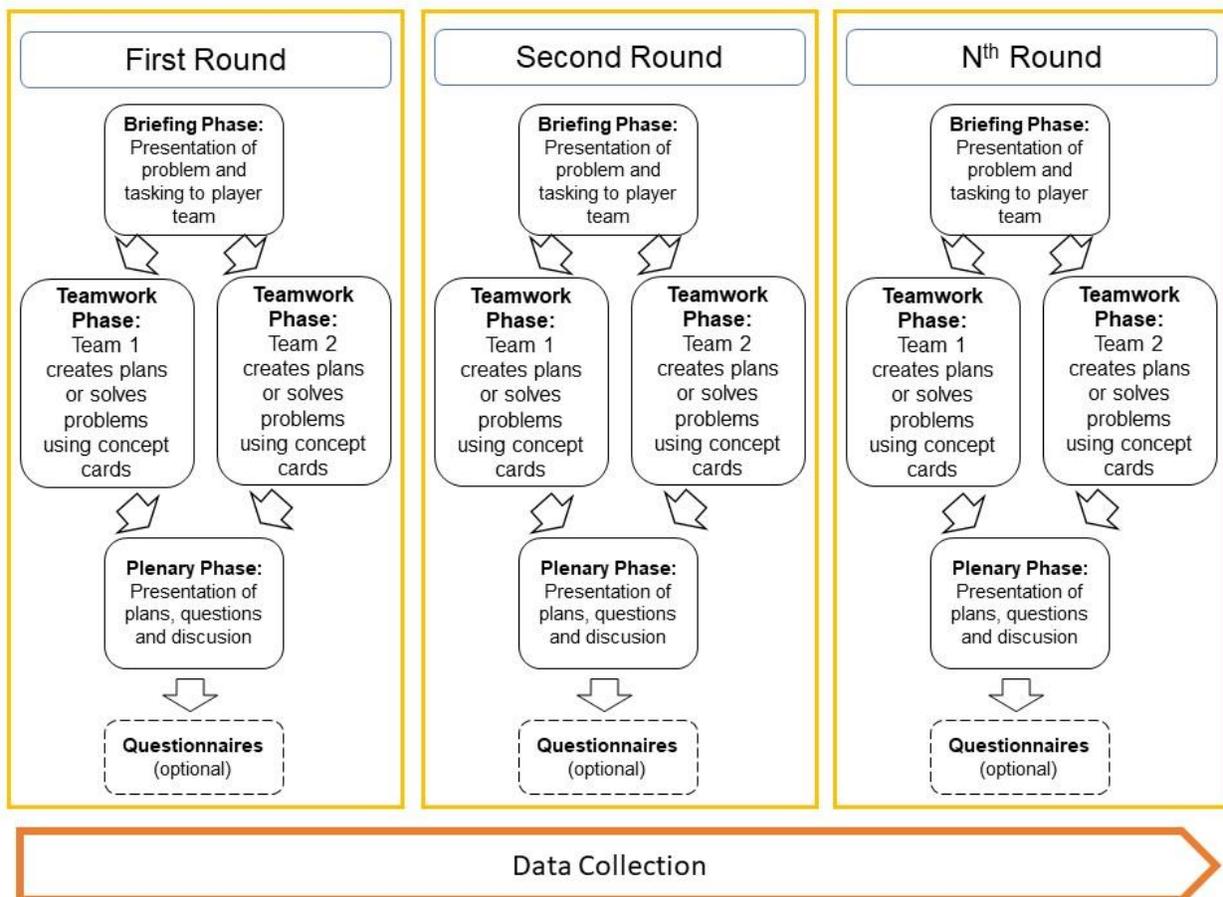
Figure 16: CDAG Process.

A typical CDAG consists of six independent rounds that are played over three days, each round lasting half a day. The number and length of rounds are flexible. A round

consists of an initial briefing, teamwork session, then challenge and discussion in plenary. The operational context is provided through scenarios, vignettes, and role-playing.

The idea of the CDAG is to "play the concept" and through playing it, discover gaps, holes, or improvements to make.

The CDAG is a game played by the document developers and/or intended users of the document. A typical CDAG will consist of three teams, with 6-8 players per team. Each team will assume a role relevant to the scenario (for example "SHAPE" or "JFC Plans"). The roles of the teams can change between rounds if desired.

Analysts capture the resulting discussion on the concept and may administer questionnaires to collect data. They may also be used to facilitate the teamwork sessions. Specialists (e.g., legal experts) may be present to advise the players. A moderator is essential to enforce game rules and facilitate the plenary discussions.

The CDAG can be used at various stages of a conceptual document's development but is best employed as a theoretical low-risk test of a concept before testing in a live environment such as an exercise. It can also be played to generate ideas for a new concept.

A side-benefit of a CDAG is that it facilitates the creation of a stakeholder community for the subject area or brings together an already existing community. It encourages different groups of people to communicate with each other. Additionally, whilst the CDAG is not a training event, the players receive education about the subject through active participation.

Concept Testing

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 17.

Context Analysis provides a broad analysis of the environment in which the product resides. Context analysis starts with '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.

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

Figure 17: Components of Concepts for Testing.

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.

Last, all testing results are brought together in a **Combined Analysis** to assist in 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 addressed by the developed concept. During this phase, the test team may be augmented with additional SME or use additional workshops or brainstorming sessions with the development team to ensure sufficiency of the final concept for validation.

CHAPTER 5 - PROJECT MANAGEMENT FOR CONCEPT DEVELOPMENT

Project Management

This chapter focusses on the phases and activities identified in the CD Method and provides considerations in each phase that you should address to ensure your CD project remains on track. Managing execution of the project and phases is critical to the timely and successful development of the concept, and the alignment of resources necessary to accomplish each of the phases. NATO prescribes the use of methods described in a 'Project in Controlled Environments' format, commonly known as PRINCE2[12].

To facilitate discussion, we must address some basic project management terms and ideas. These will help you 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, and it requires disciplined progress through the CD phases to ensure timely delivery, and thus the relevance of the concept.

Basic relevant characteristics of a project are that:

- It has (a) tangible output(s);
- 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 project begins to "push" these boundaries, you should review the basis for the concept and assess its validity.

Six constraints bind all projects, even concept development projects: Time, Scope, Resources, Quality, Benefit, and Risk. These factors are essential to success in the CD project and cannot be ignored. In neglecting those you put yourself at risk of failure.

- Time: How much time is required or available?

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[12] For HQ SACT Staff: Formal training in this project management method is available from several sources. 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). This course addresses the principles of project management applied to capability development under the NATO Defence Planning Process (NDPP).

- Scope: What are the characteristics required of the concept? To what level should it 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 activities/technology are required? How much funding is needed to secure the 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 a potentially negative impact? How and to what level does the concept influence current or projected strategic development or operational requirements?

Figure 18: Keys to Project Success

Successful concept development is a function of good management as a project with a defined end and goal. Effective project management of the CD activities acknowledges that it is conditions-based while enabling you to maintain momentum throughout the CD project. This is paramount to ensure the relevance of the concept upon completion, the good use of Alliance and national resources, and that maximum effect may be achieved. The remainder of this section addresses considerations for project management enabling concept development.

Activities to manage your project in a CD Project

Several specific activities facilitate a project management approach for a CD project. They are identified below to provide emphasis and context for discussion of the CD Method. Processes and Activities discussed are:

- Reviews and Decision;

- Evaluation;

- Revision; and

- Approval.

Reviews and Decisions

Various reviews and decision are executed throughout the project. You may wish to establish internal checkpoints and milestones at critical moments throughout your CD project. Checkpoints and milestones serve to define key elements or activities. They assist in managing tasks and alignment to components of the concept[13]. The primary function of reviews and decisions includes:

- Assess concept relevance: ensuring the problem or gap, scope, and approach remain relevant to the task and consistent with Alliance goals;

- Approve further efforts or resources: ensuring the availability of resources and aligning allocation based on the continued relevance of the project;

- Assign or adjust project roles: this may include the designation of the Concept Development Leader, 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 and analysis activities, or Alliance goals.

Evaluations

Evaluation is a constant activity 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 Draft 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.

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[13] 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.

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 project 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 an in-stride evaluation will be conducted as a war game wherein the concept need not "win", but the results should provide evidence to support 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 for concept development is a constant, iterative activity. 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 comments. 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 indicate progress on the development of the concept. More formal approvals include milestone briefings and status updates, however, informal approvals may be used as a means of maintaining the momentum of the project. Generally, approvals will result in two decisions or directions for the project (although formal approvals may have more):

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

- 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 project.

CHAPTER 6 -   PRE-INITIATION ACTIVITIES

Objective of these activities

Objective. This collection of activities precedes the method and captures the actions essential to the successful initiation and development of a concept. The objective is to present HQ SACT's Concept Development Branch Head with a valid and suitable concept idea before the initiation of a concept development project.

To achieve this objective, there are two secondary objectives:

a.   To mature, at low cost, a hunch for a concept to be developed, originated by external or internal sources, or discovered by studying trends in a certain domain, into a **Concept Idea** (CI).

b.   To assess the extent of the work involved in the development of the proposed concept resulting in an estimate of the needed resources in a **Resource Request** (RR).

Approval of the CI&RR ends these activities and triggers the start of your CD project. The approval assures you that a concept developed from the CI will have value for NATO and will therefore have the requested resources (people, time, and budget), to allow the developer to progress to the Initiation Phase.

Activities

Activities to manage your project

The extent of management activities in the Pre-Initiation activities depends on the specific area for investigation; it can be minimal or exhaustive. An essential aspect of management in this phase is the necessity to maintain awareness on resourcing and budgetary procedures this aspect continues throughout the project. It is important to develop an understanding of the CD&E process, along with the timings and resourcing of the CD project, as this will ensure supportability and sustainment of the project.

Activities to develop the concept

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

- NATO Summit Declarations and supporting comments or papers;
- NDPP output;

- 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;

- 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;

- National analytical and assessment reports.

