To create an instantiated safety case for the GPCA system, we need to replace the placeholders with appropriate domain information. Here, I'll utilize the domain information related to the hazards, safety requirements, and properties. We'll specifically look at the mentioned hazards ("Overinfusion" and "Underinfusion") and map them accordingly.

Below is the instantiated hierarchical tree structure using dashes (-) to denote different levels:

### Instantiated Safety Case for the GPCA System:

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- G1: Operational safety is verified in GPCA system

- S1: Argument over the satisfaction of all specs over GPCA system

- C1: All specs are given by spec.allInstances()

- G2: All operational hazards are mitigated

- S3: Argument over operational hazards

- C2: Operational hazards are given by operational\_hazard.allInstances()

- G3: Overinfusion is mitigated

- S4: Argument over the applied scenarios of Overinfusion

- C3: All related scenarios are given by operational\_hazard

- G4: Overinfusion is mitigated under Scenario1

- S5: Argument over all specs related to Scenario1

- C4: All related specs are given by scenario.spec.allinstances()

- G5: SR1.1 is appropriate for Scenario1

- S6: Argument the appropriateness of SR1.1 over properties

- C5: Properties are given by spec.property.allinstances()

- G6: Flow rate sensor is equipped is appropriate for SR1.1

- S7: Argument over the source of the Flow rate sensor is equipped definition

- C6: Source is given by property.source

- G7: FDA Standard is appropriate and trustworthy

- Sn1: source

- G8: Flow rate sensor is equipped definition is sufficient

- Sn2: property

- G9: Underinfusion is mitigated

- S4: Argument over the applied scenarios of Underinfusion

- C3: All related scenarios are given by operational\_hazard

- G10: Underinfusion is mitigated under Scenario2

- S5: Argument over all specs related to Scenario2

- C4: All related specs are given by scenario.spec.allinstances()

- G11: SR1.2 is appropriate for Scenario2

- S6: Argument the appropriateness of SR1.2 over properties

- C5: Properties are given by spec.property.allinstances()

- G12: Period (to trigger the underinfusion alarm) is 15 minutes is appropriate for SR1.2

- S7: Argument over the source of the Period (to trigger the underinfusion alarm) is 15 minutes definition

- C6: Source is given by property.source

- G13: Expertise opinion is appropriate and trustworthy

- Sn1: source

- G14: Period definition is sufficient

- Sn2: property

- G15: SR1.4 is appropriate for Scenario2

- S6: Argument the appropriateness of SR1.4 over properties

- C5: Properties are given by spec.property.allinstances()

- G16: Flow rate is less than 90% of the programmed rate setting is appropriate for SR1.4

- S7: Argument over the source of the Flow rate is less than 90% of the programmed rate setting definition

- C6: Source is given by property.source

- G17: Previous knowledge is appropriate and trustworthy

- Sn1: source

- G18: Flow rate is less than 90% of the programmed rate setting definition is sufficient

- Sn2: property

- S2: Argument over reliability in all suitable levels of GPCA system

- C2: Operational hazards are given by operational\_hazard.allInstances()

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This hierarchical tree format lays out how each goal (G#), strategy (S#), context (C#), and solution (Sn#) are instantiated and connected, providing a clear argument structure for the safety case concerning the GPCA system.