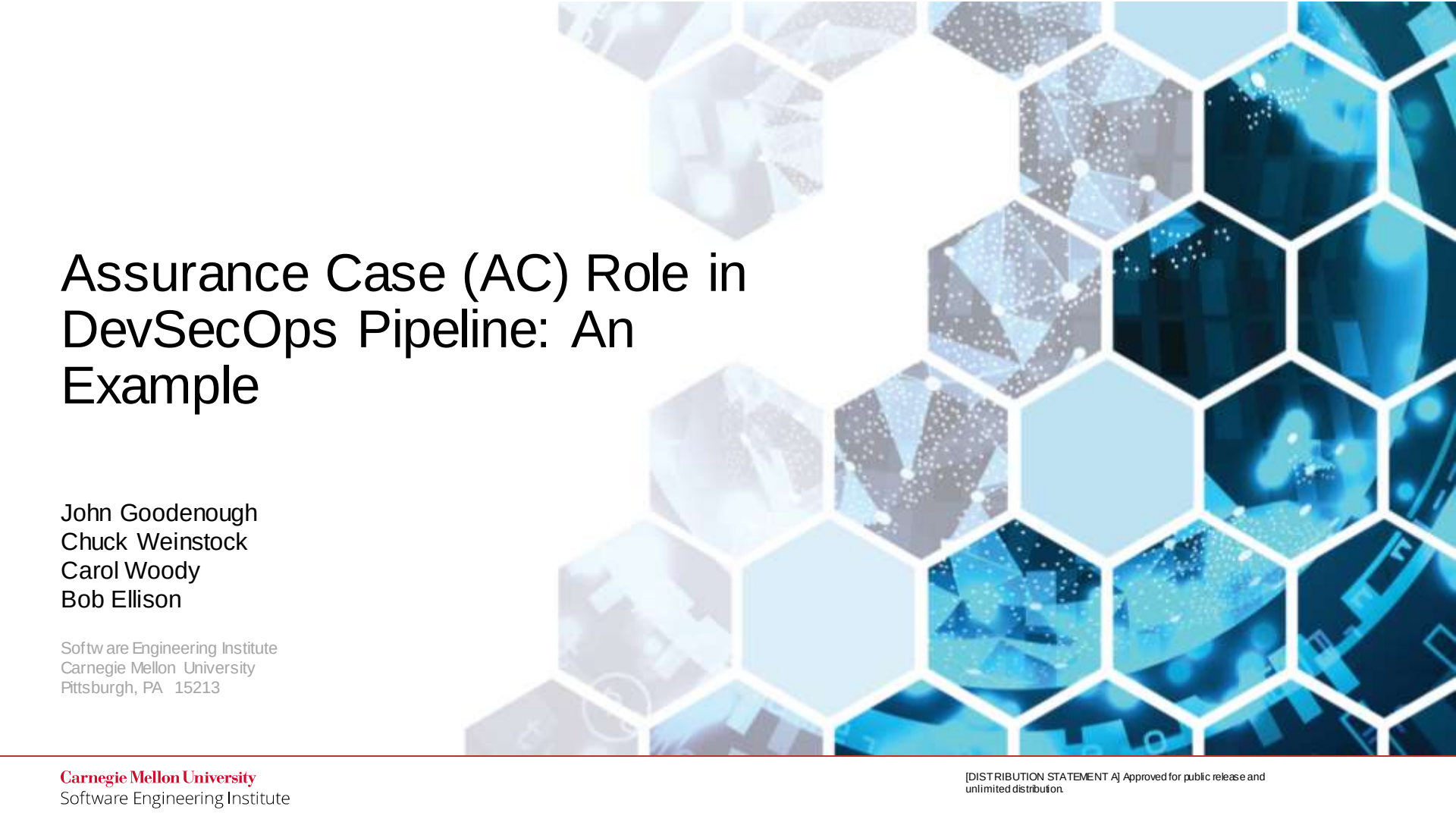




# Assurance Case (AC) Role in DevSecOps Pipeline: An Example

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# Goals of Presentation

Show potential role of a pipeline-oriented (DevSecOps) assurance case (AC)