Activities will focus the developer on addressing any perceived shortfalls in the body of knowledge. In the pre-initiation phase, the 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 could include reviewing JALLC reports and feedback, direction, and guidance from NATO operational commands, contacting concept development centres within NATO and partner nations. The developer should actively conduct inquiries and analysis 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)[14] and NATO Force Structure (NFS)[15] as they relate to the defence planning and capability development. This can assist in the initial identification of stakeholders. Strategic and operational communities can provide relevant insights into potential shortfalls and solutions.

- Build a community of interest consisting of Subject Matter Experts, staff officers, industry, and academia. Where possible, consider accessing internal and external expertise. 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 project such as Centres of Excellence (COEs); the Joint Warfare Centre (JWC) and Joint Force Training Centre (JFFT), JALLC; and national concept and capability development centres.

- Ask OA and Experimentation staff for advice on potential analysis and experimentation support requirements. At this phase, defining the levels of

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[14] https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_02/1802-Factsheet-NATO-Command-Structure_en.pdf
[15] https://www.nato.int/cps/en/natohq/topics_69718.htm.

support and engagement, plus articulating these to senior leadership to secure key resources, is a proven key to success.

Schematic overview of major activities
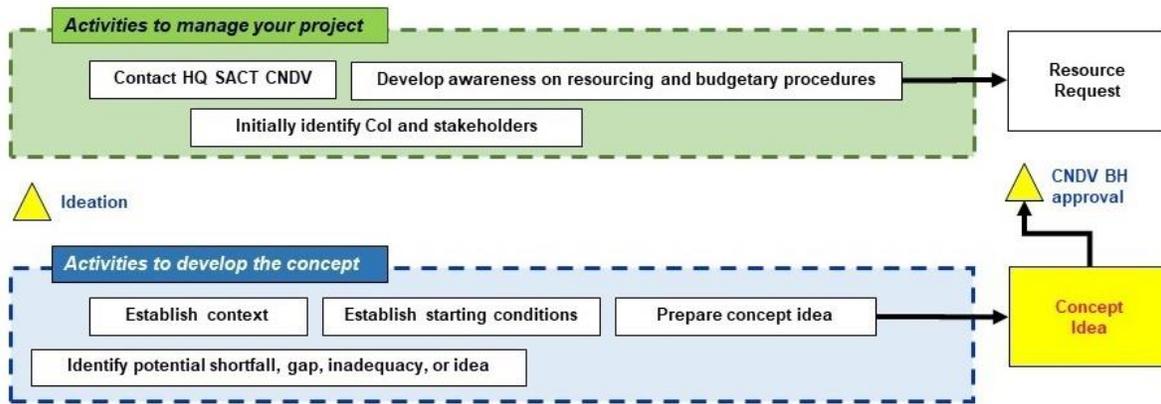
Figure 19: Major Pre-Initiation Activities.

Developing the Concept Idea and Resource Request

For NATO Concepts, the Pre-Initiation activities result in the development of a Concept Idea and Resource Request (CI&RR) and (eventually) culminates in a presentation to HQ SACT's Concept Development Branch Head (BH CNDV). These two products must support the Branch Head's assessment and decision to initiate a CD project. Based on the understanding of the requirement and potential for benefit to NATO, the Branch Head can provide access to or authorize initial resourcing for a CD project. The Branch Head may also decide to postpone or not to initiate the project[16].

Product: The Concept Idea

The Concept Idea (CI) is not developed to the level required for a Concept Proposal but a loosely structured document outlining key elements; however, a well-worked out and detailed CI better informs the Branch Head's decision-making process.

The CI lays out the following key elements:

- Statement of the problem or purpose;

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[16] Publication in the CD&E WG Programme of Work (POW) does not automatically mean that the BH CNDV has approved the CI&RR. This publication, even it concerns the development of a NATO concept, serves as a clearing house between NATO and the nations.

- Justification for the CD&E project;

- Identification of stakeholders and recommendations on sponsorship.

Product: Resource Request

| Resource Request | Efforts spent on analysing resource requirements support the Initiation Phase and signal a greater potential for a successful CD project. The Resource Request (RR) is a Rough Order of Magnitude (ROM) level resource (time, budget, people…) estimate. It is important to note the sources of the different resources, certainly, if those resources will come |

outside the entity.

- Timeline for development with milestones;

- Proposal for a project team;

- Initial budgetary resource estimates and their origin.

> A NOTE ON RESOURCE ESTIMATION
>
> In the Pre-Initiation Activities, 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 actual cost[17]. 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 you in identifying similar projects and costs for this purpose.

Next

Approval of the CI&RR by the HQ SACT Concept Development (CNDV) Branch Head releases initial planning resources under the control of the Branch Head and triggers the next phase: **Initiation**.

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[17] A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 5th Ed., 2013, p. 201.

CHAPTER 7 -   INITIATION PHASE

Objective of this phase

Objective. After the initiation of your CD project, decided by the MC or SACT, the Initiation Phase expands upon the pre-initiation work, providing greater fidelity of the project. Step 1 is to develop and submit a formal proposal for review by the CDNV Branch Head. Based on the level, scope, and potential impact of the concept, formal approval (and resourcing) decisions may be made at various levels, including review by the HQ SACT Campaign Steering Board.

To achieve this objective, you should:

a.   Explore the problems the concept will address or the opportunities it will exploit leading to a 'problem statement' and resulting in a **Concept Proposal** (CP);

b.   Develop the plan for concept development with a list of stakeholders and refine the estimate of the needed resources summarized in a **Concept Development Plan** (CDP).

The review and approval of the CP constitute **Decision Point (DP) 1** (Approval to Proceed) of the CD&E Method. Approval of the CP and CDP ends this phase and the formal initiation of your CD project, which then triggers the Research Phase.

Remark: Your project may be initiated with little or no pre-initiation activities. In that case, you will need more initial work to do and making this phase longer.

Activities

Activities to manage your project

During the initiation phase, you should focus on properly scoping the project, engaging leadership, and getting a grip on resources. This is done in coordination with the CNDV Branch. You must engage with the CD&E Working Group (CD&E WG), which will assess the Concept Idea & Resource Requirements (and other information on the project), will identify opportunities, will prioritise Alliance CD&E requirements, and will harmonise the project with related Alliance and National projects. Input from the CD&E WG informs the development of a CDP which is, together with the Concept Proposal, presented to an ACT CSB upon completion of the Initiation Phase.

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

Engage with stakeholders and SMEs through interviews, surveys, and workshops to help understand the problem. Stakeholders can be drawn from NATO and other organisations (e.g., COEs, Nations, Industry, 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 project.

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 maintain support for the project as well as ensuring effective and efficient utilization of Alliance and supporting national resources.

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

Governed by Terms of Reference established in March 2018, the CD&E WG organized under the HQ SACT supported by National CD&E representatives.

The **CD&E WG** provides one of the clearinghouse functions to identify Alliance high-value CD&E requirements, to harmonise and coordinate NATO CD&E requirements and activities. The CD&E WG reviews past and monitors current CD&E activities, assesses CD&E project proposals for technical validity, identifies opportunities for synergy with national and multinational activities, and provides 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 the need for and resourcing of CD&E efforts. The **Campaign Steering Board** (CSB) reviews strategic aspects for ACT work, assessing the effectiveness and sustainability of output. It is a decision-making forum which actions the recommendations provided through the CD&E WG. The **Executive Decision Board** (EDB) actions the recommendations of the CSB, identifies topics for joint SACT/SACEUR/CMC consideration, and validates the ACT Campaign Management Plan (CMP).

Activities to develop the concept

Explore the problem or opportunity to be addressed by the concept. Understand why the problem or opportunity exists. Define its scope, nature, impact, and significance.

Conduct preliminary research to review the origins of the concept request including capability shortfalls, operational issues, and Lessons Learned reports. Use the Community of Interest (CoI)[18] and stakeholders to identify related concepts and existing solutions; this will help define the scope of the concept. You may conclude 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 experts to this meeting to provide advice. These will help form the core team.

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 to 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 complemented by early discovery experimentation.

Activities during the Initiation Phase

- Understand the Problem. Learn the context of the problem to gain a sense of direction.

- Establish a 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 COEs as they may be doing similar work and are a source of support.

- Conduct Preliminary Research. Type and level of concept. Possible 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 up-coming proposal to get their support.

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[18] A Community of Interest (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.

Schematic overview of the major activities
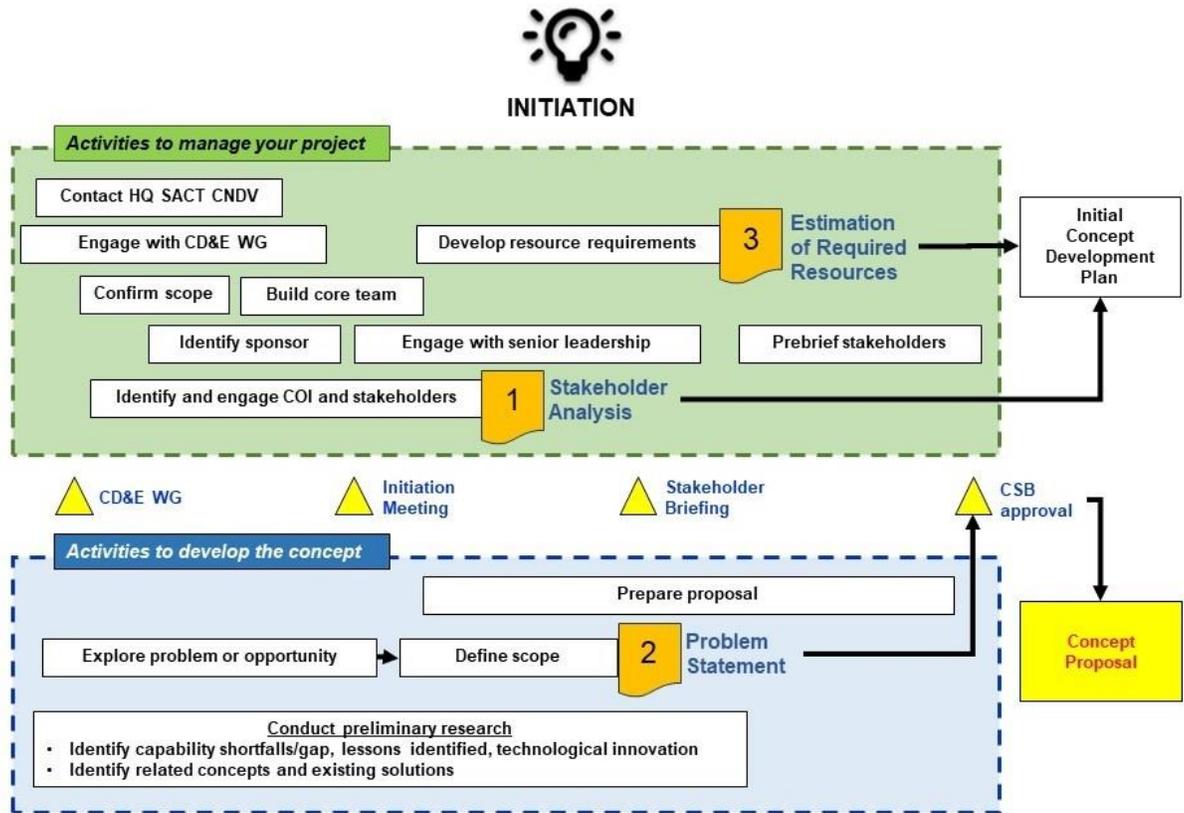
Figure 20: Major Activities in the Initiation Phase.

