### Instantiated Safety Case for a GPCA System

The instantiated safety case will replace all placeholders `{}` with appropriate values and display the hierarchical structure as specified in the predicates.

#### Instantiation Details:

- \*\*System\*\*: GPCA

- \*\*Operational Hazard\*\*: "Pump failure"

- \*\*Scenario\*\*: "Continuous infusion mode"

- \*\*Spec\*\*: "Infusion rate control spec"

- \*\*Property\*\*: "Consistency"

- \*\*Source\*\*: "Technical specification document"

Based on these values, we can translate the safety case pattern into the instantiated safety case and display it in a hierarchical tree format.

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- Goal (G1, Operational safety is verified in GPCA)

- Strategy (S1, Argument over the satisfaction of all specs over GPCA)

- Context (C1, All specs are given by GPCA.allInstances())

- Goal (G2, All operational hazards are mitigated)

- Context (C2, Operational hazards are given by Pump failure.allInstances())

- Strategy (S3, Argument over operational hazards)

- Goal (G3, Pump failure is mitigated)

- Strategy (S4, Argument over the applied scenarios of Pump failure)

- Context (C3, All related scenarios are given by Pump failure)

- Goal (G4, Pump failure is mitigated under Continuous infusion mode)

- Strategy (S5, Argument over all specs related to Continuous infusion mode)

- Context (C4, All related specs are given by Continuous infusion mode.spec.allinstances())

- Goal (G5, Infusion rate control spec is appropriate for Continuous infusion mode)

- Strategy (S6, Argument the appropriateness of Infusion rate control spec over properties)

- Context (C5, Properties are given by Infusion rate control spec.property.allinstances())

- Goal (G6, Consistency is appropriate for Infusion rate control spec)

- Strategy (S7, Argument over the source of the Consistency definition)

- Context (C6, Source is given by Consistency.source)

- Goal (G7, Technical specification document is appropriate and trustworthy)

- Solution (Sn1, Technical specification document)

- Goal (G8, Consistency definition is sufficient)

- Solution (Sn2, Consistency)

- Strategy (S2, Argument over reliability in all suitable levels of GPCA)

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In this hierarchical tree:

1. \*\*G1\*\* is supported by \*\*S1\*\*, \*\*G2\*\*, and \*\*S2\*\*.

2. \*\*G2\*\* is defined as the goal where all operational hazards ("Pump failure") are mitigated, supported by \*\*S3\*\*.

3. \*\*S3\*\* narrows down to the mitigation of each operational hazard, here exemplified by \*\*G3\*\* focusing on "Pump failure".

4. \*\*G3\*\* is expanded by \*\*S4\*\*, addressing scenarios under which the hazard is considered, bringing attention to \*\*G4\*\* – handling pump failure in specific "Continuous infusion mode".

5. \*\*G4\*\* is supported by \*\*S5\*\* which covers specifications related to the scenario ("Continuous infusion mode") leading to \*\*G5\*\* about the appropriateness of the "Infusion rate control spec".

6. \*\*G5\*\* is further substantiated by \*\*S6\*\*, verifying the appropriateness of specs over properties, thus leading to \*\*G6\*\* with a focus on the property "Consistency".

7. \*\*G6\*\* includes \*\*S7\*\*, scrutinizing the source of property "Consistency", leading to \*\*G7\*\* and \*\*G8\*\*, ensuring both source appropriateness and sufficiency.

8. \*\*G7\*\* and \*\*G8\*\* are addressed by \*\*Sn1\*\* and \*\*Sn2\*\* respectively, indicating proper solutions or evidence.

9. \*\*G2\*\* also points to \*\*S2\*\*, arguing over reliability levels in the GPCA system.

By instantiating placeholders and linking context appropriately, we ensure the safety hierarchy effectively demonstrates logical and comprehensive safety evidence.