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MINI-GUIDE 6: SUMMARISING AND COMMUNICATION

Summary

This document is part of the Declare CAE guidance document set. It contains guidance on the application of CAE for the development of summary cases.

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1 Introduction

This document contains guidance on developing summary cases. This is mini-guide 6 of the Declare document set.

2 This mini-guide and the CAE document set

The CAE guidance can be seen as having two main components:

1. **CAE process:** The first component describes an overall process made up of five steps (the “CAE process”), explaining the evolution of a justification within an organisation and the activities involved.
2. **CAE mini-guides:** The second part provides specific technical guidance on the underlying concepts, their definition and their application. We have compartmentalised the technical guidance into “mini-guides”: small, dedicated sets of guidance each focusing on a particular issue. Each mini-guide contains a concise summary with a short list of the key points and risks and challenges that need to be considered, which is then supported by more detailed guidance.

The CAE process, and the supporting mini-guides, are summarised in Figure 1. This mini-guide is highlighted in the figure below (mini-guide 6), and a full list of available mini-guides is given in Section 7.2).

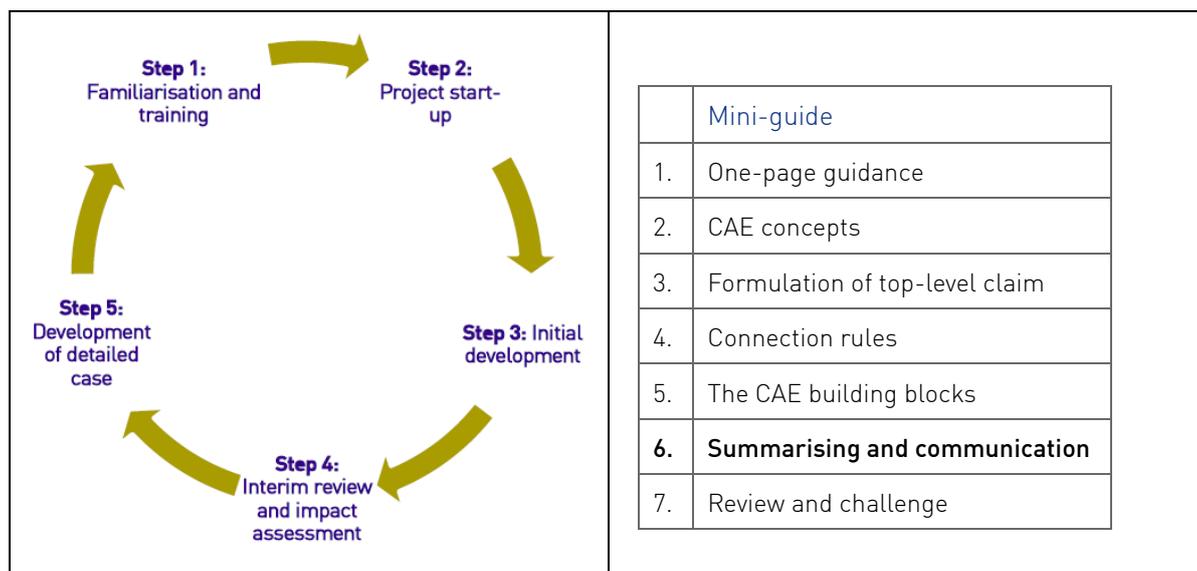


Figure 1: Summary of the CAE process and supporting mini-guides

The overall CAE process is described in the main CAE guidance document [1]. The process is flexible and adaptable, and depending on the project, only specific phases may be required. The main guide explains the various scenarios of use and how the guidance may apply in different cases. The document also discusses how the mini-guides may be used in different scenarios and at different phases of a project.

Table 1 below illustrates how this mini-guide (Summarising and communication) applies throughout the CAE process.