Possible questions for the Initiation Phase

- Who is the target audience for this concept?

- What are the relevant sources of information?

    o Applicable international law;

    o NATO policy;

    o regulations, orders, and directives promulgated by an appropriate authority concerning the concept being developed;

    o Strategic assessments of current and future threats (i.e., SFA/FFAO);

    o Joint and Single-Service Lessons Learned databases; and

    o 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?

Developing the Concept Proposal and Concept Development Plan

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, you should:

- Create a deeper understanding of the problem space.

- Link the concept proposal to current NATO doctrine, concepts, defence planning, capability development activities, and national concept and capability development activities.

- Solidify the CoI and network for CD&E regarding the proposed concept.

- Continue to develop the stakeholder analysis[19] to identify and refine nations, organizations, agencies, inter alia who may have a vested interest in the project and, through the analysis assign levels of 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;
    - 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, conferences); significant exercise or modelling and simulation events;
    - Key resourcing requirements;
    - Initial plans for CoI engagement (e.g., workshops, conferences).

- 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 individual engagement.
    - Have a senior member of your chain of command engage a peer within the staff responsible for concepts in the stakeholder organizations to solidify acceptance of the proposal.

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[19]   [*HQ SACT]* The ACT Office of Strategic Management (STRATMAN) has developed stakeholder management methodologies that may be used to facilitate this process.

o 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.

Output: The Concept Proposal

<div style="border: 2px solid black; background-color: yellow; padding: 10px; text-align: center;">
Concept Proposal
</div>

The Initiation Phase results in the 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. The Concept Proposal clearly and concisely describes the problem, the rough conceptual idea of how to solve the problem, and its scope. 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 (potentially) briefed to the CNDV Branch Head and the CSB.

The Concept Proposal should include the following:

- Title;

- Motivation - the problem to be solved, requirements to be satisfied, the 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 the concept might fit in relation to other NATO concepts.

Output: The Concept Development Plan

<div style="border: 2px solid black; padding: 10px; text-align: center;">
Concept Development Plan
</div>

The Concept Development Plan describes the initial project plan in more detail than the one in the Resource Request. The plan should be checked by staff experienced in CD projects and with the resource providers. It should include the result of a stakeholder's analysis. The plan puts forth a general idea (including actions, important events, and milestones) of how to proceed with the development of the concept.

The Concept Development Plan presents the framework of the management for the concept development and includes proposed timelines, linkages to capability deliverables, resource requirements, and required activities. The Concept Development Plan will evolve by adding details 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 project result in iterations of the Concept Development Plan. The format of the 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 marked 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, analysis, and M&S 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 skillsets 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 project team as well as other project teams which may support or be supported by the project.

Next

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 Campaign Steering Board[20].

- Assistant Chief of Staff (ACOS).

- Chief of Staff (COS).

- Bi-Strategic Commands (Bi-SC).

- Senior NATO Body (e.g., MC).

The Concept Proposal may be reviewed electronically by the CD&E WG which can advise the CSB in its consideration. The CSB assesses the proposal, determines its priority, and allocates resources required. If the CSB concurs with the proposal, it may be necessary to forward it 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

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[20] MCM-0056-2010, NATO Concept Development and Experimentation Process, 06 July 2010 (Ref C).

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 already authorised by the Military Committee, IMS approval is not necessary.

The CSB, or any intermediate level, may decide essentially on one of the following options:

- **Approval to Proceed**: If approved, the concept, eventually with adaptations, moves to the next phase, the Research Phase. Appropriate resources are assigned as laid out in the CDP.

- **Cancel**: A "Cancel" decision is taken if the research has shown a new concept is not required.

- **Hold**: A "Hold" or freeze decision is taken if development should be postponed (e.g., lack of resources). Periodically, the concept status should be re-evaluated by the BH CNDV.

- **More Information Required**: This would require the Concept Team to do additional research, or further elaborate on the CP and/or CDP. The revised documents are submitted for reconsideration.

Approval at the DP1 triggers formal initiation and progress to the **Research Phase**.

CHAPTER 8 - RESEARCH PHASE

Objective of this phase

Objective. Activities in the research phase ensure that sufficient rigour and objectivity are applied in the identification and development of potential solutions. Although some level of research is incorporated into the pre-initiation activities and initiation phase, more detailed research is now required to inform all stakeholders of the threats, options, and opportunities before the development of solutions[21].

To achieve this objective, you should:

a.   Refine the problem stated in the Concept Proposal and identify potential solutions through extensive research resulting in an **Initial Concept ver 0.1 (IC)**;

b.   Develop a formal **Updated Concept Development Plan** (CDP) plan, which is a living document to guide the CD project. As a living document, the development plan will be updated throughout the project to ensure relevance and to consider external factors impacting the CD project.

Activities

Activities to manage your project

During this phase, you 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. You should make every effort to maintain progress and to avoid "paralysis by analysis". The most valuable concepts are those delivered on time with sufficient, relevant details; 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 your chain of command, BH CNDV, ACT CSB, or the MC.

Continue with stakeholder engagement. This will help you to expand the CoI and identify linkages with other activities that have relevance to your work.

Prepare the updated CDP identifying key activities, milestones, outputs, resources, and risks. Use analysis and experimentation. Consider the need for any ongoing working groups to support concept development. Leverage the experience of respective specialists to inform planning. Ensure the CDP is consistent and includes activities and resources that will properly develop and test the solutions. Socialize the Concept Proposal with the core team and CoI through holding regular progress meetings and staffing.

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[21]   Although the CD Method seemingly limits research to one phase, this is not the case. It is true that most of the research will take place at the beginning of the project, however, you will need research through the whole life of the project.

Use insights gained through the Research Phase to refine the scope of the concept and resource requirements resulting in improvement of the CDP. Tasks of the research phase include:

- Refinement of project scope and resource requirements;

- Expansion of the CoI and Stakeholders Network;

- Assessment of exercise and experimentation requirements and opportunities based on a review of Education, Training, Exercise and Evaluation (ETEE) plans;

- Identification and engagement with SMEs; and

- Management and control of resources (funding, personnel, time, etc.).

Progress on the project is facilitated through iterative reviews, as foreseen in the CDP or in agreement with the sponsor, informed by the management and development activities. For every review, there are the same four possible decisions as in DP 1 and DP 2 (see CHAPTER 7 - Next page 47):

- Approval to Proceed;

- Cancel;

- Hold;

- More Information Required.

Activities to develop the concept

Conduct a 'kick-off' workshop to bring the CoI together and to introduce the core team[22]. During the workshop, review the Concept Proposal and consider feedback from the Initiation Phase review. Encourage the team members to ask questions, identify issues for consideration, and ensure there is a common understanding of the aims. Review the Concept Development Plan, check timescales and resource availability, and agree on 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 engaging stakeholders, conducting research, and literature review. Possible sources are: NATO policies, public declarations, military professional journals, national concepts, academia, S&T assessments, intelligence estimates, and open-source publications. This research should be ongoing throughout the project. Consider solutions to the problem from across the DOTMLPFI spectrum. Document research and justifications for why potential ideas or

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[22] Core Team potential participants are: Concept Champion, Concept Sponsor, Concept Developer, Program Manager, Project Manager, OA and OPEX representatives, Subject Matter Experts (SMEs). See Annex B for their roles.

solutions were rejected or accepted. This will support arguments and provide evidence to support the concept's development and implementation.

Arrive at a detailed definition of the problem space and potentially viable DOTMLPFI solutions through progressive elaboration. Results of this work are combined into an Initial Concept ver 0.1 that describes the problem, identifies potential solutions, presents initial recommendations, and outlines initial thoughts on the implementation of the concept.

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 modelling and simulation.

Activities during the Research Phase

- Identify the Core Team. The core team is responsible for developing the concept documents.

- Conduct Visits. Visit operational commands, research organisations, and individual SMEs to gain insights and knowledge.

- Conduct Kick-off Workshop. This is the first formal workshop of the project. The outcome should be agreements on the division of work and research assignments.

- Conduct Information Search. A multiple source search for information on the topic.

- 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. A workshop focused on identifying potential solutions or lines 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 (LL/LI) that relate to the project.

- Examine Modelling and Simulation (M&S) Requirements. Identify if there is a need for M&S; if so, include these 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 suitable.

- Conduct Red Team Workshop. SME workshops to assess the content and adequacy, and viability of the concept.

