Systems Engineering: Common Problems

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Physical vs. Logical Architecture

The overall goal of the program/project – ensure that the product meets the customer expectations (how to get fully paid on this and potential future projects)

◦ This is an essential step to scope, budget, schedule and staff the realization of the solution

Decomposition of the Systems Architecture:

◦ Logical/Functional Architecture - elements by function

◦ Physical Architecture - elements by form

◦ Functions are the 'what to do'; Physical are the 'how it is done'

Value of Functional Architecture

Are discrete physical vs. logical/function definitions widely accepted in industry with regard to system architecture and MBSE?

◦ UTEP observation: Industry seems to take an abstract view of the physical architecture without expressing functionality

Logical architecting with functions assigned to physical elements

◦ Do you have the right design, material selection, product acceptance?
◦ Have you specified the right interfaces – physical, mass transfer, information transfer, control signals?
◦ Does your system balance – internal minimums, maximums cannot conflict to compromise reliability?

What observable consequences have you seen for in a project that does not have SE?

Small projects may be able to survive without formal SE structure
◦ Typically, manageable by a single individual or a small, tight team
◦ SE seen as 'decorative wallpaper' or a 'check the box' activity – conflicts with limited budget, timeline and staff resources

Early Issue: large projects are *late in starting formal SE planning processes*
◦ *Requirements that are unclear, unachievable, or lack metrics to demonstrate compliance*
◦ *Unanticipated changes and rework due to lack clarity in project scope and gaps in SMEs*

Mid-project Issue: emergent design changes *lack clarity in option space*
◦ *Underinformed decisions may create constraints on product use, missed opportunities to optimize*

Later Issue: insufficient body of data that *verifies compliance with requirements*
◦ *Decomposition, mapping to V&V solutions could have identified these gaps*

References

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