CAE steps	Summarising and communicating
Step 1: Familiarisation and training	Review and preparation.
Step 2: Project start-up	Determine the purpose of the summary case, by identifying the project <ul style="list-style-type: none"> • stakeholders that will have an interest in the summary case, as well as those that may provide input to it • milestones where a summary case may be required as early as possible • information that the summary case may capture and present (e.g. status and risks)
Step 3: Overview and initial development	Develop the initial CAE structure using the guidance contained in this document. It is very likely at this time that the full case that is being summarised is still fairly small. As such, the summary case may not be much smaller than the full case.
Step 4: Interim review and safety case impact assessment	At this stage, all of this guidance may be applicable. The summary case should be complete within this step, although it is most likely that some evidence will still be in development as the project will be ongoing. Use the guidance to capture key project information.
Step 5: Development of a more detailed case	Update the summary case developed earlier to include any new information, and mark up project information as complete where applicable.

Table 1: Relationship of this mini-guide to the CAE process

The following section contains the detailed guidance on the use of CAE for the development of summary cases.

3 Mini-guide 6: Summarising and communication

3.1 Objectives

An engineering justification, or a safety case, can potentially end up being large and complex with both graphical representation of a CAE structure and supporting narrative. It may be difficult to communicate to certain stakeholders that are either not familiar with, or not necessarily interested in, the full detail of the case. It can be particularly useful to be able to present a visual and accessible summary of the main information from the safety case, that encourages the various interested parties to focus on the key claims and supporting arguments and evidence, without being drawn into the technical complexity that is often inevitable in a full safety justification. This guide considers some options on presenting this visual summary.

The objectives of this mini-guide are to

- explain and illustrate the options available for producing a summary of the case
- provide advice on when and how to use the different summary approaches
- consider how to use the mini-guide within the overall CAE process

These topics are explored in detail in the following section.

4 Guidance and examples

Table 2 below helps to navigate through the guidance, by presenting some of the key questions we need to answer when considering how to develop and present a summary case, discussing them briefly, and then pointing to the relevant section further down in this document.

	Question	Relevant guidance
1.	<p>What is the purpose of the summary case?</p> <p>The purpose of the summary case will determine what it will look like. This depends on the system, the project, and the information that the summary needs to present.</p>	Section 4.1
2.	<p>What are the stakeholder requirements for the summary case?</p> <p>We need to establish stakeholder requirements and viewpoints, so that the summary case is most effective. We therefore will need to consider:</p> <ul style="list-style-type: none"> • Who is interested in the summary and why? • Who will be needed to provide input to the summary case when it is required? 	Section 4.2
3.	<p>What is the project information the summary case is required to provide?</p> <p>A summary case is a great opportunity to communicate key project information that can be presented down to claim or evidence level. For instance, project status and risks can be graphically illustrated in the summary case to brief stakeholders as necessary of progress and issues.</p>	Section 4.3
4.	<p>What are the approaches available to developing and presenting the summary case?</p> <p>There are two approaches, the “shorthand” graphical summary, and a summary case supported by text. The balance between the two depends on many of the topics discussed under the previous questions.</p>	Section 4.4
5.	<p>Why is traceability between the summary and the full case important, and how can it be achieved?</p>	Section 4.5
6.	<p>How can I use other mini-guides when I produce a summary case?</p>	Section 4.6

Table 2: Key questions answered in this guidance

4.1 What is the purpose of the summary case?

When considering its *purpose*, clearly, the underlying aim is to cut down the complex and extensive graphical structures, but it is the actual purpose of the justification itself that we are discussing here. For instance, is the summary case aiming to summarise an entire safety case, an ALARP argument, a business case, or an engineering justification?

This consideration is important because a summary case still needs to be proportionate. Over-summarising can result in miscommunication which must be avoided. The summary of a full safety case for an entire system may be far more challenging to put together than an ALARP argument for a system modification. Furthermore, a summary case may just be developed to support a meeting, or it could be part of the executive summary of a full safety case report.

If any key information is omitted from the summary case, and this is acceptable, it may still be necessary to articulate this in the case. For instance, if the summary case focuses on key hazards/risks only, we would recommend that there is a brief acknowledgement of other hazards/risks, or a statement clarifying what has been left out.

It is also highly advised that the requirement for a summary case is considered early on in the project. The identification of stakeholders, their case requirements/inputs, the milestones at which the summary will be needed, and the project information to be presented should all be captured.

