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Knowledge management for space activities in the digital transformation age (2)

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STREAMLINED REQUIREMENTS MANAGEMENT AND MATCHMAKING BETWEEN SPACE PAYLOADS AND SATELLITE BUS ENABLED BY INDUSTRY4.0 TRANSFORMATION AND DATA INTELLIGENCE

Abstract

NewSpace comes along with complex topics such as digitization and Industry4.0 which play a crucial role regarding emerging expectations of new clients. Requirements such as time-to-market and total cost of ownership are becoming more stringent, while at the same time demand for product and service quality is increasing. Furthermore, increased complexity of product lifecycle management makes a sustainable transformation of the space industry necessary.

Based on the project SLOT4.0 funded by the German Federal Ministry for Economic Affairs and Energy and administrated by the German Aerospace Center (DLR) Space Administration, this paper addresses how platform economics with accurate knowledge management methods combined will be used to contribute to a more customer oriented and sustainable transformation towards meeting such expectations in the near future. Based on Industry4.0 technologies and processes in combination with innovation strategies, a service architecture and different procedures are modelled to map the product life cycle phases of a modular satellite bus from ordering and acquisition to manufacturing and operation. By process optimization and closing of the gap between the business layer and the communication layer based on the reference architecture model Industry 4.0 (RAMI4.0), new potentials are uncovered and specified.

Moreover, business processes are presented plotting the phases of payload development and satellite production. Focus here is on the "Customer Journey". With proprietary and modular end-to-end processes, development and production are accelerated, delivery times shortened, ordering procedures simplified and communication standardized. In addition, the processes themselves are also modularly structured and can therefore be added or changed over time. Market uncertainty and long implementation cycles are addressed via several potential payloads identified and associated market needs captured. This allows the usage of clear market-relevant information with the purpose of making the development process more efficient. Data evaluation, market studies, interviews and targeted workshops are presented. Based on broadly diversified results, a digital web platform has been set up adopting overlapping user needs. Such environment supports central administration of all user and mission relevant information, collects and processes all technical specifications and requirements in an automated, simple and standardized fashion.

Specifically, the dedicated algorithm automatically determines the compatibility of payloads with characteristics of hosting satellite buses. The algorithm also identifies missing or incompatible properties for payload customers, and, thereby generates feasibility awareness at an early stage on top.