- Prior use of ACs focused on gaining release decision from oversight body

Show potential value/benefits of a pipeline-oriented AC

- Justify exit criteria for pipeline stages
- Define evidence needed to meet (evolving) exit criteria
- Provide basis for reassurance activity, e.g.,
  - What evidence needs to be refreshed to maintain confidence that (relevant) exit criteria continue to be met

A properly annotated AC defines exit criteria for each pipeline stage as well as showing how each stage contributes to overall system assurance

# Presentation Approach

Show (by example) how AC helps define exit criteria for the PLAN phase

- AC justifies what we need to know before something can be released to the IMPL phase
  - Show how the AC could be used in the PLAN phase on each iteration of the DevSecOps loop

Construct an example for the PLAN phase

- Choose a desired system property, e.g., availability
- Focus on one class of reasons why the property might not hold, e.g.,
  - Resource exhaustion (due to poor design or unauthorized user actions)
- Show part of a possible AC for this situation (**use CWE to start with**)
- Contrast exit criteria for the PLAN phase from criteria for the IMPL phase
- Postulate a change to the system and show the **reassurance** case

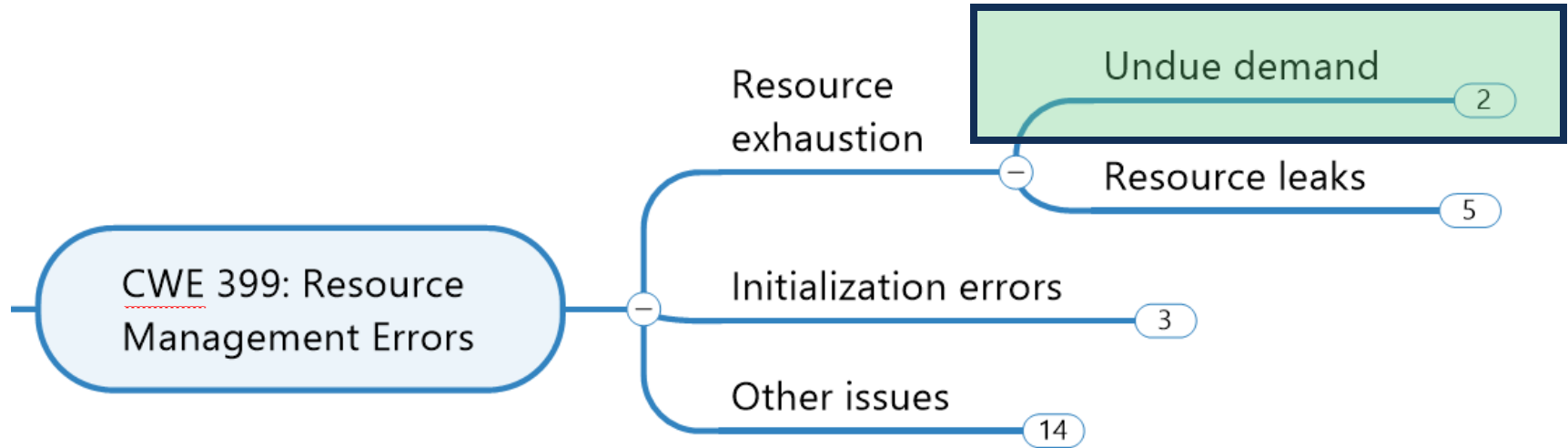
# The Common Weakness Enumeration

## The Common Weakness Enumeration (CWE)

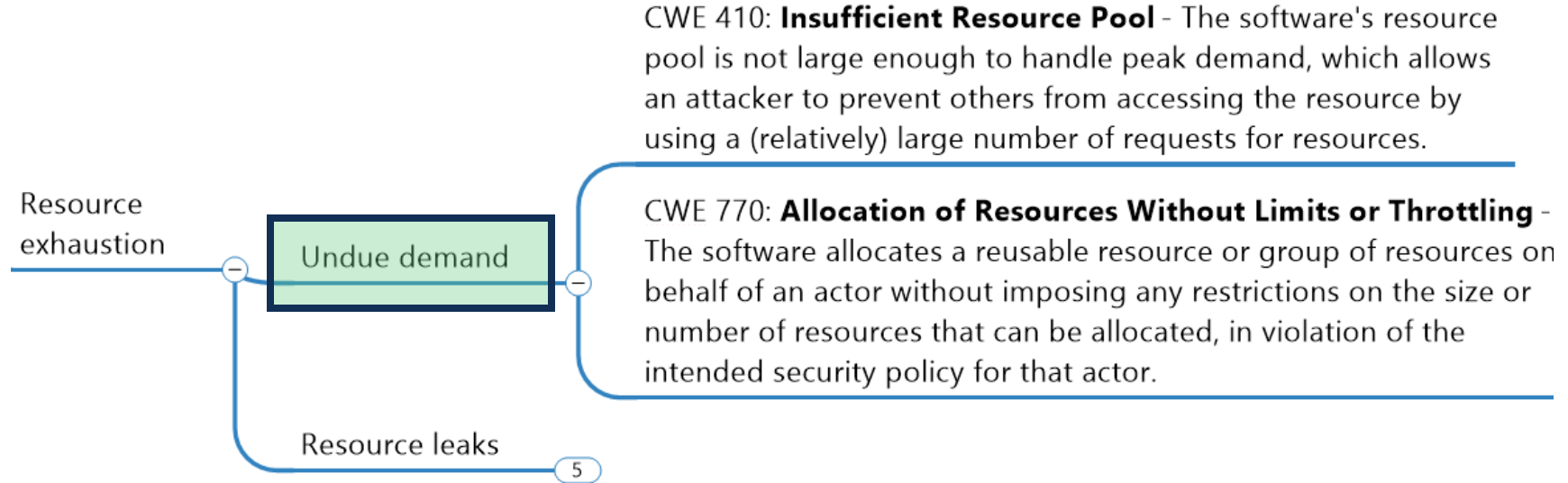
- A list of commonly seen types of SW/HW design and implementation weaknesses
- Examples of categories: Authentication Errors, Authorization Errors, Bad Coding Practices, Concurrency Issues, Data Validation Issues, Privilege Issues, Resource Management Errors
- There are 21 CWEs in the **Resource Management Errors** category (CWE 399)
  - We have grouped these into
    - Resource Exhaustion Errors (4 CWEs)
    - Initialization Errors (3 CWEs)
    - Other Issues (14)
- In this presentation we focus on **Resource Exhaustion Errors**