Schematic overview of the major activities
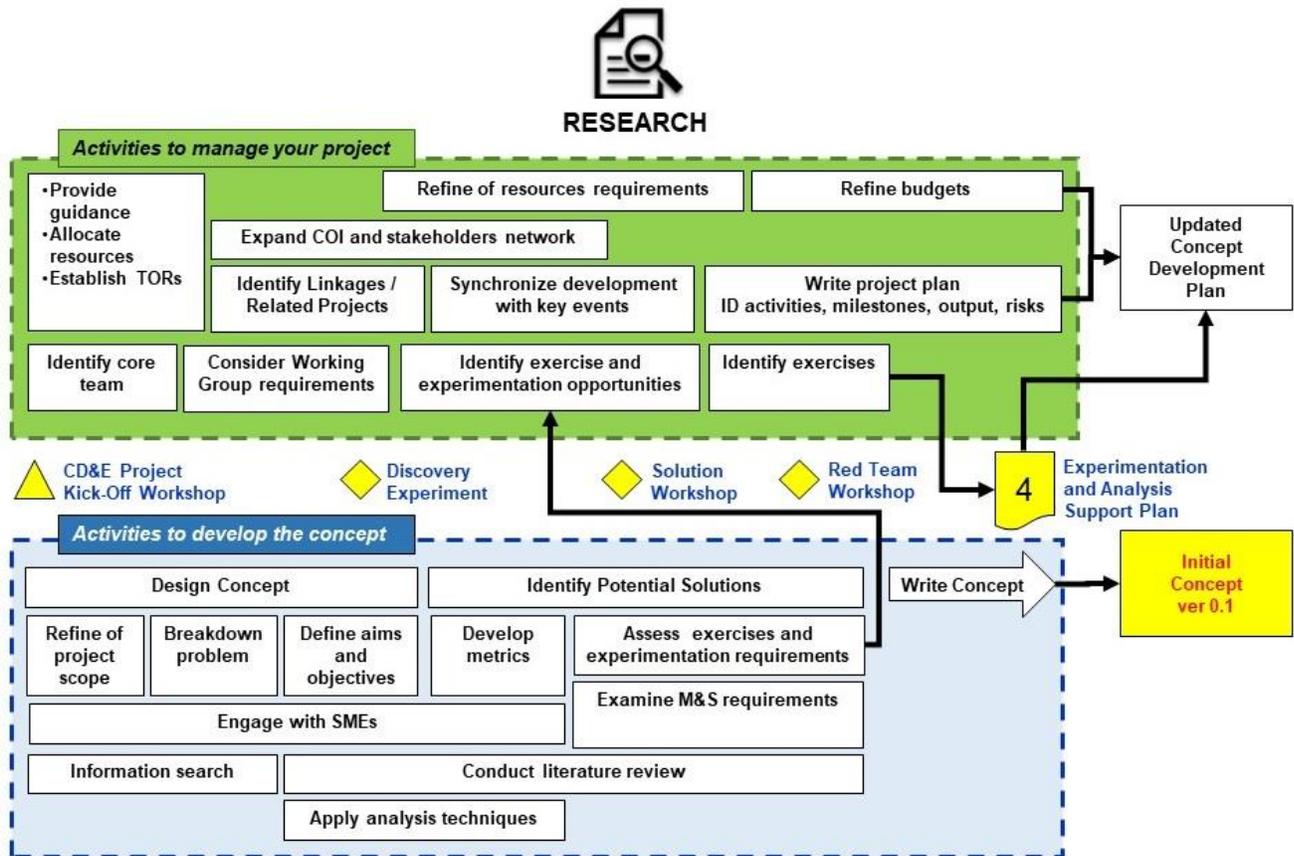
Figure 21: Major Activities in the Research Phase.

Possible questions in the Research Phase

- 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 interviews 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 the current activities and concepts about 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?

Developing the Initial Concept ver 0.1 and the Updated Concept Development Plan

The Initial Concept ver 0.1 is a starting point with a clear problem statement and potential solutions. The Updated Concept Development Plan presents the foundational outline required to develop the mature concept document. It provides the foundational outline for the development project and facilitates senior leadership's approval for the concept's inclusion in the CD&E Campaign Plan.

Product: The Initial Concept ver 0.1

Initial Concept ver 0.1

The Research Phase results in the Initial Concept ver 0.1. In that document, you describe the concept design concisely and logically with a clear problem description, scope, and potential solutions. You may need to present the Initial Concept ver 0.1 to the BH CNDV who assesses the concept for validity and reviews the approach outlined in the CDP.

The format of the Initial Concept ver 0.1 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:

    o Aim, Purpose, and Objectives;

    o Scope including limitations.

- Background, to include:

    o The Military Problem, Shortfalls, or Deficiencies;

    o Future Operational Context, Missions, or Operational Construct.

- Summary of initial literature search

- Linkage to:

    o Strategic Vision and/or Strategic Guidance;

    o Other Concepts (as appropriate).

- Principles, Central and Supporting Ideas.

- Conclusions.

- Recommendations.

- Appendices – As required.

Some tips

- 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 by 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 a uniform style and accountability.

- Establish a writing team for support which follow a particularly structured approach if a significant number of documents require collection, collating and analysis.

- Consider that staff diversity and turnover rates experienced within NATO could impact the product.

Product: Updated Concept Development Plan

Updated Concept Development Plan	An update of the Initial Concept Development Plan that identifies past and future key activities, milestones, outputs, consumed and needed resources, and risks. The CDP is consistent and in line with the status of the CD project.

Next

Acceptance of the Initial Concept ver 0.1 and the Updated Concept Development Plan triggers the **Development Phase**.

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CHAPTER 9 - DEVELOPMENT PHASE

Objective of this phase

Objective. The Development Phase further evolves ideas laid out in the Initial Concept ver 0.1 and matures them into viable solutions. The main aim of this phase is to determine how a selected and specific solution could address the problem or exploit the opportunity. This must include evidence justifying the selected solution. Several workshops and conferences are identified, acknowledging the need for integration across development, experimentation, and analysis.

To achieve this objective, you should:

a.   Mature the concept sufficiently in preparation for formal staffing by further research and assessment activities, resulting in a **draft Concept version 0.5**;

b.   Refine the **Updated Concept Development Plan** (CDP);

c.   Consider the implementation of the concept through the development of an **Initial Implementation Proposal**[23].

Key to success is an 'experiment event' that provides critical feedback for the project.

Activities

Activities to manage your project

Activities in the Development Phase result in a draft Concept. This is prepared for socialization and (informal) staffing within the CoI and with SMEs, who provide a detailed review and critique of the draft Concept.

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.

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

Allocate writing and research assignments across the CD 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 your

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[23] A proposal for implementing the concept across DOTMLPFI.

team through collaboration platforms. Information sharing and collaboration are essential to the timely development of a comprehensive concept.

Essential tasks in this phase include:

- Creation and initiation of a Communication Plan;

- Coordination of interim concept staffing; and

- Management and control of resources (funding, personnel, time, etc.).

The ACT Concept Development Branch can assist you in identifying collaboration resources to facilitate the execution of this phase.

Activities to develop the concept

Throughout the Development Phase, the concept should undergo analysis and testing of solutions. As in the Research Phase, you 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.

Further develop potential solutions described in the Initial Concept ver 0.1 by conducting additional research, literature reviews and continue 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 likely is an opportunity to conduct stakeholder workshops to review the research, refine the concept, and agree on the solutions for evaluation.

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 project team starts to develop proposals for concept implementation. Although implementation is beyond the scope of the CD Method, the project team is nonetheless in the best position to identify potential synergies, issues, and activities, either facilitating or inhibiting successful implementation of the concept. Developing the implementation proposal may prove useful by enabling advance identification of potential issues, which may be avoided or mitigated through the development project 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; and

- Engagement with SMEs.

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 simulation-based experiment to compare solution effectiveness.

- Hypothesis Experimentation. Hypothesis testing experiment(s) to compare solutions against a baseline. This activity can require 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 consist of both quantitative[24] and qualitative[25] measures demonstrating how well the solutions address the problem. Outcomes provide evidence justifying or validating the need for the concept, supporting further refinement, and helping you to express the concept's overall benefits and risks.

Activities during the Development Phase

- Communicate with stakeholders and CoI. Keep the stakeholders and CoI informed.

- Continue to expand the CoI. Bring additional members of the CoI into the development work.

- Continue research and literature reviews. Continue to investigate areas of interest as they arise.

- Conduct development workshop(s). Workshop to develop the content of the Concept and update the 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.

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[24] Relating to, measuring, or measured by the quantity of something rather than its quality (OED, https://en.oxforddictionaries.com/definition/quantitative).

[25] Relating to, measuring, or measured by the quality of something rather than its quantity (OED, https://en.oxforddictionaries.com/definition/qualitative).

- 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.

- Integrate. Integrate the individual lines of effort into a cohesive package.

- Actively use opportunities to collaborate. Take advantage of opportunities to collaborate with other projects.

- Conduct a writing workshop. Workshop to write the detailed concept document.

- Assess benefit(s) and risks. Identify how the concept provides benefit to the stakeholders. Justification for implementation.

- Develop an Initial Implementation Plan. Develop an initial draft of how the concept could 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.

Schematic overview of the major activities
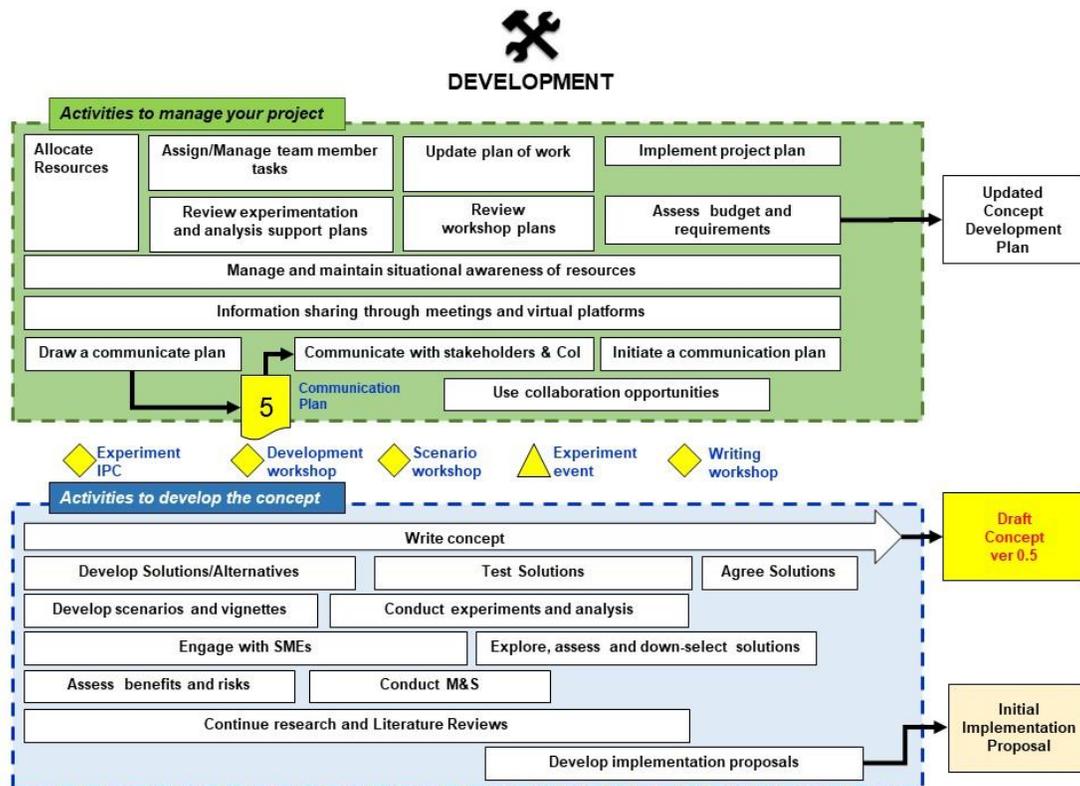
Figure 22: Major Activities in the Development Phase.

