DIGITAL INDUSTRIES SOFTWARE

Enhance data access for aerospace E/E system design

Large aerospace OEM uses Capital to improve productivity of virtual program teams across the globe

Executive summary
Several trends in the aerospace and defense industries are creating new challenges for original equipment manufacturers (OEMs). There is constant pressure to reduce program costs and meet tight schedules while negotiating increasing product and mission complexity. To take advantage of new capabilities, modern systems are not only increasingly electrical in nature, but they're designed by multiple program teams that work virtually around the globe. Model-based design (MBD) is essential to minimize the risk introduced by electrification, complexity and globalization while enabling effective collaboration among distributed teams.

Anthony M. Nicoli, Siemens Digital Industries Software

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Introduction

Model-based design enhances collaboration by enabling worldwide teams to work together in a single environment. The need for this capability is underscored by the new work-from-anywhere directive that has gained momentum in the wake of Covid-19, along with the trend toward third-party partnerships. As employees continue to work remotely and as partners are introduced to the design process, secure collaboration and data storage – along with granular data access control – are of paramount importance. What's more, designing on a global scale requires teams to meet diverse regulations and make data and systems broadly accessible. All of these parameters must be met while improving team productivity and reducing time-to-market with innovative designs.

Grappling with these challenges, a large U.S.-based aerospace OEM turned to Capital™ software, Siemens Digital Industries Software's electrical/electronic (E/E) systems development solution. Capital is part of the Siemens Xcelerator portfolio, the comprehensive and integrated portfolio of software, hardware and services. By leveraging the authorization and authentication capabilities of Capital, the client provides its global design teams with secure access to the data they need to build next-generation E/E systems for aircraft

The primary goal is a digital transformation

Enabling teams and implementing processes to address the key challenges of current aerospace system design comes at a high cost. Platform development programs must use the right mix of developer skill, availability and cost to meet demanding schedules on a tight budget. To get that skill and cost mix right, program teams are often distributed geographically.

Abiding by industry regulations is critical to avoid the risk of a dangerous, and potentially devastating, data breach. International teams must gain access to the data required to advance program milestones and at the same time adhere to export control and the International Traffic in Arms Regulations (ITAR). Manual processes for governing data access are error-prone, time-consuming and can cause delays and overruns while increasing the workload on the end user.

For this OEM, the need for a digital transformation was apparent.

To that end, the company is using the Capital suite to implement model-based E/E system development and leverage a digital twin to transform its business processes, including information technology (IT) access control. Capital was designed to support model-based E/E system development. It is central to solving the challenges of design complexity, from change management to system configuration control and integration. It relies on a true digital twin, not digitized representations, which enables data to be highly accessible at the right time and in the right format.

Using Capital, the client can easily import requirements, system models and constraints into an environment where they can design, capture and optimize the E/E architecture. They can then produce the information required to drive four key electrical disciplines: electrical distribution, electronics, software and networks. This is done in the context of the program's product lifecycle management (PLM) and mechanical development environments using integrations with Siemens' and competitors' tools. Information can then be connected downstream for verification and virtual integration, and to support manufacturing and operational processes.

Secure data access is a must

Enterprise security is extremely important, as is maintaining the confidentiality of the data set. Given the nature of the client's business, data must be accessible even to those with restricted access so they can complete their work without being impaired. As such, data access control is a critical capability for ensuring the right data is available to people who need it to do their jobs while preserving data integrity.

The client said its U.S. team needed access to the entire design, while the third-party subcontractor was only authorized to access the work they're contracted to perform. Meanwhile, its offshore team has additional limitations due to governmental restrictions, as well as an additional requirement for authorizing and licensing the transfer of data. Using Capital enabled the client to accommodate all of these requirements while providing access to the necessary data.

Access control for exporting data – a complex process

The conventional method for exporting controlled data is complex. The client leverages a Capital database governed by a data owner who is responsible for controlling access to users. Employees request access from their managers, which triggers an assessment to on whether to authorize individuals – engineers who understand the design intent of the project and are trained in global trade law to review the request. They log their determinations into a PLM system. The design owner then confirms that access controls are added to the project using Capital domains. They also add data markings on the design to communicate access rights and limitations.

The global trade team works in parallel with the U.S. government to secure licensing for exporting the data. All of the licenses are stored in a database, and the data owner is responsible for maintaining and enforcing those licenses. They must also ensure the export classification of the designs and projects are authorized for the licenses.

According to the client, the traditional authorization and authentication process requires a lot of manual oversight. Ultimately, the client's IT organization must double check the access control policy is enforced to ensure the end user is able to access the database and verify the employer's nationality. They have a lot of training in place to ensure that all stakeholders in that process understand their responsibility and what's expected of them.

Using Capital enables granular data access control

Capital features a rich authorization model that provides control over permissions, domains and change policies. The client can authorize a user in many dimensions and in a fine-grained manner, all the way down to individual data attributes and properties. Access can be configured based on an individual's role or identity, and the client can define custom domains to control access to specific data. Additionally, Capital enables teams to use external information to augment authorization with stronger authentication requirements such as password aging. Importantly, using Capital enables the client to control authorization based on externally supplied constraints and grant appropriate access to programs for team members and partners as needed.

Using Capital and its model-based access control, the client can enable its worldwide teams to access the data they need to do their work quickly and securely. The client seeks to leverage the extensibility of Capital to establish guardrails via automation and make sure users don't expose data to the wrong parties; for example, verifying domains for automatically validating access controls. Such automation will lay the groundwork for externalizing access controls.

Supporting effective data access control

Using Capital enables effective data access control with its authentication and authorization capabilities:

- **Authentication** verifies the user identity and keeps data secure by permitting only genuine users to access protective resources such as databases, websites and networked applications
- **Authorization** is a security mechanism used to determine user privileges or access levels related to system resources, including data and application features

Conclusion

Moving forward, Siemens and the client will collaborate to combine the authentication and authorization capabilities of Capital with the client's enterprise IT information and policies. Leveraging the extensibility of Capital and joint service development between the OEM and the supplier, the software's model-based access control will be used to automate and reduce the complexity of data access for the client's global teams.

According to the client, Capital is helping them to go well beyond standard development and design to reduce the complexity of data access.

Siemens Digital Industries Software

Americas: 1 800 498 5351

EMEA: 00 800 70002222

Asia-Pacific: 001 800 03061910

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Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. Siemens Xcelerator, the comprehensive and integrated portfolio of software, hardware and services, helps companies of all sizes create and leverage a comprehensive digital twin that provides organizations with new insights, opportunities and levels of automation to drive innovation. For more information on Siemens Digital Industries Software products and services, visit siemens.com/software or follow us on LinkedIn, Twitter, Facebook and Instagram.

About the author

Anthony leads the aerospace business for Siemens's Integrated Electrical Systems (IES) segment. He is charged with expanding IES's contribution to this market. Prior to this role, he led the Mentor Graphics technical sales team serving The Boeing Company. He joined Mentor in 1999, growing to lead the marketing organization for Mentors' integrated circuit physical verification product line, Calibre, before joining Mentor's sales team. He spent nearly twenty years in the defense industry, developing electro-optic and electro-acoustic systems and businesses, working primarily in the tactical missile countermeasure and underwater imaging domains. He holds Bachelors and Masters Degrees in Electrical Engineering from the Massachusetts Institute of Technology and a Masters in Business Administration from Northeastern University.

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