To generate the assurance case for the BlueROV2 system using the provided assurance case pattern, we'll follow the instructions to replace the placeholders with BlueROV2-specific information, remove the additional assurance case pattern decorators, and present the natural hierarchy.

### Instantiated Elements:

#### Goals:

1. \*\*G1\*\*: Hazards for BlueROV2 system addressed in accordance with ALARP principle.

2. \*\*G2\*\*: No intolerable risks present in the system.

3. \*\*G3\*\*: Risk from hazard has been reduced as low as reasonably practicable.

4. \*\*G4\*\*: Model BTD accurately describes possible propagation of hazard.

5. \*\*G5\*\*: Quantitative risk estimates are accurate and below acceptable threshold.

6. \*\*G6\*\*: Possible hazard propagation paths correctly captured in BTD.

7. \*\*G7\*\*: Barriers in the BTD correctly describe their respective control action including any required system functions.

8. \*\*G8\*\*: All non-negligible threats have been identified.

9. \*\*G9\*\*: State probability distribution used for risk estimation is an accurate representation of expected system states.

10. \*\*G10\*\*: Estimated probability of consequence is below allowable threshold for severity class.

#### Strategies:

1. \*\*S1\*\*: Argument by risk reduction/elimination of each hazard.

2. \*\*S2\*\*: Argue that risk posed by any remaining hazards is negligible.

3. \*\*S3\*\*: Argue that no other risks have been identified.

4. \*\*S4\*\*: Apply ReSonAte to estimate level of risk from hazard condition.

#### Contexts:

1. \*\*C1\*\*: Definition of "intolerable".

2. \*\*C2\*\*: Assigned severity class is Hazard.Severity.

#### Assumptions:

1. \*\*A1\*\*: Function required by BTD is available.

#### Solutions:

1. \*\*Sn1\*\*: Estimated risk level of the system.

### Hierarchical Tree Structure:

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G1: Hazards for BlueROV2 system addressed in accordance with ALARP principle. (Undeveloped, Uninstantiated)

S1: Argument by risk reduction/elimination of each hazard.

|

|- G2: No intolerable risks present in the system.

| |

| |- S2: Argue that risk posed by any remaining hazards is negligible. (Undeveloped)

| |- S3: Argue that no other risks have been identified. (Undeveloped)

|

|- G3: Risk from hazard has been reduced as low as reasonably practicable.

|

|- S4: Apply ReSonAte to estimate level of risk from hazard condition.

| (IncontextOf A1: Function required by BTD is available) (Uninstantiated)

|

|- G4: Model BTD accurately describes possible propagation of hazard. (Uninstantiated, Undeveloped)

|- G5: Quantitative risk estimates are accurate and below acceptable threshold.

|

|- G9: State probability distribution used for risk estimation is an accurate representation of expected system states. (Undeveloped)

|- G10: Estimated probability of consequence is below allowable threshold for severity class. (Uninstantiated)

|

|- Sn1: Estimated risk level of the system. (Uninstantiated)

(IncontextOf C1: Definition of "intolerable")

(IncontextOf C2: Assigned severity class is Hazard.Severity. (Uninstantiated))

|- G6: Possible hazard propagation paths correctly captured in BTD. (Undeveloped)

|- G7: Barriers in the BTD correctly describe their respective control action including any required system functions. (Undeveloped)

|- G8: All non-negligible threats have been identified. (Undeveloped)

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The above tree structure demonstrates the hierarchical view of the assurance case we instantiated from the given pattern for the BlueROV2 system. Certain elements remain undeveloped and uninstantiated, which indicates where further specific details or evidence need to be provided.