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ACTIVITIES (D5)

For a successful space program: Quality and Safety! (1)

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MODULE: ESA PERSPECTIVE FROM THE DEVELOPMENT PHASE TO THE SUCCESSFUL
ARTEMIS I MISSION AND BEYOND.**Abstract**

The European Service Module (ESM) is the powerhouse of the NASA's Orion spacecraft; it's procured by the European Space Agency (ESA) and built by the prime contractor Airbus in Germany. Its function is to provide the power, propulsion, thermal control, air, and water to the Orion spacecraft, which is the NASA space vehicle built for sending astronauts to the Moon on the Artemis Missions and eventually to Mars. The Artemis I Mission, launched in November 2022, has been a great success for the first ESM; five additional modules are currently under production, integration and testing phases, incorporating the required design changes necessary to support the different future Artemis Missions. The purpose of this paper is to illustrate the ESA perspective on the roles of the Product Assurance (PA) and Configuration Management (CM) within the ESM Project. It includes insights in the methods, tools, standards, best practice, challenges, and lessons learned related to these multifaced roles, gathered from the early design phases up to the successful Artemis I Mission and beyond. The contribution of PA and CM is analysed at different levels, including design reviews, validation and qualification programs, production control, testing supervision, suppliers' surveillance, and mission support. Special consideration is given to the European PA and CM contributions to the human-rated requirements including the crew safety aspects, the processes and materials selection methods, the collaboration with NASA and industries counterparts, and the challenge of a sustainable production of several ESMs in parallel. The PA and CM roles are recognized as fundamental contributors to the success of a space mission; the paper demonstrates how these functions need to harmonize standards and rigorous discipline with flexible and open-minded methods and approaches to accommodate cost and schedule pressure, while also guaranteeing the highest level of quality and risk mitigation, which are required in a human-rated spacecraft, on the path to a sustainable presence of humanity on the Moon and beyond.