4.2 What are the stakeholders involved?

Another aspect that will determine what the summary case will look like is the consideration of the different *stakeholders*. It is important that we identify all stakeholders and their relationship to the case – for instance whether they are providing input or whether they are users of the summary case. This can help to focus on their relevant parts of the case in the summary. These are called “stakeholder viewpoints”.

Who is the audience, and who are the other stakeholders involved (e.g. engineers, operators, suppliers), and how do they need to be represented in terms of the claims or evidence that they might be responsible for. We therefore need to identify the stakeholders and their requirements and responsibilities.

Furthermore, by identifying stakeholders and their safety case requirements, we may consider defining different *viewpoints* – presentations of fragments of the case only as relevant to a particular stakeholder.

4.3 What is the project status information to be captured

When presenting a summary case, it is very likely that the overall project will still be ongoing. One of the functions of the summary case could be to capture and convey aspects relating to project management along with the technical aspects that the structure is focusing on.

In a summary case, it is important to capture the *status of key evidence*, and any *uncertainties or project risks* that need to be communicated. Graphical annotations can be used to decorate the graphical structure, and the approach to this should be presented to the reader so that they can read and understand the case. We recommend that annotations are developed to visually present information such as *complete, in development, not yet started*.

An example is illustrated below.

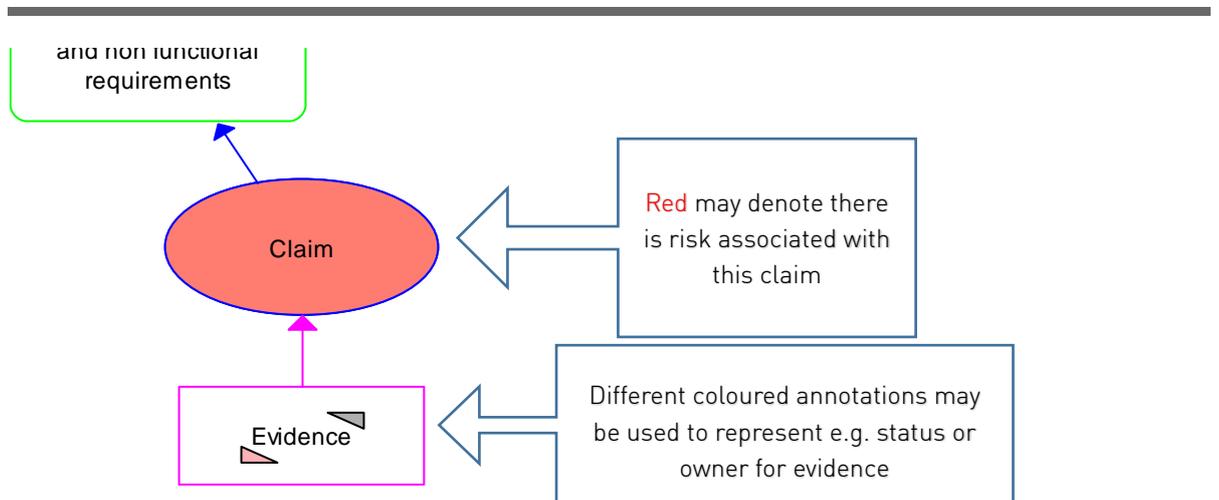


Figure 2: Example annotations to capture project information

4.4 Different approaches to summarising

Having answered the questions discussed in the previous section early on in the project helps to develop an effective summary case. We may then proceed to decide what the summary case will look like, taking these factors into account. As discussed earlier, we may consider the following approaches to producing summary cases:

1. **The “shorthand” summary case:** This is otherwise known as the “safety case on a page”, with the longhand being the full CAE structure, where the summary is provided only graphically. With this approach, there are different ways in which to “cut down” the graphical structure, whilst ensuring that the key information is not lost or re-interpreted.
2. **The summary safety case report:** This is a short report summarising the overall safety case. This could just be the first option along with some supporting narrative, or it could be a different approach, where a balance between the graphical and the textual content is provided.