Possible questions for the Development Phase

- 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:

  o Clarity. Is the text sufficiently clear that the intended audience will understand the subject being discussed?

  o Accuracy. Has the information contained in the publication been verified to a practicable extent?

  o Relevance. Do all elements contained in the publication have relevance to the subject of the concept?

  o Depth. Have the elements contained in the concept been discussed to the appropriate depth?

  o Breadth. Have all necessary elements been included in the concept?

  o 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?

Developing the Draft Concept version 0.5, the Updated Concept Development Plan, and the Initial Implementation Proposal

Developing the Draft Concept is an on-going effort throughout this phase. You should ensure a clear definition of the problem and identify and discuss potential solutions. Solutions should be analysed through experimentation to down-select to those most relevant, realistic, and employable. Results highlight benefits, risks, and issues that may need to be addressed in follow-on testing, evaluation, and development.

In developing the draft Concept version 0.5, 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 drafts of the) document with the CoI.

Through the life of the CD&E project, formal staffing of the concept results in the delivery of interim versions leading to the final, validated, and approved concept. The Initial Concept ver 0.1 Document described above is the start point for the Concept Document which benefits from the insights and knowledge gained through iterative reviews. Its main purpose is to present a mature concept. The CD Method indicates three iterative production versions of the concept as a document: version 0.5, version 0.9, and the Final Concept. These are the minimum recommended and are intended to assist in progressive elaboration

of the concept. Depending upon the factors identified above, you may wish to insert additional, intermediate versions for staffing or production checks.

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

- Purpose;

- Intended use and audience;

- Scope; and

- Applicability.

Although planning for and executing implementation are not within the responsibilities of the CD effort, you and your team will have acquired valuable implementation insights during the project. These should be captured into the DOTMLPFI lines of development addressed in the concept. A proposal for implementing the concept across DOTMLPFI (or Implementation Proposal) is progressively developed through the life of the CD 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.

Product: The Draft Concept, version 0.5

Draft Concept ver 0.5	The Draft Concept ver 0.5 document is the focused objective of the CD&E project and progressively developed through the life of the project.

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

- Executive Summary:
    - Describes the main features of the concept;
    - Developed after the concept has gone through initial reviews.
- Introduction:
    - Concept Statement, Vision or Definition;
    - Aim, Purpose, and Objectives; and
    - Scope including limitations.
- Background, to include:
    - Current state of play, availabilities, etc.;
    - Military Problem, Shortfalls, or Deficiencies;
    - Needs Statement, or Rationale for a capability;

- Gap Analysis;

- Future Operational Context, Missions, or Operational Construct; and

- Illustrative Example and Scenarios.

- Summary of literature search material and conclusions.

- Linkage or Relevance to:

  - Strategic Vision and/or Strategic Guidance;

  - Other Concepts (as appropriate).

- Principles, Central and Supporting Ideas.

- Components, Elements, Characteristics, and Attributes.

- Necessary Capabilities, Capability Needs, and/or Inferred or Derived Requirements.

- Conclusions and Assessment to include Recommendations or the Way Ahead.

- Review Schedule.

- Appendices – as required, may include:

  - Definitions, Terminology, or Glossary of Terms;

  - Models, Flow Charts, and Diagrams; and

  - Capability Attributes and Metrics;

  - Detailed literature search.

Product: The Updated Concept Development Plan
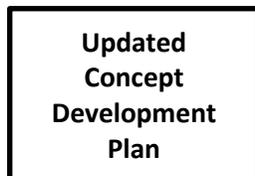
Updated Concept Development Plan	This document is an update of the Concept Development Plan (CDP) reflecting the situation at the point in time of the Draft Concept ver 0.5.

Product: The Initial Implementation Proposal
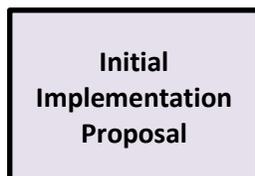
Initial Implementation Proposal	The initial Implementation Proposal collects the insights for implementation of the concept along the DOTMLPFI lines of development.

Next

Successful closure of this phase, as defined in your CDP, ensures progress to the **Refinement and Validation Phase**.

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CHAPTER 10 - REFINEMENT AND VALIDATION PHASE

Objective of the phase

Objective. The Refinement and Validation Phase aims to revise the concept until it is sufficiently mature that it can be formally tested in a representative operational environment. As in the Development Phase, workshops, conferences, and exercises support refinement by providing feedback.

To achieve this objective, you should:

a.   Further develop, refine, and validate the concept and demonstrate with evidence that the concept effectively addresses the problem, resulting in a **Validated Concept, version 0.9**;

b.   Keep track of the **updated Concept Development Plan** (CDP) till it is ready to be archived;

c.   Develop the **updated Implementation Proposal** (IP), eventually presenting a plan for the implementation as a capability.

Activities

Activities to manage your project

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 another event. This provides an opportunity to orient staffing promoters to the problem space. Understanding the context enables a detailed discussion to address concerns over the identified solutions, the fidelity of the concept, or the development phase itself.

Later in this phase, the implementation of a Communication Plan is an important management task. Effectively communicating the purpose, intent, and progress of the concept to stakeholders and interested parties should positively influence resourcing decisions.

Activities to develop the concept

The activities conducted are like those in the Development Phase with ongoing research, solution development, and testing being conducted via analysis and experimentation. However, the concept's solutions now are 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 to ensure continued validity and relevance. 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 phase focus on clarity of solutions and specific responses to identified issues.

Prepare for formal concept testing as part of the validation phase in combination with operational analysts participating in the development.

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); and

- Simulation systems and functional services integration, or wargames.

Due to the technical nature of these activities, the experimentation and analysis communities have an important role in their successful execution.

Typically, experimentation must be planned and coordinated well in advance requiring significant resource commitment. If you wish to use an exercise in support of concept development, then this will need to be de-conflicted with exercise planners through their IPC and MPC. For larger NATO exercises, this can require 1-2 year's notice, so this should be considered within the earlier concept development phases. Even if that means planning a slot that may later be cancelled if deemed no longer necessary. Other validation events employing simulation systems and war games will also require planning. Experimentation for concepts directly influencing operational capabilities will often require validation through exercises or war games; however, validation of some concepts may suffice with simpler experimentation and analytical approaches. Experimentation and analysis SMEs are well-positioned to assist in these areas.

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

- Integration – Link the concept to existing DOTMLPFI capabilities. Identify how the implementation will impact capability development and in-service capabilities. Determine associated risks.

- Approval Body Engagement – Determine who needs to be engaged and what information they need to endorse the concept's implementation.

Activities during the Refinement and Validation Phase

- Exploit opportunities. Take advantage of opportunities to collaborate with other projects.

- Explore further areas. Investigate areas identified during the Development Phase.

- Conduct refinement workshop(s) 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.

- 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 the approval decision. Approved for staffing to the MC, or further work required.

Schematic overview of the major activities
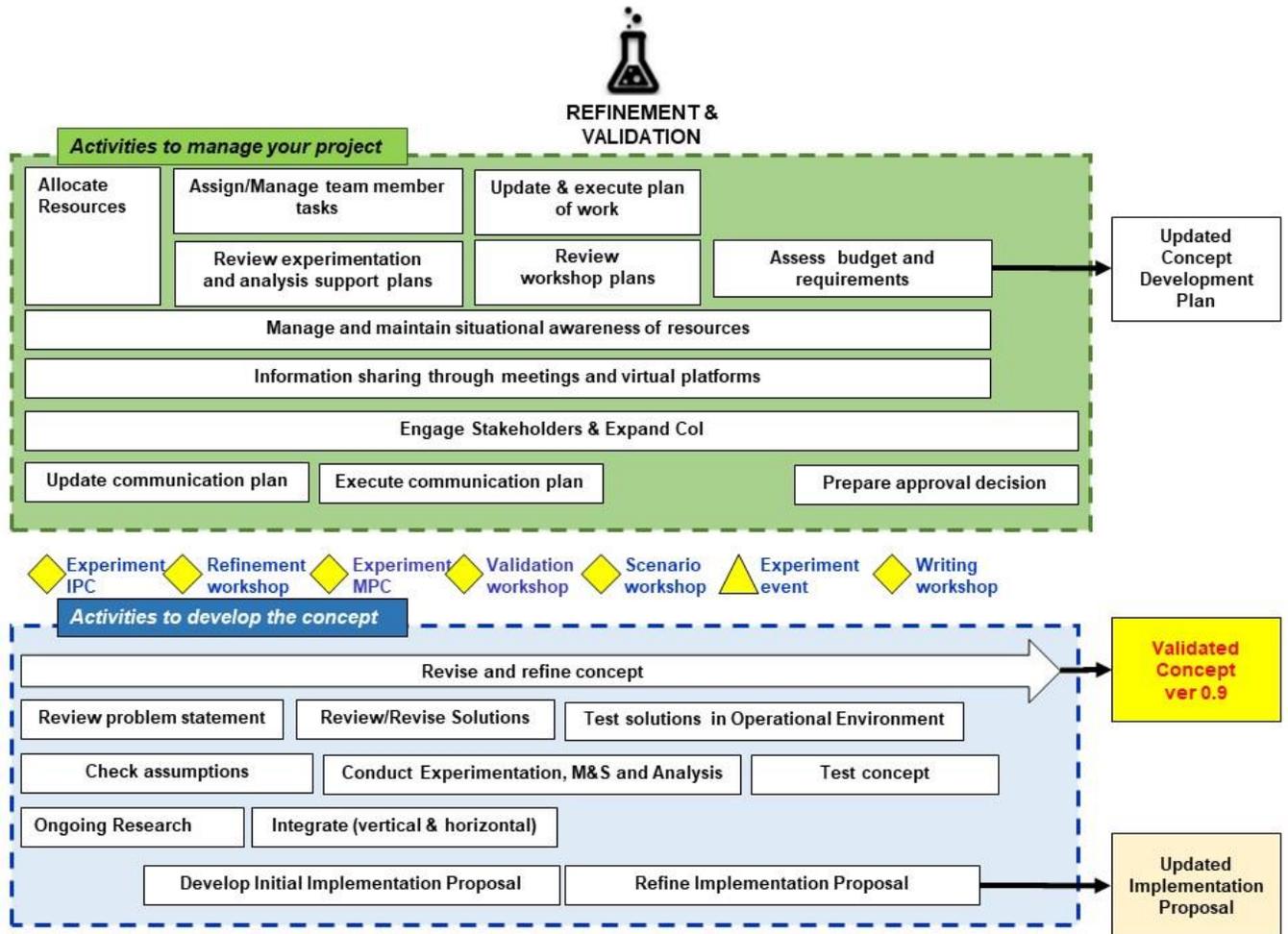
Figure 23: Major Activities in the Refinement and Validation Phase.

