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Process Modeling in an Aeronautics Context

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Abstract : Many innovative projects exist in the field of aeronautics, each addressing specific areas so to reduce weight, increase autonomy, reduction of CO2, etc. In many cases, such innovative developments are being carried out by very small enterprises (VSE's) or small and medium sized-enterprises (SME's). A good example concerns airships that are being studied as a real alternative to passenger and cargo transportation. Today, no international regulations propose a precise and sufficiently detailed framework for the development and certification of airships. The absence of such a regulatory framework requires a very close contact with regulatory instances. However, VSE's/SME's do not always have sufficient resources and internal knowledge to handle this complexity and to discuss these issues. This poses an additional challenge for those VSE's/SME's, in particular those that have system integration responsibilities and that must provide all the necessary evidence to demonstrate their ability to design, produce, and operate airships with the expected level of safety and reliability. The main objective of this research is to provide a methodological framework enabling VSE's/SME's with limited resources to organize the development of airships while taking into account the constraints of safety, cost, time and performance. This paper proposes to provide a contribution to this problematic by proposing a Model-Based Systems Engineering approach. Through a comprehensive process modeling approach applied to the development processes, the regulatory constraints, existing best practices, etc., a good image can be obtained as to the process landscape that may influence the development of airships. To this effect, not only the necessary regulatory information is taken on board, also other international standards and norms on systems engineering and project management are being modeled and taken into account. In a next step, the model can be used for analysis of the specific situation for given developments, derive critical paths for the development, identify eventual conflicting aspects between the norms, standards, and regulatory expectations, or also identify those areas where not enough information is available. Once critical paths are known, optimization approaches can be used and decision support techniques can be applied so to better support VSE's/SME's in their innovative developments. This paper reports on the adopted modeling approach, the retained modeling languages, and how they all fit together.

Keywords : aeronautics, certification, process modeling, project management, regulation, SME, systems engineering, VSE
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