4.4.1 “Shorthand” graphical summary

As discussed earlier on, a typical approach towards summarising a CAE structure is to present a shorter graphical argument. The general approach to this is to “compress” the middle layer of the case, and to summarise the claims, arguments or evidence. It is also possible to expand the text in the claims, arguments and evidence graphical nodes to provide more information that is summarised or reduced further down in the case. If the approach to summarising a case requires that multiple subclaims are merged into one node, it may be helpful to keep some of the “argument rule” information that ties these subclaims together.

It is very important to ensure that the summary case does not replace any elements of the full argument, and it does not omit any key information or re-interpret the messages of the full case, but it only simplifies and summarises key information from the safety case in a visual format, keeping the focus and attention on what is important.

We may also consider the summary case in terms of its horizontal and vertical dimensions. For example, if a CAE structure has a great number of same-level subclaims under one argument, we may take the approach to list them in a single node, thus reducing the width of the structure. Overall, it is possible to

compress and condense a structure both on the x and the y axis, but we must be careful that this is done proportionately and without omitting any key information.

If a case is becoming too large, you may decide to use a tabular summary for some of the lower level claims or evidence. This is discussed in more detail in Section 4.4.2 where we consider the balance between graphical and textual summaries.

Figure 3 below presents an example CAE structure where the top-level claim is that “system X meets its requirements”. The approach taken in this case is to consider all requirements as provided in the requirement specification, splitting them between functional and non-functional requirements. These are further elaborated until evidence is provided in the form of design and V&V documentation for each requirement.

This CAE structure already contains some summarisation as the arguments linking the evidence to the bottom claims are not represented; why, for example does evidence about reliability requirements models, and V&V justify the claim that the reliability requirements are met? In addition is “Relevant V&V” the same report or just a series of different reports with the same name? Also, some side claims have been omitted.

