A COLLABORATION PLATFORM FOR AVIONICS SYSTEMS

The Business

The *Direction générale de l'armement* (DGA), is the French Government Defense procurement and technology agency responsible for the program management, development, and purchasing of weapons systems for the French military.

The Challenge

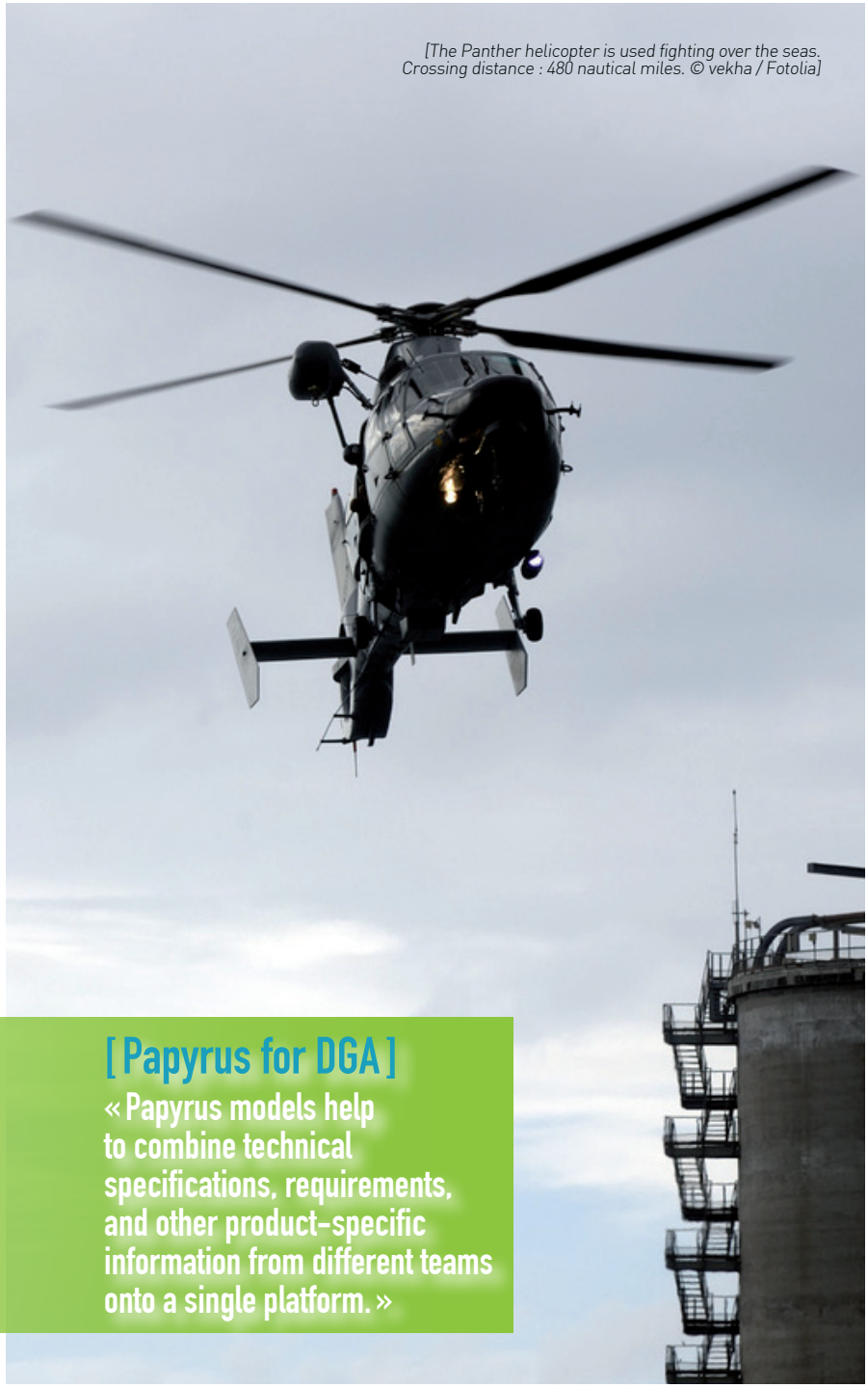
DGA is involved in the development of complex avionics systems which requires close collaboration of many teams. The problem arises when individual teams use their own software tools and specification languages. As a result, communications between teams become difficult and increasing the likelihood of errors.

The Solution

DGA turned to open-source solutions like the Papyrus modelling tool. Using Papyrus diagrams and the SysML language, we designed an Avionics System which combines within a single platform all the project artifacts, starting from requirements as well as the behaviour, functional, software, and hardware architectures.

The Benefit

Papyrus allowed us to gather dispersed information related to our avionics project into a single uniform environment and to automatically generate reports that describe the system models. This significantly improved communications among members of the different teams.



