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SYSTEMPADS: A UNIQUE APPROACH TO IMPLEMENTING SYSTEMS ENGINEERING TASKS

Abstract

This research paper examines a methodology and tool to bring Knowledge Management and Model-Based Systems Engineering of Space Systems in line by adding important notions of domain-driven design. The knowledge that resides in countless standards, guidelines, operations books, policies, body of knowledge (BOK) volumes and even laws is mostly of the prescriptive type. Prescriptive in the sense that: (1) it tells you what to do, (2) how to do it and (3) it makes it compulsory. The NASA program, project and systems engineering handbooks, standards, policy directives (NPDs) and procedural requirements (NPRs) fall into this category as do European Commission on Space Standards (ESSS) used by ESA. The nature of complex systems requires that both the group of knowledge providers and users of this prescriptive knowledge somehow understand each other—instead given that each of these groups views the system from their own domain of expertise their understanding may differ to some degree. For any a project, stakeholders expect a justification that must be fulfilled by the Program Manager who relies on the Systems Engineer for all things technical products—yet the PM/SE must take into account all of the Engineering procedural requirements dictated by programmatic and institutional authorities. In Domain Driven design these silos of domain experts are said to live in their own "bounded-context" and what they use to communicate is called a "ubiquitous language." The proposed methodology and tool in this paper make "prescriptive knowledge" executable—by providing a way to encode it, a computer-assisted environment to interact with the user—known as SystemPAD, and an interpreter agent that executes the prescriptive knowledge. The paper will describe the development and initial implementation of these SystemPADs, with the first example being a RequirementsPAD used to more easily extract system requirements from stakeholders and organize and communicate them to others on the project.