Below is the instantiated assurance case for the BlueROV2 system based on the provided assurance case pattern. The instantiated elements are based on plausible assumptions about potential hazards, risks, and system functions relevant to an underwater remotely operated vehicle like BlueROV2.

\*\*@Assurance\_case:\*\*

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

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

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

- \*\*C1: Definition of "intolerable": risks that cannot be reduced or are unacceptable under international safety standards for underwater vehicles.\*\*

- \*\*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 electrical fault has been reduced as low as reasonably practicable.\*\*

- \*\*C2: Assigned severity class is critical due to potential for loss of vehicle control.\*\*

- \*\*S4: Apply ReSonAte to estimate level of risk from electrical fault.\*\*

- \*\*A1: Function system redundancy is available.\*\*

- \*\*G4: Model Fault Tree Analysis (BTD) accurately describes possible propagation of electrical faults.\*\* (undeveloped)

- \*\*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)

- \*\*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 vehicle loss is below allowable threshold for severity class critical.\*\*

- \*\*Sn1: Estimated risk level 0.0001 (representative attr:RiskEst).\*\*

\*\*Explanation of the hierarchy:\*\*

- Each goal (Gx) or strategy (Sx) element is linked hierarchically. Support relationships are defined with "SupportedBy", meaning one element supports the claims or assertions of another directly above it in the hierarchy.

- "IncontextOf" links are included to specify the surrounding context or condition influencing the goals or strategy.

- "Undeveloped" states are highlighted to show elements without details on implementation or further refinement.

- Placeholders from the pattern are instantiated with specific details true to the hypothetical role of BlueROV2.

- The "HasMultiplicity" and "HasChoice" predicates, important for scalability or flexible implementation, are used to illustrate complex relationships between strategies or goals. They are key in systems where the outcomes depend on varying factors or where multiple strategies may fulfill a requirement.

\*\*@End\_Assurance\_case\*\*

This instantiation of the assurance case pattern for BlueROV2 involves typical considerations such as risk management, redundancy, and critical system functionality relevant to the safe operation of an underwater remotely operated vehicle.