[The Panther helicopter is used fighting over the seas. Crossing distance : 480 nautical miles. © vekha / Fotolia]

[Papyrus for DGA]

« Papyrus models help to combine technical specifications, requirements, and other product-specific information from different teams onto a single platform. »

& The Business The Challenge

« Modern avionics systems include navigation, communication, display, surveillance, piloting... »

[Front of a Rafale, the first aircraft designed to operate both from the land and aircraft carrier.
© choucashoot / Fotolia]

The Business

« Providing the armed forces »

The Direction générale de l'armement (DGA), is the French Government Defense procurement and technology agency responsible for the program management, development, and purchasing of weapons systems for the French military

Armament programs require that the weapons systems that provide the armed forces with the capacity and performance levels corresponding to their operational needs must be produced at optimal cost and within the specified delivery deadlines. In collaboration with the defense industry, the DGA designs and produces the equipment destined for France's armed forces.

The DGA's responsibilities cover the entire lifetime of these programs, from the preparation stage to operational use.

The Challenge

Modern avionics systems are complex and include navigation, communication, display, surveillance, piloting and management of multiple systems, and the hundreds of sub-systems that perform individual functions. The development of such systems requires sophisticated processes conforming to various standards and norms.

Communication issues between numerous stakeholders involved into the development process, lead to serious obstacle in delivering a high quality products.

These include difficulties in comprehending and overseeing the project as a whole, the inability to centralize and consolidate technical specifications and requirements issued by different teams, as well as ambiguous and incomplete documentation.

« Overseeing the project as a whole »

The Solution

« New approaches to system engineering »

[" Papyrus allowed us to centralize distributed information and to automatically generate reports describing the system models. This significantly improved the communication in our teams."]

OLIVIER - INFOSEC ENGINEER - DGA

In order to cope with the complexity issues while building reliable and robust avionics systems, we turned to innovative model-based tools and new approaches to system engineering.

We selected Papyrus, an open-source, model-based engineering tool, because it provides industrial-strength community-backed solutions for system and software developers who demand a standards-compliant, reliable, modular, extensible, and configurable modeling tool.

Six systems constituting the Avionics System were modeled in the SysML language using Papyrus.

These systems included navigation, communication, display, surveillance, sensor and piloting. The high level requirements and technical specifications of each system were reviewed, integrated into a single project and linked with corresponding architectural components.

The automatically generated reports describe close to a hundred functions of various subsystems.

[The Tiger combat helicopter is designed to be used without any heavy infrastructure, maintenance can be provided as close to the battlefields. © Éric Cabasse / Fotolia]

The Benefits

« Papyrus provides a facility to automatically generate documentation that describe the system models. »

[Mirage 2000 © mattei / Fotolia]

The Papyrus platform appears to be a good solution capable of consolidating within a single uniform environment information that is distributed across various project members and teams.

This significantly increases the quality of exchanges between different disciplines, which is so important in a large project.

In addition, Papyrus provides a facility to automatically generate different kinds of documentation that describe the system models.

This significantly improves the communications among members of different teams. After avionics models, Papyrus add-on will allow analysis of specific performances.

About DGA

Web site : http://www.defense.gouv.fr/dga

Nature : French Government Procurement Agency

Domain : Defense

Employees : 10 000

PAPYRUS CASE STUDY SERIES

Publisher : CEA List // Chief Editor : Sébastien Gérard // Texts : Olivier // Layout : Florence Boulenger-Delplanque // Copy Edit : Bran Selic

© 2015 CEA List. All rights reserved. All other trademarks, trade names, service marks and logos referenced here belong to their respective companies. This document is for your informational purposes only.

About List (www-list.cea.fr) : One of three institutes which comprise CEA Tech (CEA Technological Research Division), the List institute is committed to technological innovation in digital systems. Its R&D activities – driven by major economic, societal and industrial challenges – encompass four main themes : advanced manufacturing ; embedded systems ; ambient intelligence ; and healthcare, including radiotherapy and imaging technologies.

About Papyrus (www.eclipse.org/papyrus) : Papyrus is an Eclipse project led by List (contact : Sébastien Gérard at sebastien.gerard@cea.fr). Papyrus is also labelled as a solution of the Eclipse industrial working group Polarsys (https://www.polarsys.org/solutions/papyrus). Papyrus supports model-driven approaches by providing a standards-based modeling tool that supports, out of the box, both the UML and the SysML international industry standards from the OMG. In addition, Papyrus provides very advanced support for custom UML profiles that specialize UML, which enables users to define and implement their own domain- and project-specific modeling tools and languages (DSMLs). The user interface of Papyrus is highly configurable to support a broad spectrum of user-specific domains and concerns.