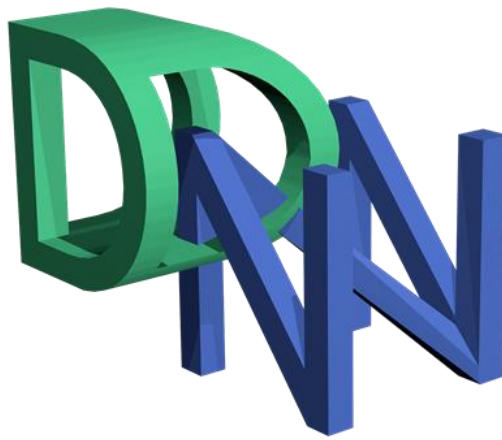


# What does 'Industry as a FIC' mean?

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15/09/2020



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## Introduction

1. This white paper describes 'Industry as a fundamental input to capability (FIC)'. The Australian Government First Principles Review (FPR) into the Department of Defence was a driver for greater consideration of Industry as a component of achieving Defence-related outcomes. Defence decided to achieve this by adding 'Industry' to the FIC framework.
2. This white paper uses some architecture primitives to help provide a common vocabulary. These primitives are based on words that are generally understood by the wider audience (with varying concepts and definitions) but are used here with specific meaning.
  - a. Effect. A desired or actual state of the environment, or a change in states.
  - b. Resource. Something tangible that can be used to achieve the desired capability effects. That 'something' could be an asset (capitally acquired and managed item), a supply item (consumable or expendable item) or an actor.
  - c. Process. A description of a workflow (a sequence of tasks) to achieve an effect. This is consistent with the BPMN definition of a "sequence or flow of Activities in an organization with the objective of carrying out work."
  - d. Organisation. A framework of roles and their relationships.
  - e. Role. An expected behaviour pattern or profile associated with participation [in a process].
3. This white paper does not look at the history of FIC nor does it examine the details of the FPR. The architecture primitives are described in greater detail in a currently non-public architecture framework (3 volumes) and this white paper introduces them as a means towards a common vocabulary.
4. This white paper is important because historically Defence has not defined the FIC clearly, and the addition of another FIC element without clear definition added to the confusion. Within this paper I:
  - a. Provide a foundation for understanding 'capability'
  - b. Provide a foundation for understanding 'FIC'
  - c. Describe what Industry as a FIC means in the context of the foundations.

## What is 'Capability'?

5. A definition of capability is 'the power to achieve a desired operational effect in a nominated environment within a specified time and to sustain that effect for a designated period.' This is the definition used by Defence<sup>i</sup> and is consistent with systems engineering best practice.
6. At the highest level, this could be considered 'the ability to do something' which is a common broad use of the word. Commonly, this is considered as shown in Figure 1 .



Figure 1: The simplified explanation of capability and effect

7. This simplified approach is fine when the audience has a good understanding of the context and the subtleties in the meaning of the elements drawn. For those who do not have this understanding, this

simplified approach can lead the audience to think that capability means the technology that results in the effect. Figure 2 illustrates a slightly more subtle approach.



Figure 2: A simplified, but more nuanced explanation of capability and effect

8. Even this approach is simplified, because it implies that the whole of the capability is used directly in the operational activity – again potentially leading the audience to think that capability is synonymous with technology systems.
9. An additional shortfall with the simplified description is that it describes the capability in isolation as something with absolute and clear boundaries. The power to achieve something is not only contingent on the internal configuration of the capability, but also the external drivers over which the operators have no control. As we will see later, the internal elements of the capability are all influenced by these external drivers.
10. Examining the definition of a capability in light of the non-controllable external influencers, a capability is a **probability** that an effect can be achieved in a given context and timeframe. This is consistent with the natural language approach when we describe that we may have a ‘limited capability’ to achieve a desired outcome.
11. The shortfalls in the simplified approach can be addressed through a capability model or framework.

## What is a ‘FIC’?

12. I have now identified that capability is defined in the terms of ‘probability’. Until capability is tested in operations, the capability function is in an ambiguous state. Once executed in a real context, the capability function collapses to an actual outcome, which itself can be measured as a statistical degree of success.



Figure 3: Probability cloud perspective on capability and effect

13. The external factors are the obvious elements driving the final outcome. But the simplified approach to conceptualising capability described earlier ignores the large influence of the internal drivers. To describe this influence, a standard model should be used.
14. Australia has created a model for the fundamental inputs to capability - Defence describe FIC as ‘those inputs that are necessarily combined to achieve capability.’<sup>ii</sup> The US uses a different model, and the UK a different one again – but what is important is that these models are used consistently<sup>iii</sup> across the range of capabilities. Defence’s current formal description of FIC suggests using them as a ‘checklist’ to ensure all considerations have been addressed – but this ignores the utility of FIC during design to properly understand the completeness of the capability (all elements and relationships working together).
15. Defence guidance also tends to treat each element of FIC separately and largely in isolation. Defence’s summary of the FIC<sup>iv</sup> are:

- a. **Organisation** means that the capability is employed within flexible functional groupings with an appropriate balance of competency, structure, and command and control to meet the endorsed capability requirements stemming from the original need;
- b. **Command and Management** includes effective command and management arrangements at all levels to safely and effectively employ the capability, including its integration across Defence;
- c. **Personnel** means the role of a competent workforce component, including ADF (permanent and Reserves), APS and contractors, in the delivery, operation, sustainment and disposal of the capability;
- d. **Collective Training** means that the capability is supported by a defined collective training regime to a validated performance level against the Defence planning requirements and based on the original need;
- e. **Major Systems** includes significant platforms, fleets of equipment and operating systems that enable the effective generation of Defence capabilities;
- f. **Facilities and Training areas** means the infrastructure requirements necessary to support the delivery, sustainment and operation of a capability system, including training areas which may mean any area of land, sea, undersea or airspace that may be designated for military manoeuvres or simulated wartime operations;
- g. **Supplies** include managing all classes of supply to maintain a capability at the designated readiness state, including sustainment funding and fleet management;
- h. **Support** includes engineering support; maintenance support; supply support; training support; packaging handling, storage and transportation; facilities; support and test equipment; personnel; technical data and computer support; and
- i. **Industry** includes the consideration of the resilience and capacity of industry, such as the reliability and health of supply chains.



Figure 4: Probability cloud with multiple elements

16. For those of us that like definitions, we can immediately see that the descriptions above are very open to interpretation. Most of them do not effectively describe the “what and “why” of the FIC elements, but reword the title in a generic fashion. A key example is ‘Support’ which simply lists type of support.

17. The current description of FIC works well in high-level conversations but does not help in achieving a **consistent** systems engineering approach. And the FIC construct is used throughout the life of a capability for systems engineering purposes. To achieve this a deeper level of thought is required. In this paper, an architectural approach is taken, consistent with systems engineering<sup>v</sup>.

18. Architecturally speaking:

- a. *Organisation* is a framework of roles and their relationships. Only when roles are filled by actors can an organisation be effective.
- b. *Command and Management* represents the governance processes, decisions and rules or policies that govern the effective employment of the capability.

- c. *Personnel* are tangible **resources** that are further divided into classes. Key to this discussion is the workforce that operate the *Major Systems*.
- d. *Collective Training* are **processes** specific to a validated performance level.
- e. *Major Systems* are **resources** that are managed assets. These are normally Supply Class VII items.
- f. *Facilities and Training areas* are **resources**, more specifically the same type of resources as *Major Systems* (managed assets). Some facilities are necessary to house major systems in order for those major systems to be used to achieve an effect. An example here is a ship (as a facility) that provides 'hotel services' to a weapons system.
- g. *Supplies* are **resources**, as defined by the classes of supply with the exception of Supply Class VII (*Major Systems*).
- h. *Support* describes **processes** (engineering; maintenance; the act of supply; training; packaging handling, storage and transportation; etc.).
- i. *Industry* is discussed in the next section.

19. Resources are the only tangible aspect within FIC. Organisations and roles are empty constructs that only become viable if actors (personnel) are assigned to them. Major systems can only be used if personnel operate them<sup>vi</sup>.

20. Processes are a glue concept. Processes are also empty constructs that only become viable when the described roles are filled with actors and the required resources are provided.

21. The architectural approach with the required relationships between the various elements creates a complex picture. But this is needed for understanding how likely a capability is going to be effective in a given context.



Figure 5: Capability cloud with direct influences indicated

22. The overall effectiveness of a capability to achieve the desired effects can be calculated through the effectiveness of the relevant FIC. Processes are only as good as the ability to resource them. Organisations are only as good as the ability to assign workforce to them. When viewed through the architecture lens, these relationships become clear.

## Industry as a fundamental input

23. With the earlier comment about the FIC being used as a checklist, the addition of Industry as a FIC sort of made sense. When doing capability development and capability management, the team must make sure that Industry has been considered (☑). This simple checklist approach does not help with the system engineering aspect – it does not identify what aspects of Industry are important, although the FIC definition given by Force Design does provide some clues.

24. To add to the ambiguity, most of the considerations in the definition seem outside the control of the Capability Manager or Delivery Group. After all, the survival of any Industry member is the responsibility of that member, the Australian Government cannot be seen to pick individual winners or losers.

25. Just having Industry involved is **not** what Industry as a FIC is about. Industry is highly likely to be engaged to execute *Support* processes, or to provide *Supply* items. Industry might provide part of the workforce (*Personnel*). This cross-over when taking the legacy simplified view of FIC is part of the confusion about what Industry as FIC means. The problem here is the lack of clear boundaries in the original definitions which I have already addressed in this white paper.

26. The easy way to consider the Industry FIC is to frame it as a simple question: *can my capability continue to be supported throughout the life<sup>vii</sup> of the capability?*

27. Framed as a question, the issue becomes clearer – Industry as a FIC requires the declaration of desired states out into the future. States that address the existence of certain Industry segments, states that address sovereign Industry capability.

28. States, and the change of states are described architecturally through **effects**.

Describing Industry as a FIC is done through describing the desired future states of industry in order to support the capability in a way beneficial to Defence for the foreseeable future.