# Exploit CWE

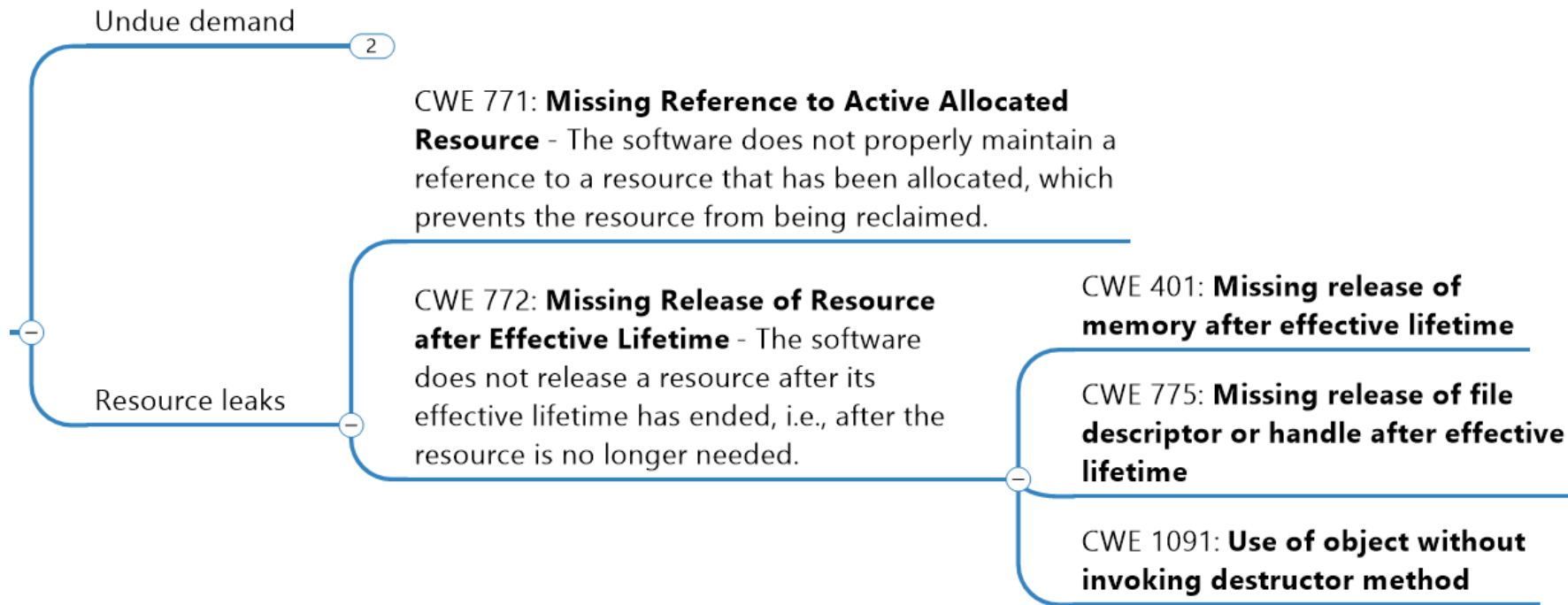
Use CWE to identify possible problems, e.g.:



# Exploit CWE

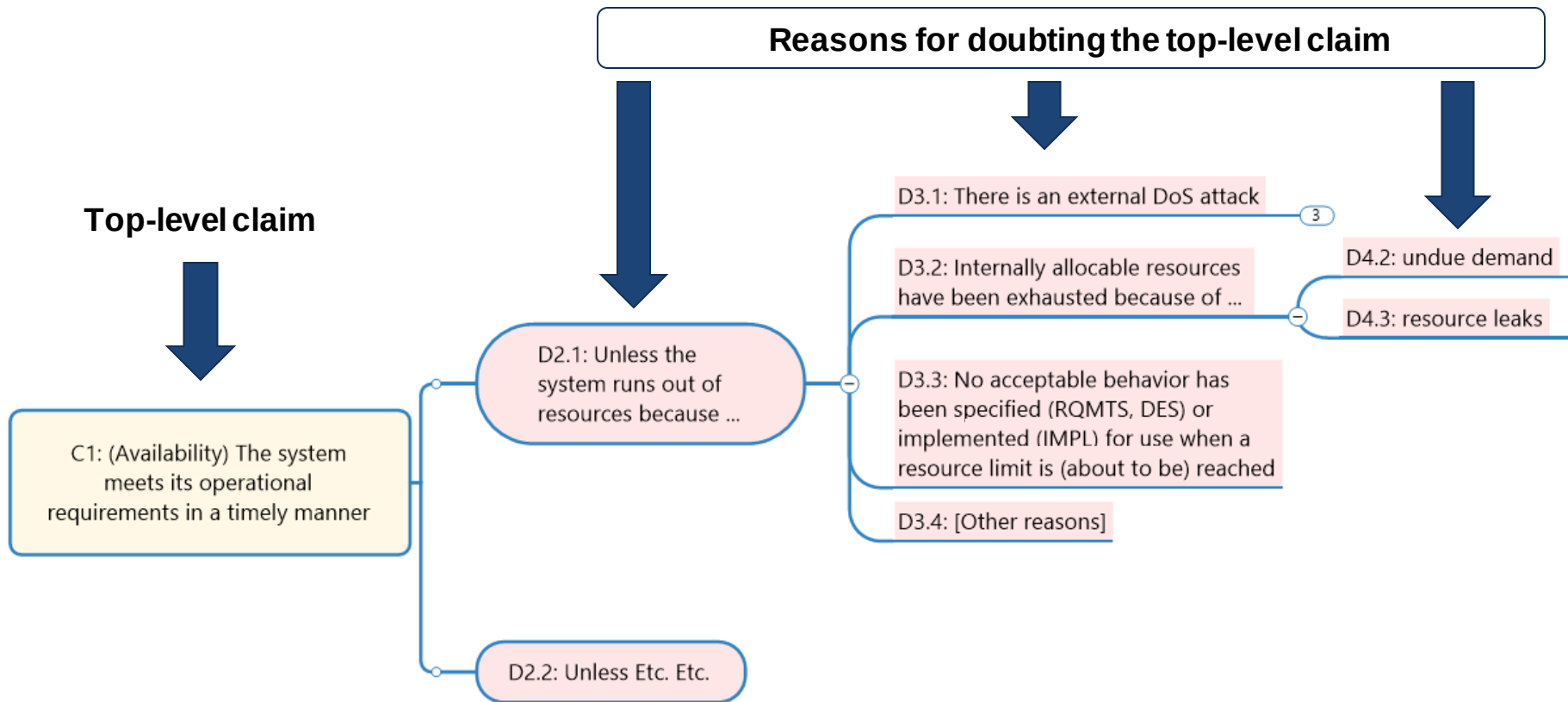


# Exploit CWE



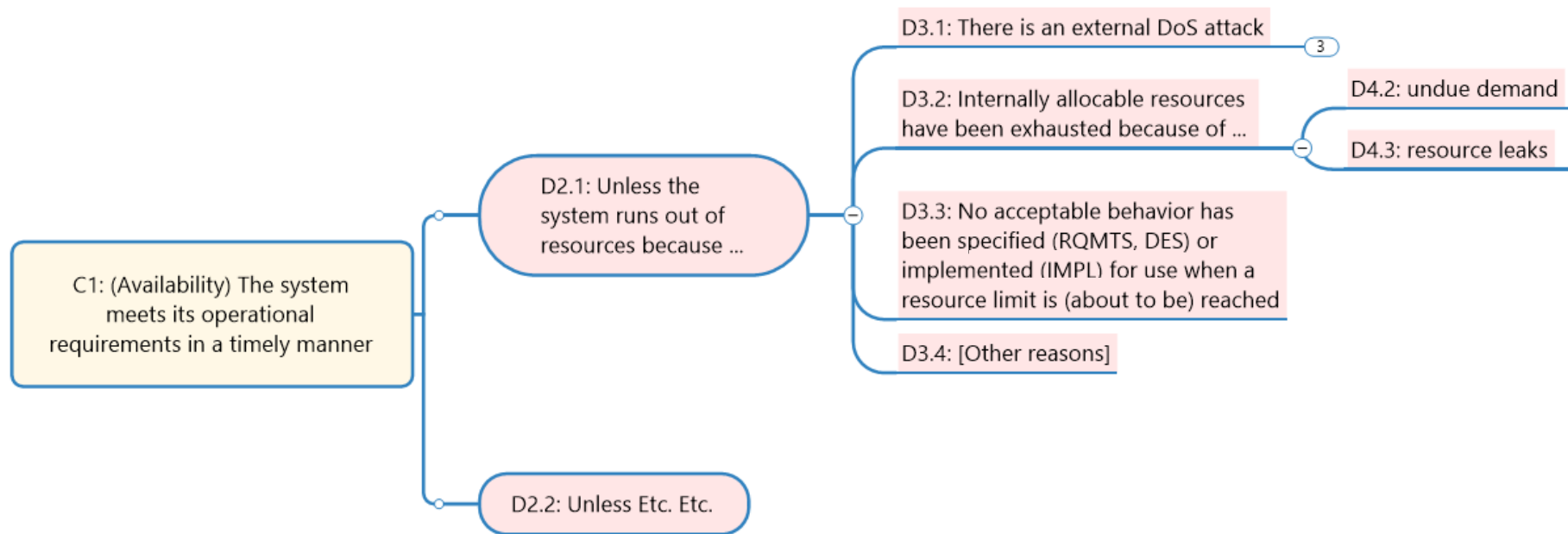


# Assurance Case Linked to CWEs