Possible Questions for the Refinement and Validation Phase

- 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?

Developing the Validated Concept, version 0.9 and the Updated Implementation Proposal

Product: The Validated Concept, version 0.9

Validated Concept ver 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.

Product: The Updated Concept Development Plan

Updated Concept Development Plan

This last version of the Updated Concept Development Plan (CDP) is both the last update, a closure at the point in time of the final version of the Validated Concept ver 0.9. After formulating the lessons identified in the CDP, the plan is ready to be archived.

Product: The Updated Implementation Proposal

Updated Implementation Proposal

The Updated Implementation Proposal (IP) builds on the initial document by adding more insights and suggestions (e.g., what, who, when) for implementation of the concept.

Next

Successful closure of this phase triggers the formal staffing of the concept in the final formal phase of the CD Method, the **Approval Phase**.

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CHAPTER 11 - APPROVAL PHASE

Objective of this phase

Objective. Initiated by the finalization of the Validated Concept version 0.9, the Approval Phase focuses on the staffing and final editorial activities required to obtain an appropriate level of approval to enter the concept into NATO's formal body of knowledge. As the final formal phase of the CD Method, this phase includes the development of project close-out documentation and archival of the project information to inform future concept development activities.

To achieve this objective, you will fulfil three secondary objectives:

a.   Initiate final editorial activities and formal staffing, resulting in a **Final Concept, version 1.0**;

b.   The final **Implementation Proposal** (IP);

c.   Close project and archive documents.

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. The rigour applied in the Refinement and Validation Phase is important to gaining approval of the final product.

Activities

Activities to manage your project

Following staffing of the Validated Concept ver 0.9, the CD project team will address substantive comments and proceed to finalize the concept. You will present the Final Concept for approval, signalling 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 to Refinement and Validation phase.

Coordination began with the first meetings on the Proposal and continues until final concept approval. It is a constant effort of informing and educating stakeholders and 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 or other formal programmes of record.

- Finalization and presentation of the concept Implementation Proposal (IP).

- Implementation of risk mitigation strategies.

- Engagement and communication with SMEs and key staff.

- Final management and control of resources (funding, personnel, time, etc.).

- 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 project management observations, insights, and lessons.

- Archiving concept and project artefacts including, inter alia:
  - Meeting and workshop information;
  - Draft and interim products;
  - Experimentation and Analysis documentation;
  - Staffing comments and feedback; and
  - Stakeholder information.

- Close-out of collaboration sites (i.e., portals, web pages, etc.).

- Presentation of project closure briefing to sponsor and/or CNDV Branch Head.

- Releasing the CD project team.

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 with the core team, key stakeholders, and the sponsor. Review feedback from previous Approval Review activities and modify the concept appropriately. Plan what internal, external, and 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 preparations, the concept enters formal staffing following appropriate NATO and subordinate command administrative procedures.

Seek senior approval authority depending on the type and level of applicability of the concept, and on 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 need significantly lower levels of endorsement. These are considerations, which, if not addressed at the outset of the project, should be addressed at some point in the development project.

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

Finalize and implement the 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 identified issues or comments.

Prepare to close the CD 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 CD&E 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 artefacts (papers, briefings, notes, analyses, etc.) from the project, are important elements used to inform future CD&E activities.

Activities to develop the concept

As the concept is fully developed, this kind of activities will be minimal in this phase. However, remain engaged throughout this final phase to ensure timely action to address any potential blocks to approval. 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.

Be prepared for the concept to be rejected or partially approved.

Experimentation and Analysis Activities

As the concept is fully developed, this kind of activities will be minimal in this phase.

Activities during the Approval Phase

- Conduct Approval Workshop. Workshop to assign tasks for taking the concept through the approval phase.

- Execute Activities to manage your project. Organisation-dependent activities 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 material for future references.

- Obtain Concept Approval. The concept is approved or forwarded for endorsement.

- Facilitate Concept Endorsement. The final endorsement authority (MC, Bi-SC, SACT, etc.) depends on the level and nature of the concept.

- Monitor/Support Implementation. The core team should monitor the implementation activities and provide support as appropriate.

Schematic overview of the major activities
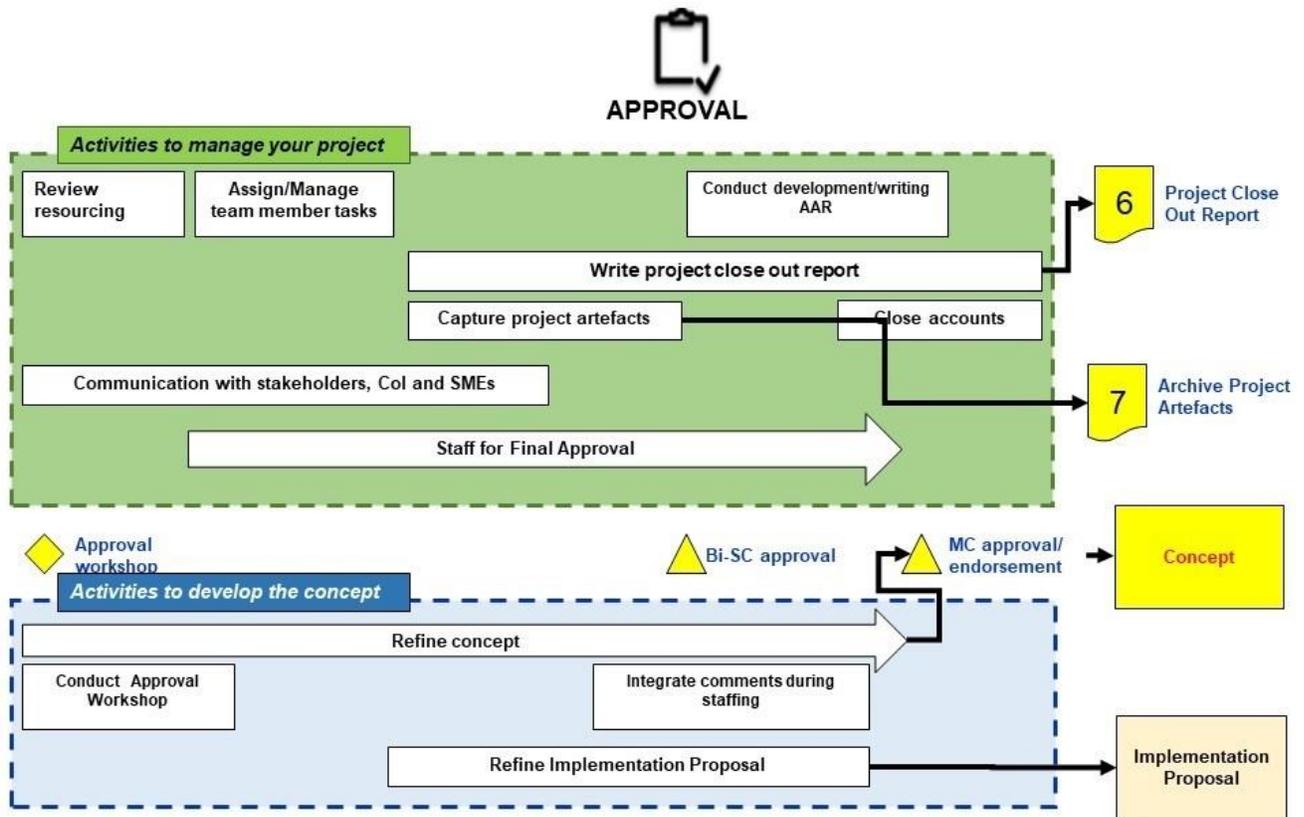
Figure 24: Major Activities in the Approval Phase.

Possible Questions for the Approval Phase

- If non-NATO concepts are consulted, what factors might inhibit adoption by NATO?

- Which agencies, commands, and/or offices are necessary to coordinate approval?

- What procedures and tools are available/required for processing the concept through approval (e.g., Tasker Tracker in the Bi-SC)?

- What events must be taken into consideration as part of the approval phase?
    - NATO HQ meetings of the IS, IMS, and Military Committee;
    - Bi-SC meetings and conferences; and
    - Other NATO bodies.

Developing the Final Concept version 1.0 and the Implementation Proposal

Product: The Final Concept, version 1.0

Final Concept ver 1.0

The Approval Phase results in the Final Concept, version 1.0.