29. Identifying this fundamental approach opens up another consideration within the Capability Management domain. Achieving particular states can only be done through **processes**. As well as the traditional processes to acquire and support for the capability, new processes to facilitate the longevity of the Industry can be defined and justified. Capability acquisition activities can now include long term activities with future effects, not just the shorter-term purchase of equipment. The continued evolution of systems can be considered, not through the lens of the current specification or requirements, but through the lens of a viable Industry in the decades to come.

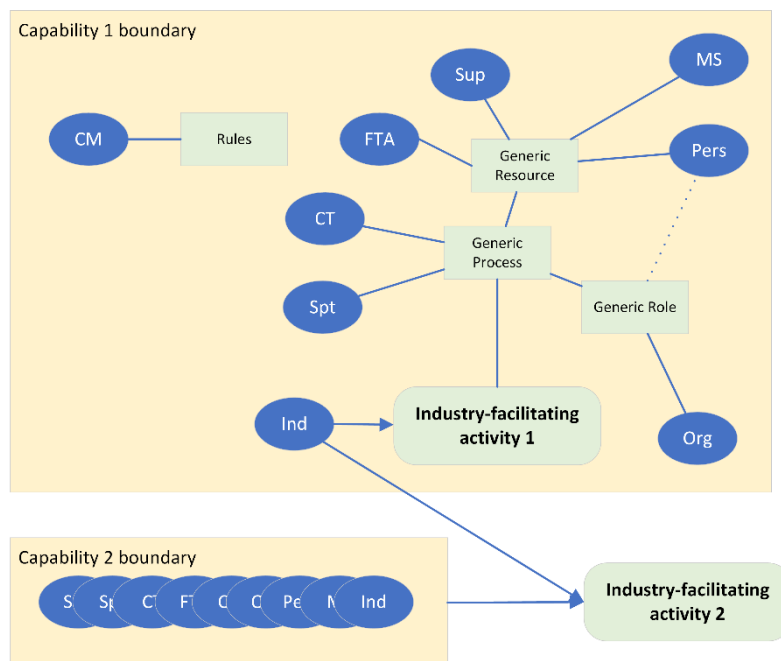


Figure 6: Industry facilitating activities

30. In a project or program sense, identifying Industry-facilitating processes is viable. What is difficult is ensuring the processes are undertaken. Ensuring a viable Industry is not a project responsibility, it is a strategic concern that goes all the way to Government. Some small wins that are specific to the capability at

hand (and thus under the direct control of the Capability Manager) are possible. But the strategic outcomes are outside the scope of any particular project and may even be outside of the program.

## Closing notes

31. This white paper has tried to open up a conversation on a complex topic in a few pages. In doing so, some of the subtleties and nuances have been glossed over. In addition, the general text here belies the years of thinking that have gone into the concepts.
32. Describing Industry as a FIC is not just about providing a better definition for a policy document. It is about achieving a better capability management outcome by identifying how the broader Industry considerations relate to all the other fundamental inputs.
33. In drafting the white paper, a different perspective on FIC than had previously been used in Defence had to be introduced. FIC cannot be seen as an add-on, a checklist or a number of silos to be considered separately. In a systems engineering sense, the concept of the capability and the concept of the fundamental inputs to the capability cannot be separate or separated. To describe the FIC is to describe the capability, and the capability cannot be described without using the FIC – they are the one and the same.
34. This paper has only barely scratched the surface on the concept of the capability being described as the totality of the FIC probability clouds. The impact of multiple capabilities sharing resources is yet to be discussed.
35. Additional conversations are required to address a maturing perspective on FIC and the use of FIC to quantify effects and probabilities.
36. Importantly, further conversations are required on how Industry-facilitating outcomes can be achieved through a whole-of-Defence approach when the majority of change activities are focussed on the stovepipes of constrained projects.

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<sup>i</sup> This definition is taken from Capstone Doctrine ADDP 00.2 – Command and Control.

<sup>ii</sup> As taken from 'Capability Life Cycle Detailed Design' document provided by Force Design at [www.defence.gov.au](http://www.defence.gov.au).

<sup>iii</sup> This white paper does not fully address the current inconsistent used within the Australian Defence context.

<sup>iv</sup> A full definition of the original eight FIC is in ADDP 00.2, but the summarised definitions here are taken from the 'Capability Life Cycle Detailed Design'.

<sup>v</sup> A system is a combination of interacting elements organized to achieve one or more stated purposes (ISO/IEC 15288-2015, Systems and Software Engineering—System Life Cycle Processes, 2015). At a base level, an architecture describes elements and their relationships – architecture and systems engineering are symbiotic activities.

<sup>vi</sup> The complex and nuanced discussion around automated systems as actors is outside the scope of this white paper. The upshot of that discussion is that personnel are still required in the operating chain.

<sup>vii</sup> The term 'life' for capability is another area of discussion outside the intended scope of this white paper. Technology systems may have a life of type, but many capabilities (and the desired effects) will be required for decades if not centuries.