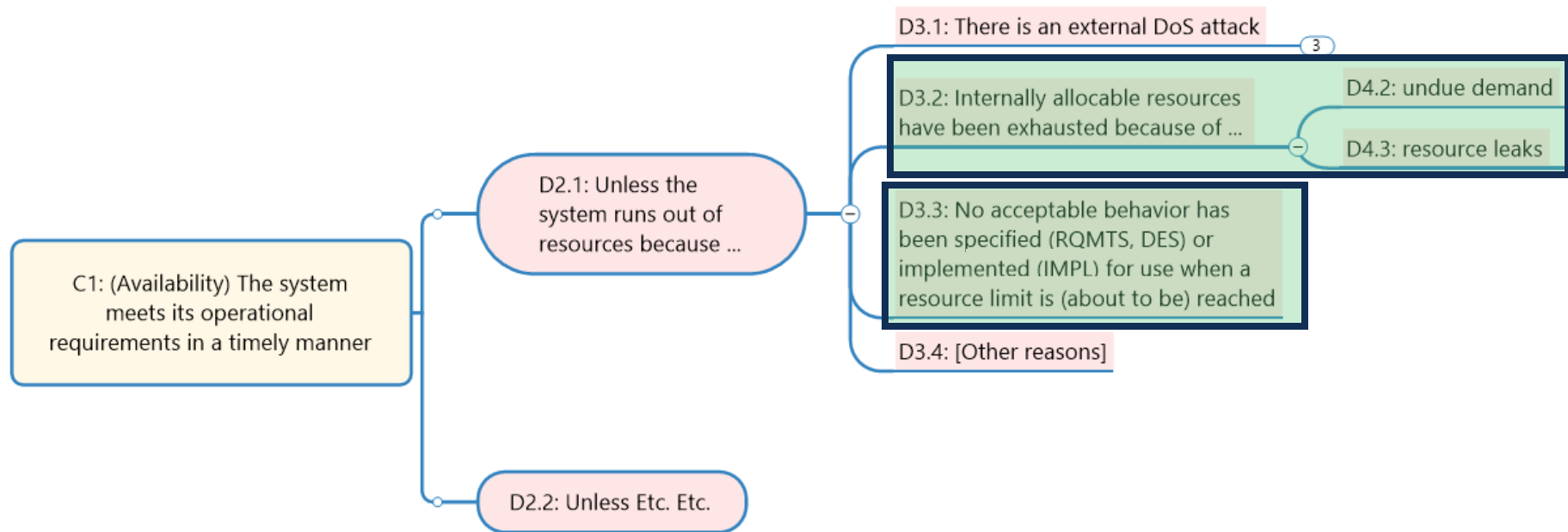


# Assurance Case Linked to CWEs

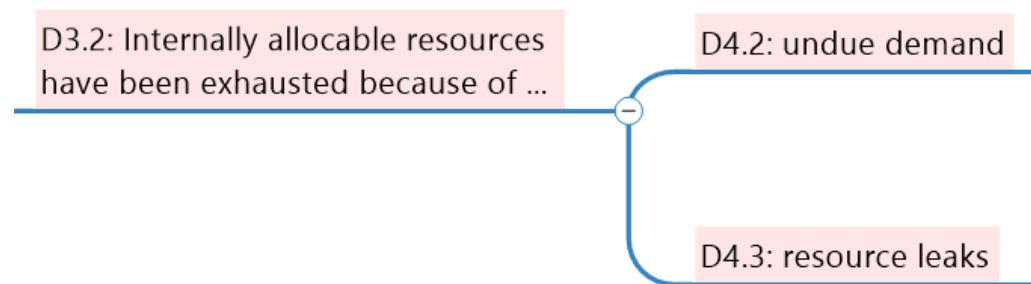
**Confidence increases as doubts are reduced**



