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Space Systems Engineering - Methods, Processes and Tools (1) (4A)

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CONCURRENT ENGINEERING FOR GROUND SEGMENT AND OPERATIONS CONCEPTUAL DESIGN – USE CASES, METHODS AND TOOLS ON THE WAY TO DIGITALISATION

Abstract

Concurrent Engineering (CE) is a modern method for system conceptual design in space industry. Although numerous facilities exist within the space sector (e.g. CDF at ESTEC), the method is not yet fully established for Ground Segment and Operation (GSOPS) conceptual design studies. While CE for the space segment in the majority of the use cases can be focused on a standardised set of expert disciplines, the engineering design problem for GSOPS is usually much more diverse. It includes varying engineering aspects and disciplines, changing based on the mission type and involving often non-space aspects but also new technologies services and especially manpower, which isn't easy to engineer. On the other hand, new use cases and systems call for an intensive consideration of GSOPS in early design phases, which can even have a driving influence on the design process or the system design as such. This paper describes the development of the initial basis for defining and tailoring a design process, models and tools to the more diversified requirements of GSOPS conceptual design. Starting with an analysis and review of the early phase GSOPS domain processes and data exchanges, a definition of use cases for the application of Concurrent Engineering GSOPS approach follows. For support, Interviews with experts from various GSOPS domains were conducted to discuss and agree on the selection of use cases. The results include the initial identifications and documentation of the meta model necessary to model the relevant artefacts involved in the use cases. The paper concludes with an outlook describing the further procedure to realise Concurrent Engineering tailored for GSOPS preliminary design, addressing in particular the perspective of MBSE/ digitalisation of the conceptual design process in view of GSOPS