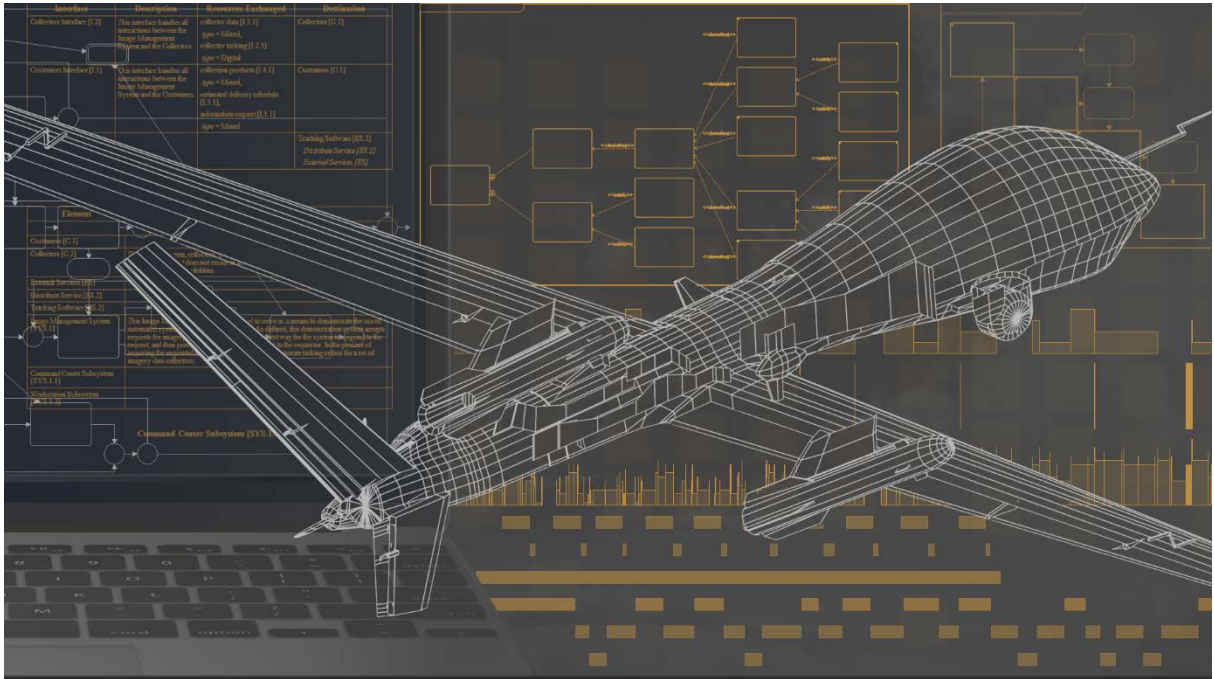# Systems engineering a new air vehicle in warp time
made possible by CORE

"We realized that the typical 'start from a clean sheet' approach was just not going to meet the schedule."

A daunting challenge

Imagine that you are a senior systems engineer with 30-plus years of experience. You work for a major US aerospace contractor. You have just been given systems engineering responsibilities on a new project to develop and fly a brand-new air vehicle within 18 months. You well know that the normal time-frame for such a project is three to five years. What are you going to do?

We will call you, for the sake of our story, Chris. While you think about what you would do in such a situation, let's check in with the real-life Chris (not his real name) and see what he had to say about the experience:

We realized that the typical 'start from a clean sheet' approach was just not going to meet the schedule. With our systems requirements review scheduled only four months from the contract award, there was no time to waste. We needed as much re-use as we could apply to the problem.

We had to quickly analyze customer requirements and derive detailed requirements that could then be flowed to suppliers in short order.

Using CORE to expedite design

Chris realized that previous work that he and his team had done in CORE (a systems engineering software tool) could be leveraged to advantage on the current project.

On an earlier project, we had developed in CORE a systems model with rich operational, functional, and physical dimensions. We had developed our entire requirements set in parallel with this detailed integrated model. During that project's development, we explicitly used CORE in such a way as to define and develop sufficiently de-coupled functional aspects with the express intent of being able to re-use them on many diverse future projects.

We also applied this to the physical partitioning of our systems. Our objective was to define system partitions in such a way as to avoid past integration problems caused by system partitions defined with respect to work breakdown structures rather than adhering to strict functional allocation boundaries.

By leveraging this work in CORE from our previous project, we were able to quickly stand up a brand new model for the new project, based on the old one. The re-use was made possible because CORE makes it very easy to re-allocate functions for any given component to a new component, while maintaining all traceability for the function.

Already-mature traceability

According to Chris, the benefits of using CORE are significant.

One of the benefits was the speed of starting a new project with significant systems requirements review (SRR) as well as design content review—which we were able to show in short order. We met our initial four-month SRR goal by being able to show the customer our tailored operational models and the high-level system requirements that flowed from these models, all while showing already-mature traceability between these models and the requirements.

The ability to execute these models with the embedded COREsim discrete event simulation at SRR impressed the customer and allowed them to engage in reviewing and commenting on those models in real time. We were even able to show the customer our functional models at the time of the SRR, which also gave the customer insight toward the next program design review milestone. During design reviews, our customer would say, 'You've got a lot of material here ahead of time, which is great.'

In short, by re-using our CORE models, we met our challenging early systems engineering milestone goals and kept the program sold by convincing the customer of our solid systems engineering approach.

This was how the real-life Chris solved the problem. What's your approach?

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