Other outcomes of this phase are a Project Close-Out Report and archived products, as discussed above.

Product: The Implementation Proposal

Implementation Proposal

This last version of the Implementation Proposal (IP) is a document with the insights and suggestions (e.g., what, who, when) for implementation of the approved concept. You should be prepared to take actions to support the transition to implementation.

Next

Approval of the concept triggers the **Post-Approval** activities.

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CHAPTER 12 - POST-APPROVAL ACTIVITIES

Objective of these Activities

Objective. Although outside the formal phases of the CD Method, Post-Approval activities are important to support the transition to and successful execution of the implementation. You and your team should also be prepared to assist other offices and agencies involved in the adoption of the concept (e.g., NATO defence planning staff, NATO Communications and Information Agency (NCIA), national entities, et. al.) by providing insights, or elaborations on the concept or the development project.

Activities

It is likely the Implementation Authority will use the recommendations formulated in the Implementation Plan and developed during the CD project as a foundation. You and the core team should be prepared to assist by promoting or even further developing this plan to support implementation.

Finally, you 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 considering any time or staff requirements required in the Post-Approval Activities.

Endorsement of the concept by the Senior NATO Body (partially) triggers implementation. Implementation is not part of a CD project and is usually the responsibility of an operational entity, or more usually the Nations. 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 Implementation Proposal.

Implementation authorities will need to develop more detailed implementation plans. You 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, you should maintain close contact with core development team members and stakeholders and ensure completeness of and access to CD project archives. In cooperation with the Implementation Authority, you may be asked to refine or develop a communication plan to inform NATO and Nations of the new concept and its relevance to NATO's mission and goals.

Schematic overview of the major activities
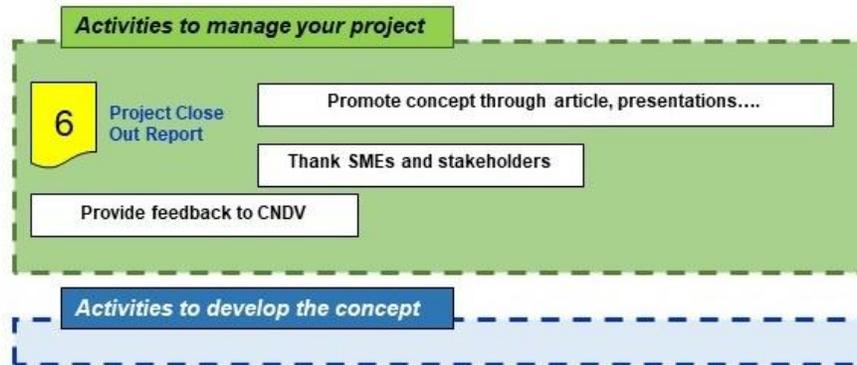
Figure 25: Major Post-Approval Activities.

Developing the Project Close-Out Report

Project Close-Out Report

Although there are no special requirements, it is common sense to take some time to write your experiences, encountered problems, lessons identified, solutions, tips … down. Try to catch not only recent Info and think also about the first phases of your project.

Send your report to the CNDV Branch for exploitation.

Writing such a report is also important when your project was stopped before the approval phase. Your experience will be helpful for others and, by doing so, you underline that the notion of 'failure' plays an important role in CD&E. Identifying a non-valid idea, a failed course of action early is not only valuable, it can also enable the reallocation of resources and efforts. Confirming how not to do certain things may be considered as failing, but it is not a failure.

Next

Great, the approval authority approved your concept! This approval does not mean that the concept is turned into policy and must be implemented as such, but that is an agreed-on document that provides guidance for different working domains and may lead to the development of a policy. The approval will be accompanied by directions on how to implement the concept.

After successfully finishing this concept development effort, you are ready to lead another project. Maybe you can write an article on your project?

Thank you and all the best.

CHAPTER 13 - AFTERTHOUGHTS

You have read this handbook from page one to its conclusion. Maybe this is the first time you read it before leading a concept development project. Maybe you have used it as your toolbox during such a project. In that case, we are glad that it helped you to bring your project to a successful ending, be it approval or termination.

Either way, we hope it has served you well and that we have achieved our goal in helping you to facilitate your team.

This handbook is a "living document" and we will update it periodically. To do that, we need your feedback and suggestions for improvement. Do not hesitate to contact us, the HQ SACT's Concept Development Branch (conceptdevelopment@act.nato.int). We are the handbook's custodian and responsible to keep your toolbox up to date.

Some of your feedback requested to add examples to this handbook. We decided not to do that because examples would significantly increase the number of pages of this handbook, would need context to understand the why of these examples, and could be viewed as the ones to copy… However, we can provide you with examples and use these during the course or briefings.

You may also contact us or our experimentation and operational analyst colleagues when you have questions or in need of support:

- o Operational Experimentation (OPEX) Branch: OPEX@act.nato.int,
- o Analysis of Alternatives (AOA) Branch: AOA@act.nato.int.

Let us bridge today to tomorrow, together.

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ANNEX A – SUPPORTING RESOURCES & STAKEHOLDERS

Supporting Resources

The following are CD&E support resources (not all are available to the public):

- HQ SACT
  - Concept Development (CNDV) Branch: ConceptDevelopment@act.nato.int
  - Operational Experimentation (OPEX) Branch: OPEX@act.nato.int
  - Analysis of Alternatives (AOA) Branch: AOA@act.nato.int
  - COE Programme Development: COECOORD@act.nato.int
- Online via TRANSNET
  - TRANSNET-CDE365
  - TRANSNET-Operational Analysis
- Training
  - NATO Concept Development and Experimentation Course (May & Oct in NATO School Oberammergau or METT)
  - NATO Alternative Analysis Course (May & Oct in NATO School Oberammergau or METT)
  - Project management courses like Portfolio, Programme and Project Management (P3) Course and PRINCE2
- Suggestions for Further Reading
  - Guide for Understanding and Implementing Defence Experimentation (GUIDEx) (Ref J)
  - Alternative Analysis (AltA) Handbook (Ref H)
- Conferences
  - Annual NATO CD&E Conference (Oct)
  - Annual OA Conference (Oct)
  - Annual EU Military Staff CD&E Conference

Stakeholders

Stakeholder engagement is key to concept development and requires good planning. Use stakeholders throughout the concept development project 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 versus interest mapping) to identify and determine how to engage best with them. The core team should consider engaging with the following stakeholders:

NATO

Below is an incomplete list of NATO entities that could be stakeholders in your project. For a complete and up-to-date list surf to https://www.nato.int/cps/en/natohq/structure.htm.

- Allied Command Transformation – advice on CD&E best practice, analysis, experimentation, future strategic trends, scenarios, trends, academia, and industry / COE engagement.
    - o Joint Analysis & Lessons Learned Centre (JALLC) – analytical support of operations, training, exercises, and experiments. (http://www.jallc.nato.int/)
    - o Joint Warfare Centre (JWC) (http://www.jwc.nato.int/) & Joint Force Training Centre (JFTC) (http://www.jftc.nato.int/) – concept testing within training/exercises and capability implementation advice, doctrine validation.
    - o Centres of Excellence (COEs) – specialized expertise and experience to support concept development and experimentation. HQ SACT COE Programme Development (CPD) Branch can be used to engage. A complete listing of NATO-accredited COEs may be found at https://www.nato.int/cps/en/natohq/topics_68372.htm#
- Allied Command Operations – concept sponsors, defence planners, operational feedback, concept review and implementation.
    - o Supreme Headquarters Allied Powers Europe (SHAPE) (https://shape.nato.int/)
    - o Joint Force Command Brunssum (https://jfcbs.nato.int/)
    - o Joint Force Command Naples (https://jfcnaples.nato.int/)
    - o Joint Force Command Norfolk
    - o Allied Maritime Command (MARCOM) (https://mc.nato.int/)
    - o Allied Land Command (LANDCOM) (https://www.lc.nato.int/)
    - o Allied Air Command (AIRCOM) (https://ac.nato.int/)
- NATO Agencies
    - o NATO Communications & Information Agency (NCIA) (https://www.ncia.nato.int/)
    - o NATO Support and Procurement Agency (NSPA) (http://www.nspa.nato.int/)

- MOU organizations
    - NATO Special Operations Headquarters (NSHQ) (http://www.nshq.nato.int)
    - NATO Intelligence Fusion Center (NIFC)
    - NATO Joint Electronic Warfare Core Staff (JEWCS)
- NATO HQ
    - International Staff (IS)
    - International Military Staff (IMS)
    - NATO Science and Technology Organization (STO) (https://www.sto.nato.int/)
    - Centre for Maritime Research and Experimentation (CMRE) (http://www.cmre.nato.int/)
    - NATO Standardization Office (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

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ANNEX B – ROLES AND RESPONSIBILITIES

Role	Function and Responsibilities
Concept Developer	Individual(s) responsible for the development of the concept. It is generally accepted that the Concept Development Leader is also the Project Manager.
Stakeholder	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. Annexe 2 to NATO AAP-20 is an abbreviated listing of potential stakeholders for lifecycle capability development. Though not exhaustive, this provides a point of departure to identify stakeholders for CD projects.
Champion	A Champion is an 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 at every level of the project. Senior-level champions can be powerful allies in identifying and obtaining resources as well as supporting cross-organization integration.
Sponsor	The concept project Sponsor is a person or group [providing] resources for the project and is accountable for enabling success.26 The Sponsor should: • Have a 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 and 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. Working with the Project Manager to assess the impact on the CD&E project. May have the ability to manage resources across several projects to facilitate an integrated concept development approach.

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26   A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 5th Ed., 2013.

Role	Function and Responsibilities
Project Manager	The Project Manager is an individual assigned by the organization initiating the concept to lead the team responsible for executing the phases of the concept development. The Concept Development Leader is also the Project Manager.
Project Team (or Core Team)	The set of individuals who support the Concept Developer 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 supporting the development of the concept. The Experimentation Manager is the SME regarding Discovery, Hypothesis, and Validation experimentation and is the source of information and expertise in preparing the necessary documentation for successful experiments.
Analysis Manager	A key member of the Project Team, the Analysis Manager is responsible for designing and managing the analytical processes associated with the analysis of alternatives and rationalisation of experiment outcomes. The Analysis Manager is the SME regarding analytical methodologies and tools for analysis and is the source for information and expertise in preparing the necessary documentation for successful analysis.

