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Insight through integration

Finding the right tool in Australia

Kevin Robinson (foreground) and Wayne Power examine a model in CORE. Robinson is Senior Systems Analyst with the Defence Science and Technology Group of the Australian Government.

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—Kevin Robinson, senior systems analyst

"A bad worker blames his tools," goes the old proverb. For Kevin Robinson, excuses are not part of the equation, but finding the right tool is. It's a task that has tremendous consequences, for good—or for ill.

In 2006, Robinson was a senior systems analyst with Australia's Defence Science and Technology Group—part of the country's Department of Defence—when he was called on to research and assess emerging concepts for ground-based air defense. Not only did he need to be able to understand the physics of flight and the chemistry of combustion, he also needed to be able to navigate the intricacies of the complex system-of-systems that is ground-based air defense systems today.

Needless to say, a ground-based air defense system is quite complicated. It involves sensors, launch platforms, guided weapons, communication networks, and information systems that must be integrated in a geographically separated, networked capability in complex and contested environments such as those found in military missions. Understanding what solution concepts are needed and how to make tradeoffs between system solutions is complex.

When Robinson's team sat down to build a model that would capture the operational concept of ground-based air defense systems and help researchers, stakeholders and users record their understanding of the high-level design, they knew they wanted several things. They wanted to help researchers better assess technical risks; they wanted future users of the system to know what they needed; and they wanted to support the engineers who would be figuring out the system requirements.

"In the early days, we tried using tools such as Visio to create the descriptive model, and while that gave us a certain level of functionality, it wasn't working so well, so we decided to try CORE," Robinson explained.

A single integrated model

The special advantage of CORE—a software tool that enables systems engineers to create a single integrated model of a system—was that it allowed for design integrity with many different players involved, all of whom were actually designing the system.

Attaining design integrity was exactly what happened when Robinson and his team gathered experts—military users, missile experts, radar experts and the like—for a workshop and immersed them in the CORE model environment.

The traditional approach to undertaking the design of an operational concept is to capture the information in the form of a document. But with CORE, you capture the design in a descriptive model. Design, a creative endeavor, is enhanced by a visual approach, with the "designers" (researchers, users, engineers) discussing, debating and making design tradeoffs in a visual environment. This, combined with CORE's integrated database reflecting all of the interrelationships, facilitates design traceability not available in traditional documentation tools.

"With CORE, you can visualize the traceability through multiple elements of the model, between strategic guidance and required functions, in one simple diagram," said Robinson. This allows design decisions to be made with more clarity.

Changes incorporated in real-time

Robinson recalled that during one of the workshop sessions, a future user was skeptical about their whole approach. "He was sitting in the back of the room following along and making his own model on the fly—but as he watched us create the model in CORE, his eyes lit up." He was quickly able to see how the design changes being discussed were being incorporated real-time across all aspects of the model.

With stakeholders seeing the system as it was being designed and having on-the-spot input, their support was tremendous. "We got so much buy-in this way," Robinson said.

Automated document production

Another feature of CORE is its ability to automatically produce documents from a model. This proved a boon. Management had been accustomed to a document-based process, but one that took many person-hours to perform.

When Robinson and his team showed a high-level manager a document produced directly from their model, "he said it was the most comprehensive and complete operational document he had seen." He was surprised to learn the document had come from a model.

"Management was used to having 100-150 pages; we gave them many more," Robinson said. When you generate a document directly from the model, Robinson explained, "there's a lot more engineering rigor behind it. You have to build the rigor into the design model." This engineering rigor is then reflected in a much more comprehensive report. In other words, with documents, you can fudge. But you can't cheat with a model.

Model fidelity

Then, if for whatever reason you have to pause your project for a while and come back to it months or even years later, you can quickly get up to speed by consulting the model directly. The model is much more faithful to your design project than any set of documents.

Robinson certainly found this to be true. "CORE gave us a better understanding of the ground-based air and missile defense systems," he said. Just like the boomerang, the most quintessential of Australian tools, CORE comes back to its master consistently and with precision, time and again.

And the stakeholder in the back of the room? He still uses CORE.

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