THALES
AUSTRALIA

AIR TRAFFIC MANAGEMENT

The Transformation of a Complex Air Traffic Management System

> *Adopting MBSE with Capella allowed us to further increase the business value of the architecture modeling activities.* - Peter Havenga

Context

The Thales OneSKY Australia Program is delivering a new Australia-wide integrated Civil and Military Air Traffic Management System, known as CMATS.

CMATS replaces the current civilian Air Traffic Management (ATM) system and Defence ATM system, providing the most advanced and integrated ATM system in the world. It will manage more than 11% of the earth's airspace and will deliver Air Traffic Services to some of the world's busiest air routes.

This project represents the development of a complex System of Systems (SoS) composed of more than 10 systems, deployed at 12 sites, and providing more than 50 interfaces to legacy systems, such as surveillance and meteorological data. This complexity required the SoS to be clearly defined and agreed by a large number of stakeholders, which led to the formalization of more than 6000 solution requirements.

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Peter Havenga is the team lead of the System of Systems Architecture Team on the Civil Military ATS, currently working in Thales Melbourne, Australia.

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Solution

Over the last 4 years of the Design phases of the program, the team has defined and deployed a new way of working by focusing on capturing the System of Systems Architecture using state-of-the-art modeling techniques.

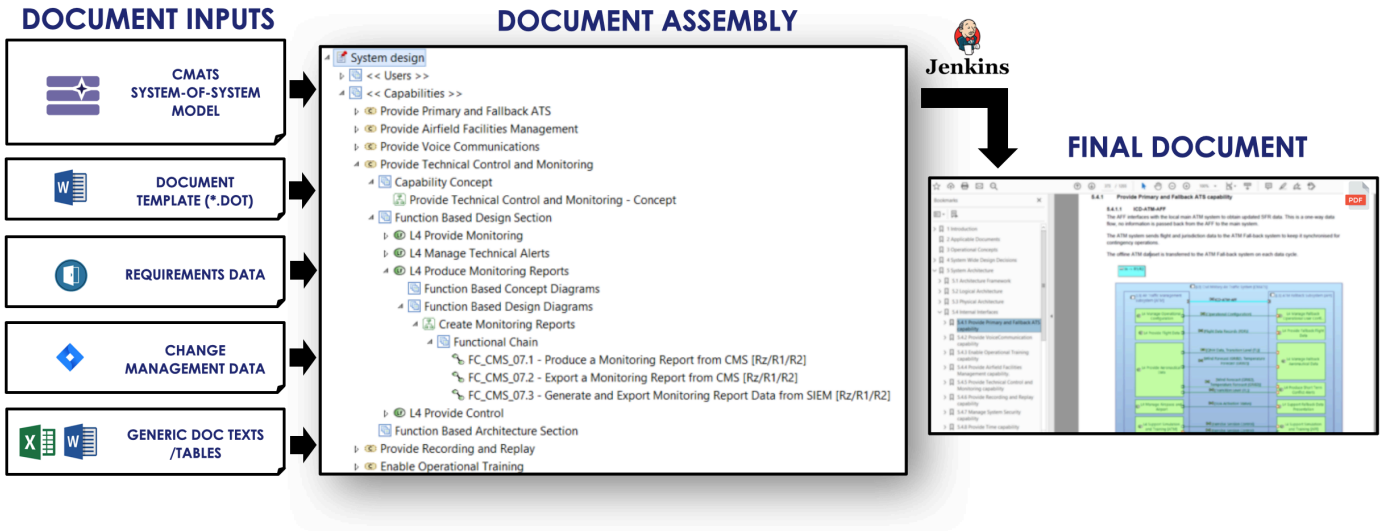
They shifted from standard practices using standalone and inconsistent documents and models, leading to a poor continuity between engineering levels, to a collaborative MBSE approach, based on shared models, offering multiple views and a common and unified language.

Using Capella, systems and subsystems are defined as “black boxes” in the Logical Architecture, with their external and internal interfaces, their related functional chains, and the traceability with requirements. In the Physical Architecture, it is described how the deployment of subsystems varies between sites, and how they are connected. As the majority of the modelling activities started at the moment that the specification was already established, Operational Analysis and System Analysis were not the main focus. However, the Operational Analysis was used in a later phase in order to clarify activities/interactions within the support system.

In addition to Capella, several key add-ons are also used:

- Team for Capella to manage simultaneous design work between team members,
- Requirements Viewpoint to manage traceability with the requirements,
- Property Value Management Tool to highlight critical functions.

And finally, the workbench has been extended by Thales with a specific documentation generation solution and a bespoke csv export capability that allows to export data from the information captured in the architecture model. This ensures the information within the model can be used by the wider organization.



Result

This approach has resulted in a stable working environment that not only allows the management of consistency and complexity, but also enables the team to collaboratively and efficiently work on the architecture definition.

With the usage of Functional Chains, the architects can demonstrate how the System of Systems design satisfies the requirements, by expliciting the role of each different subsystem fulfilling a requirement.

The approach and the Capella tool provide an accurate, referenced and available architecture definition that ensures:

- a solid ground for design decisions and for the descriptions of the system and subsystems,
- a definition of how the solution will be delivered along its lifecycle,
- a definition of how the deployment of subsystems varies between sites,
- a support to engineering change requests.