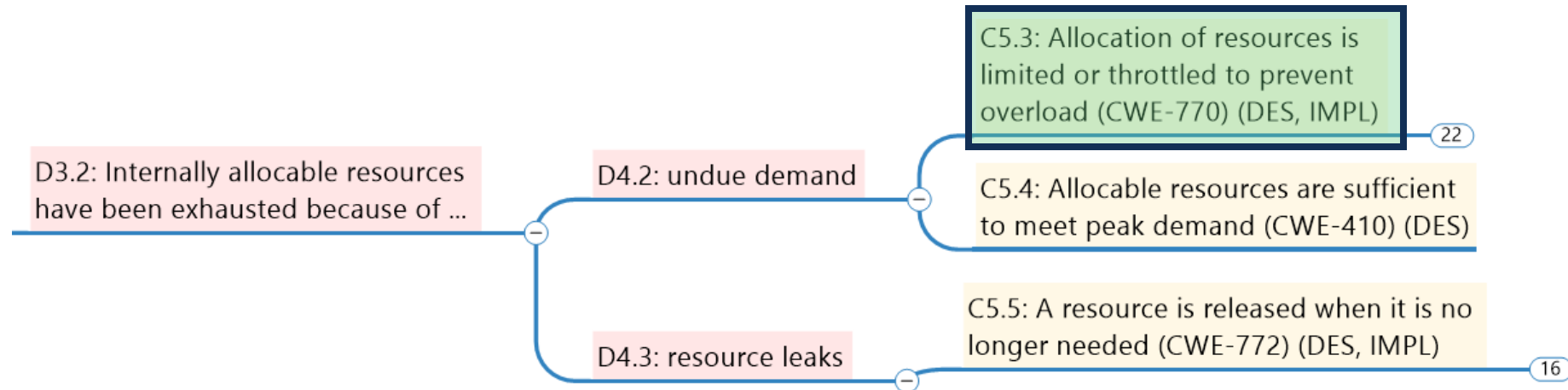
# Assurance Case Linked to CWEs



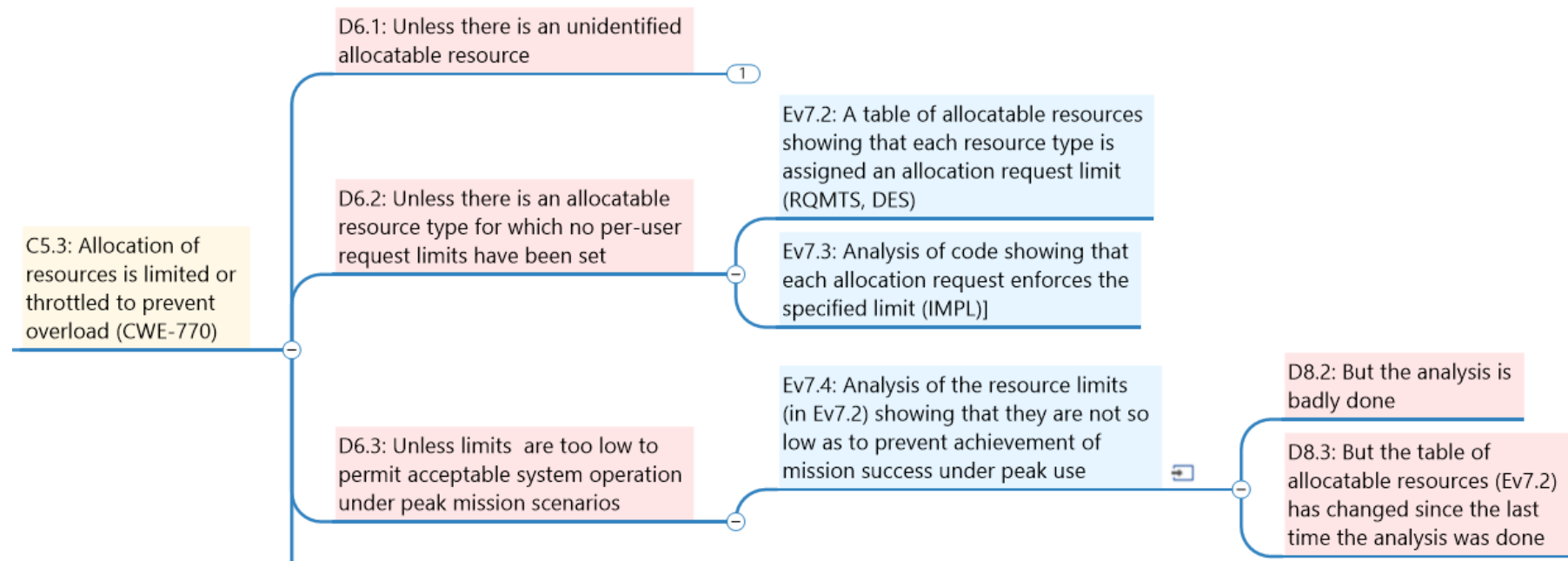
# Assurance Case Linked to CWEs



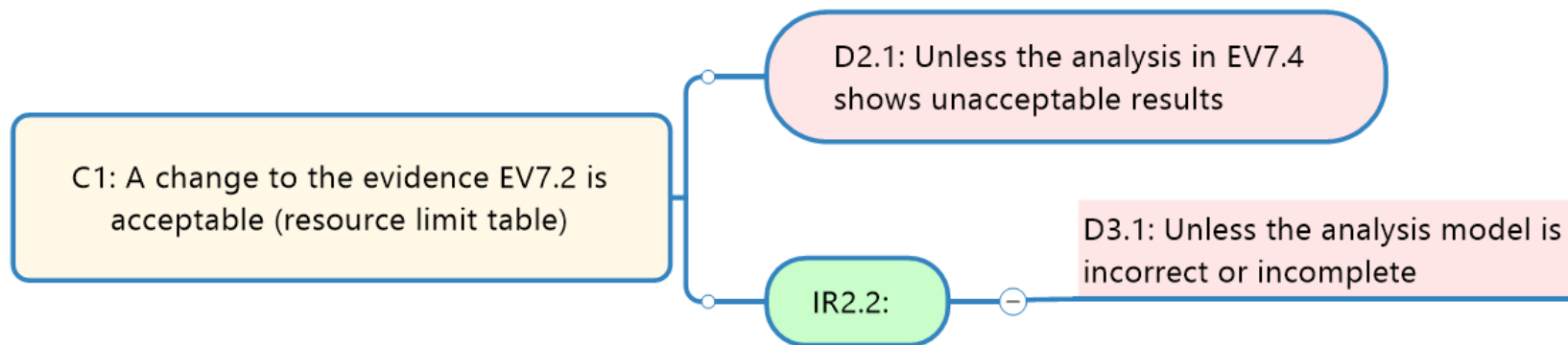
# Assurance Case Linked to CWEs



# Assurance Case Linked to CWEs



# Reassurance Case Example



# Summary

We have shown:

- How an AC based on CWEs can suggest the evidence that needs to be gathered to increase confidence in a system's behavior
- How the AC can identify exit criteria for a stage in the DevSecOps pipeline
- What evidence needs to be refreshed to maintain confidence that (relevant) exit criteria continue to be met after a change (the reassurance case)