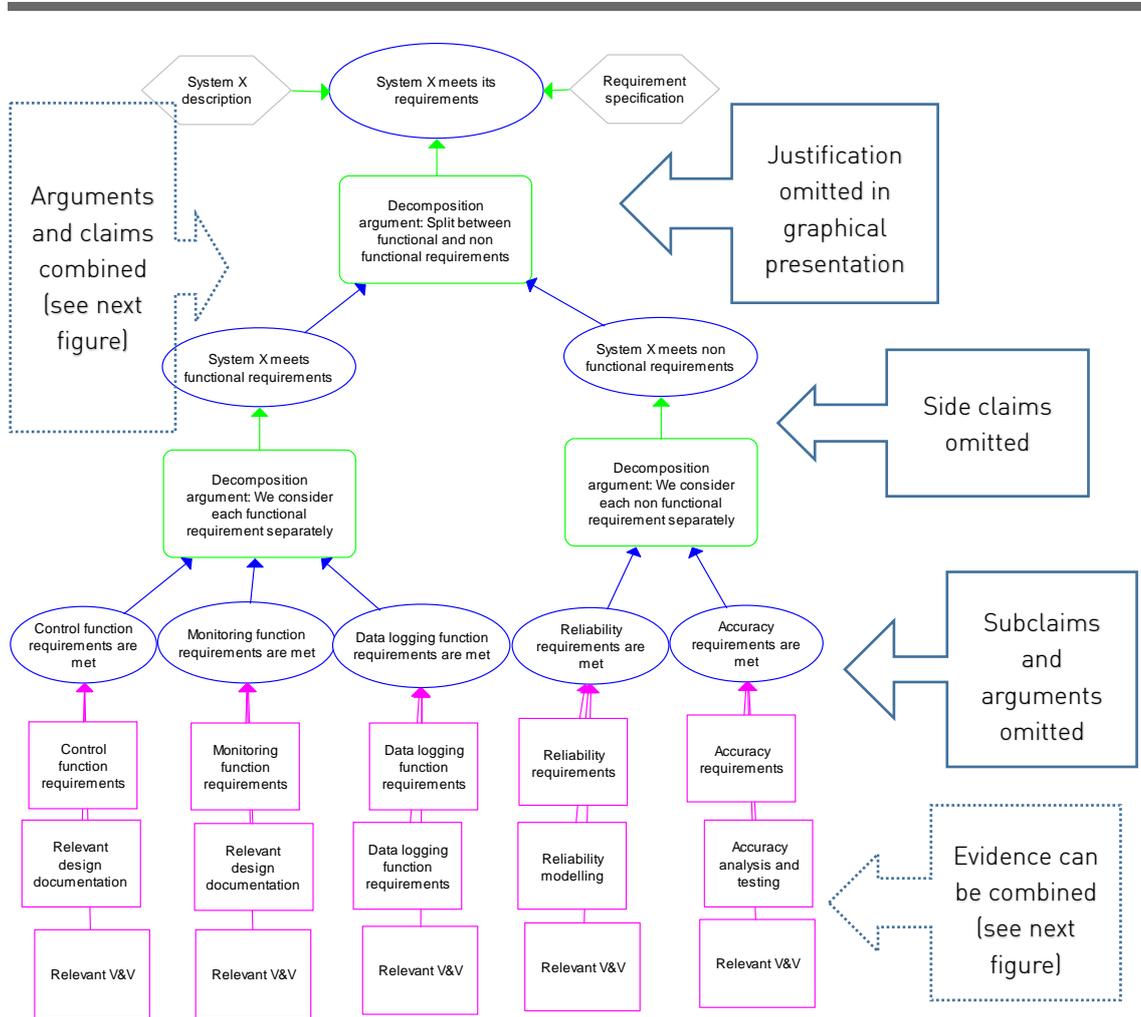


Figure 3: Initial summary

Figure 4 below presents a shorthand for this example, where the middle layer has been compressed and the evidence has been summarised. In this example the functional-non-functional has been highlighted because for example

- different stakeholders response for these different aspects or
- they are seen as having different project risks (non-functional, reliability claims often more problematic for digital systems than functional ones)

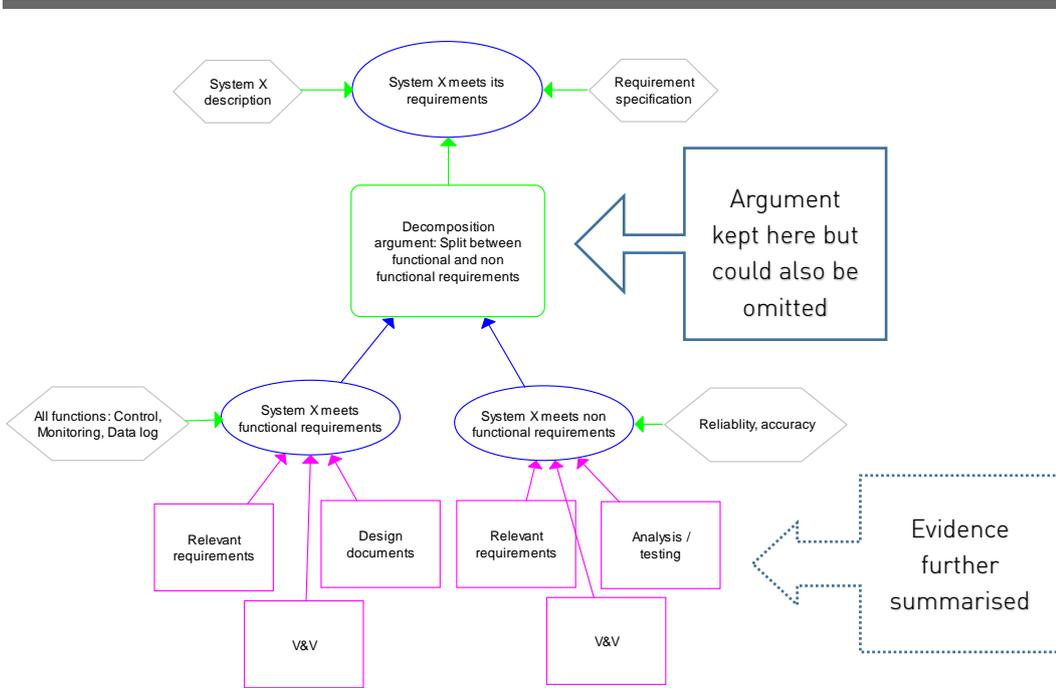


Figure 4: Shorthand – another further summarised version

4.4.2 Summary report - text

As mentioned earlier on, another option for summarising a case is to produce a summary report – this could either be the graphical summary discussed in the previous section along with some supporting narrative, or it could be a more elaborate summary, where balance is achieved between graphical and textual content.