ANNEX C – ABBREVIATIONS

ACO	Allied Command Operations
ACT	Allied Command Transformation
AltA	Alternative Analysis
AOA	Analysis Of Alternatives Branch (at HQ SACT)
BH CNDV	HQ SACT's Concept Development Branch Head
Bi-SC	Bi-Strategic Commands; the commands ACO and ACT
CD	Concept Development
CD&E	Concept Development and Experimentation
CDP	Concept Development Plan
CI	Concept Idea
CMC	Chair Military Committee
CNDV	Concept Development Branch (at HQ SACT)
CoA	Courses of Action
COE	(NATO accredited) Centre of Excellence
CoI	Community of Interest
COS	Chief of Staff
CRR	Capability Requirements Review
CSB	(ACT's) Campaign Steering Board
DCAP	Data Collection & Analysis Plan
DCOS CD	Deputy COS Capability Development
DCOS JFD	Deputy COS Joint Force Development
DCOS SPP	Deputy COS Strategy, Plans and Policy
DOTMLPFI	Doctrine, Organisation, (Education &) Training, Materiel, Leadership, Personnel, Facilities, and Interoperability
DP	Decision Point
EDB	Executive Decision Board
EDD	Experiment Design Document
ETEE	Education, Training, Exercise and Evaluation
FCC	Final Coordination Conference
FER	Final Experiment Report

FFAO	Framework for Future Alliance Operations
HQ	Headquarters
HQ SACT	Headquarters Supreme Allied Commander Transformation
HTML	Hyper Text Mark-up Language
IC	Initial Concept
IO	International Organization
IoS	Ideas of Systems
IP	Implementation Proposal
IPC	Initial Planning Conference
JALLC	Joint Analysis and Lessons Learned Centre
JFTC	Joint Force Training Centre
JWC	Joint Warfare Centre
LI	Lessons Identified
LL	Lessons Learned
M&S	Modelling and Simulation
MC	Military Committee
MCR	Minimum Capability Requirement
MoE	Measure of Effectiveness
MoP	Measure of Performance
MPC	Main Planning Conference
NAC	North Atlantic Council
NCIA	NATO Communications and Information Agency
NCS	NATO Command Structure
NDC	NATO Defence College
NDPP	NATO Defence Planning Process
NIAG	NATO Industrial Advisory Group
NLR	National Liaison Representative
OA	Operational Analysis / Operational Analyst
OIL	Observations, Insights and Lessons
OPEX	Operational Experimentation / Operational Experimentation Branch (at HQ SACT)
PNLR	Partner Nation Liaison Representative

POW	Programme of Work
ROM	Rough Order of Magnitude
RR	Resource Request
S&T	Science and Technology
SACEUR	Supreme Allied Commander Europe
SACT	Supreme Allied Commander Transformation
SAGE	SACEUR Annual Guidance for Education, Training, Exercise and Evaluation
SC	Strategic Commander
SFA	Strategic Foresight Analysis
SHAPE	Supreme Headquarters Allied Powers Europe
SME	Subject Matter Expert
SOW	Statement of Work
STO	Science and Technology Office/Organization
TRANSNET	Transformation Network Portal
TTP	Tactics, Techniques, and Procedures
WBS	Work Breakdown Structure
WG	Working Group

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ANNEX D – REFERENCES

A. (NU) MC-0583 (Final), MC Policy for NATO Concept Development and Experimentation, 04 October 2010.

B. (NU) MC-0583 Change 1 (Final) MC Policy for NATO Concept Development and Experimentation,   18 August 2011.

C. (NU) MCM-0056-2010, NATO Concept Development and Experimentation Process, 06 July 2010.

D. (NU) Disruptive Technology Assessment Game (DTAG) Handbook v0.1, Allied Command Transformation, August 2016.

E. (NU) Concept Development Assessment Game (CDAG) Handbook v4.1, Allied Command Transformation, February 2014.

F. (NU) Allied Administrative Publication (AAP) 6, NATO Glossary of Terms and Definitions, 17 November 2017.

G. (NU) Allied Administrative Publication (AAP) 20, NATO Programme Management Framework, Edition C, Version 1, October 2015.

H. (NU) Bi-SC Alternative Analysis Handbook – 2nd Edition, 12 December 2017.

I. (NU) Bi-SC 075-004, Experimentation Directive, 31 July 2007.

J. Guide for Understanding and Implementing Defence Experimentation (GUIDEX), Version 1.1, February 2006; The Technical Cooperation Programme (TTCP).

K. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 6th Edition, Project Management Institute, Inc., Newtown PA USA, 2017.

L. (NU) ACT Dir 10-1, Terms of Reference for the Concept Development and Experimentation Working Group, 09 March 2018.

Not referred work

Cooper, R.G., Phase-Gate Systems: A new tool for managing products. Business Horizons, pp.44-54, May-June 1990.

John F. Schmitt, A Practical Guide for Developing and Writing Military Concepts, Hicks & Associates, Inc., 2002.

Kaminski, P.G. & Lyles, L.L., Pre-Milestone and Early-Phase Systems Engineering: A Retrospective Review and Benefits for Future Air Force Acquisition, National Academy of Sciences, U.S. Air Force Studies Board, Washington, D.C.: The National Academies Press, 2008.

(NU) Experimenting in Exercises – A Short Guide, HQ SACT Operational Experimentation Branch, 01 April 2016.

(NU) Bi-SC 085-001, BI-SC Capability Package Directive, Edition 5, April 2017.

(NU) MCM-0177-2017, MC Advice on Improving the Governance of Commons Funded Capability Delivery, 29 September 2017.

ANNEX E – PUBLICLY ACCESSIBLE INFORMATION

Ser	Title	HTML/HTTP/HTTPS address	QR code link
1	(NU) MCM-0056-2010, NATO Concept Development and Experimentation Process, 06 July 2010	http://www.act.nato.int/images/stories/events/2011/cde/rr_mcm0056.pdf	
2	(NU) MC-0583 (Final), MC Policy for NATO Concept Development and Experimentation, 04 October 2010	http://www.act.nato.int/images/stories/events/2011/cde/rr_mc0583.pdf	
3	Overview – NATO Defence Planning Process (NDPP)	https://www.nato.int/cps/ua/natohq/topics_49202.htm	
4	Strategic Foresight Analysis (SFA), 2017	http://www.act.nato.int/images/stories/media/doclibrary/171004_sfa_2017_report_txt.pdf	
5	Framework for Future Alliance Operations (FFAO), 14 May 2018	https://www.act.nato.int/images/stories/media/doclibrary/180514_ffao18.pdf	
6	Overview – NATO Strategic Concepts	https://www.nato.int/cps/en/natohq/topics_56626.htm	

Ser	Title	HTML/HTTP/HTTPS address	QR code link
7	Active Engagement, Modern Defence: NATO Strategic Concept, November 2010	https://www.nato.int/strategic-concept/pdf/Strat_Concept_web_en.pdf	
8	(NU) DSG (2010)0528, Military Concept for NATO Strategic Communications, 18 August 2010	https://info.publicintelligence.net/NATO-STRATCOM-Concept.pdf	
9	NATO Alternative Analysis Handbook, 2d Ed, December 2017	http://www.act.nato.int/images/stories/media/doclibrary/alta-handbook.pdf	
10	Guide for Understanding and Implementing Defence Experimentation (GUIDEX), Version 1.1, February 2006; The Technical Cooperation Programme (TTCP).	https://docplayer.net/3917709-Guide-for-understanding-and-implementing-defense-experimentation-guidex.html	
11	Disruptive Technology Assessment Game (DTAG) handbook	https://www.innovationhub-act.org/sites/default/files/docs/DTAG%20handbook.pdf	
12	TRANSNET Account Registration[27]	https://transnetportal.act.nato.int	

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[27] Full access to linked information requires a valid Transformation Network (TRANSNET) account. TRANSNET access may be requested at: https://registration.act.nato.int/extranet/transnet/Lists/AccountRequest/Register.aspx.

Ser	Title	HTML/HTTP/HTTPS address	QR code link
13	ACT TRANSNET CDE365	https://transnet.act.nato.int/COI/cde365	
14	TRANSNET-Operational Analysis	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Home.aspx	
15	Problem Structuring Methods	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Soft%20OA%20Methods.aspx	
16	War Gaming	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Wargaming.aspx	
17	System Dynamics Simulation	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/System%20Dynamics.aspx	
18	Benefits Analysis	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Benefits%20Analysis.aspx	
19	Stakeholder Analysis	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Stakeholder%20Analysis.aspx	

Ser	Title	HTML/HTTP/HTTPS address	QR code link
20	Multi-Criteria Decision	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/MCDA.aspx	
21	Morphological Analysis	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Morphological%20Analysis.aspx	
22	Concept Development Assessment Game-CDAG	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/CDAG.aspx	
23	Disruptive Technology Assessment Game-DTAG	https://transnet.act.nato.int/COI/oraa/ora/ORA%20Wiki/Disruptive%20Technology%20Assessment%20Game%20(DTAG).aspx	
24	Defence Experimentation for Force Development Handbook (ver 2, Jan 21)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957195/20210121-DEFD_Handbook_Version_2-O.pdf	
25	CD&E Handbook: A Concept developer's Toolbox (up-to-date version)	https://www.act.nato.int/application/files/1316/1889/0702/NATO-ACT-CDE-Handbook_A_Concept_Developers_Toolbox.pdf	
26	CD&E Conference Info	https://www.act.nato.int/cde-conf	

Ser	Title	HTML/HTTP/HTTPS address	QR code link
27	JADL Portal to take the ADL 201 Introduction to Concept Development & Experimentation module	https://jadl.act.nato.int/	
28	NATO Concept Development and Experimentation Course (ETE-ET-21371) at NATO School Oberammergau	https://www.natoschool.nato.int/Academics/eLearning/Course-Catalogue/Course-description?ID=126&TabId=163&ID=155&language=en-US	
29	NATO Modelling and Simulation Master Plan	https://nmsg.sto.nato.int/home/nmsmp	

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