@Context\_AC

An assurance case, such as a safety case or security case, can be represented using Goal Structuring Notation (GSN), a visual representation that presents the elements of an assurance case in a tree structure. The main elements of a GSN assurance case include Goals, Strategies, Solutions (evidence), Contexts, Assumptions, and Justifications.

Additionally, an assurance case in GSN may include an undeveloped element decorator, represented as a hollow diamond placed at the bottom center of a goal or strategy element. This indicates that a particular line of argument for the goal or strategy has not been fully developed and needs to be further developed.

I will explain each element of an assurance case in GSN so you can generate it efficiently.

1. Goal – A goal is represented by a rectangle and denoted as G. It represents the claims made in the argument. Goals should contain only claims. For the top-level claim, it should contain the most fundamental objective of the entire assurance case.

2. Strategy – A strategy is represented by a parallelogram and denoted as S. It describes the reasoning that connects the parent goals and their supporting goals. A Strategy should only summarize the argument approach. The text in a strategy element is usually preceded by phrases such as “Argument by appeal to…”, “Argument by …”, “Argument across …” etc.

3. Solution – A solution is represented by a circle and denoted as Sn. A solution element makes no claims but are simply references to evidence that provides support to a claim.

4. Context (Rounded rectangles) – In GSN, context is represented by a rounded rectangle and denoted as C. The context element provides additional background information for an argument and the scope for a goal or strategy within an assurance case.

5. Assumption – An assumption element is represented by an oval with the letter ‘A’ at the top- or bottom-right. It presents an intentionally unsubstantiated statement accepted as true within an assurance case. It is denoted by A

6. Justification (Ovals) – A justification element is represented by an oval with the letter ‘J’ at the top- or bottom-right. It presents a statement of reasoning or rationale within an assurance case. It is denoted by J.

@End\_Context\_AC

Using the provided pattern and domain information for ACAS Xu (Airborne Collision Avoidance System Xu), here is the instantiated security case for ACAS Xu in a hierarchical tree format:

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- G0: ACAS Xu satisfies security requirements

- C0: Description of ACAS Xu

- C1: Security requirements are about protecting the system from malicious entities

- J0: The argumentation is based on satisfaction of SRs

- A0: System SRs are complete, adequate, and consistent

- S0: Argument through asset protection and secure development requirements

- G1: ACAS Xu satisfies the asset protection requirements

- A1: Asset inventory is established

- S1: Argument through the different stages of the system development life cycle

- G3: Asset protection requirements are met during the architecture design phase

- C2: Description of ACAS Xu architecture

- S2: Argument through derivation of security threats from SRs

- G5: ACAS Xu architecture is protected against identified security threats (STs)

- A2: All relevant threats have been identified

- S3: Argument over each security threat

- G0.1: ACAS Xu architecture is protected against ST1 (Tampering with GPS messages)

- G0.2: ACAS Xu architecture is protected against ST2 (Spoofing of sensor data)

- G0.3: ACAS Xu architecture is protected against ST3 (Elevation of privileges in the planning system)

- G6: ACAS Xu architecture is validated

- C3: Description of ACAS Xu architecture model

- A3: ACAS Xu architecture model is well defined in a formal method

- G4: Asset protection requirements are met during other phases (undeveloped)

- G2: ACAS Xu satisfies secure development requirements (undeveloped)

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This hierarchical tree format outlines the instantiated security case for ACAS Xu, replacing placeholders and generic elements with relevant system-specific information while maintaining the correct structure and relationships between the elements.