The following options are available in this approach:

- Remove side-claims from the graphical structure and incorporate them in the text
- Use tables to summarise a group of subclaims that form part of a decomposition
- Cut up the overall structure into smaller fragments and present them separately

When doing so, we must be sure to maintain traceability between the summary case and the full case. This is useful as it eases maintenance, can be useful during communication, and offers verifiability.

If a summary report was produced to support the “shorthand” presented in Figure 4, we may for instance expect the following summary table for the functional requirements claims (and similarly for the non-functional ones) to also accompany the graphical structure (Table 3).

Subclaim	Supporting evidence
Control function requirements are met	<ul style="list-style-type: none"> • Control function requirements • Design documentation • V&V

Subclaim	Supporting evidence
Monitoring function requirements are met	<ul style="list-style-type: none"> • Monitoring function requirements • Design documentation • V&V
Data logging function requirements are met	<ul style="list-style-type: none"> • Data logging function requirements • Design documentation • V&V

Table 3: Functional requirements are met

4.5 Traceability and accuracy

Here, we address the question - How is traceability maintained between the summary and the detailed case?

The summary case should not reinterpret the full case, or it could mislead the reader. One way of ensuring and demonstrating that the summary case is faithful to the full case, is to maintain traceability between the summary case and the full case. This eases maintenance, can be useful during communication, and offers verifiability. One way of achieving this is using a numbering scheme so that nodes have IDs. For instance, if the tree under a higher-level claim (e.g. numbered as Claim 1.3) is summarised graphically, we should be able to look this up in the full case to identify the relevant full sub-tree.

Finally, a review of the summary case should confirm that there are no omissions in comparison to the full case, and it captures all the necessary information. Such traceability will help to achieve this.

4.6 Other mini-guides in the CAE guidance set

In addition to these aspects, it is also important to consider how other mini-guides in this document may become useful. For instance, the use of normal form (see mini-guide 2 [5]) and the CAE Blocks (see mini-guide 4 [6]) (e.g. "Decomposition of the system architecture") helps to articulate the overall approach and rationale that is undertaken in supporting a claim quickly, while consistency within a case (through using the Blocks) helps the reader to follow what is being communicated.

5 Summary recommendations

The following presents a summary of the recommendations contained in this mini-guide.

Key points:

- A summary case in CAE presents a visual and accessible summary of the main information from the safety case, that encourages the various interested parties to focus on the key claims and supporting arguments and evidence, without being drawn into the technical complexity that is often inevitable in a full safety justification.
- We need to identify the purpose of the summary case, the stakeholders, their requirements and inputs to the case.

-
- There are two generic approaches: the shorthand approach, which only presents a graphical summary, and the summary report, where text is also provided.
 - The most common way of summarising a CAE structure is to “compress” the middle layer of the case, and to summarise the evidence. This can be done by thinking of how to condense information on both the horizontal and the vertical dimensions of the structure.
 - We may consider presenting different viewpoints of the case for different stakeholders.
 - A summary case may also present key project information, such as status of evidence, uncertainties and risks. An annotation of the CAE graph using different colours and decorators can help to communicate these issues to the reader effectively (and also serve as a project management tool).
 - Maintain traceability between the summary and the main case.
 - The use of other mini-guides as described in this guidance document can help to develop clear, concise, consistent and well-structured CAE cases. These are easier to summarise and to communicate. Their use can at least indirectly contribute to a good summary case.

Risks and challenges:

- The summary case should not reinterpret the full case, or mislead the reader.
- If any information from the full case is omitted, capture this in the summary case and explain why this is not presented at the time.
- The summary case should also be reviewed using the guidance provided on review of cases.

6 Acknowledgements

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This deliverable draws on a number of sources developed in earlier Cinif, SSM and Adelard projects.

7 Bibliography

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