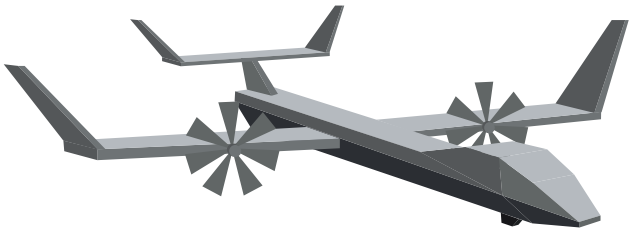
Software Integration

Delivering Excellence



When a DoD contractor approached Tangram Flex to build an adaptable, reconfigurable autonomous aircraft for the U.S. Air Force, Tangram delivered a software toolkit specifically created to improve the speed and safety of software component updates. As DoD and industry organizations push forward to outpace adversaries, software integration platforms will pave the way for rapid integration with confidence.

Software offers today's systems the potential for modernization more than ever before. Yet, some defense programs lag in the technology race, and growing gaps between system engineering requirements and software development implementations make it difficult to deliver new capabilities in pace with mission demands.

Mission-critical systems need new technologies quickly and need them to work correctly every time. While reinventing the system overnight isn't a reality, there is a way to avoid software integration's pitfalls and time challenges. With the right tools, engineering organizations can cross the gaps between phases of the engineering lifecycle and work together to field solutions faster for the Warfighter.

The Problem

A large government prime contractor for the US Department of Defense (DoD) was tasked with building an autonomous aircraft that can be quickly, seamlessly configured to respond to new missions for the US Air Force (USAF). To meet the USAF's vision, the aircraft would need to swap and replace components between missions and across multiple systems to support the teaming of manned and unmanned aircraft in a forward deployed fight.

With this challenge presented to them, the contractor approached Tangram Flex (Tangram) with a question: Was there a way to rapidly generate interfaces that could translate between a classified messaging standard used by the USAF and an open DoD standard? These interfaces would have to enable faster integration of off-the-shelf technologies and avoid any issues of vendor lock. The contractor was trying to create interfaces, but generating the interfaces could take months or even a year of handwriting code, and it was difficult to prove the system's security and correctness.

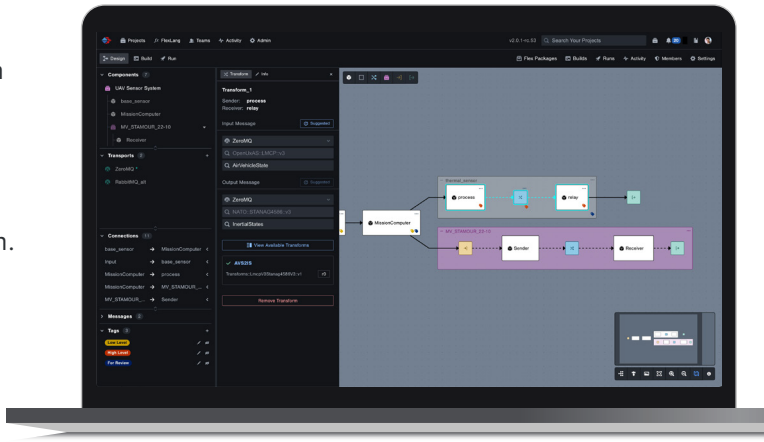
The contractor needed a partner with expertise in software integration and system interoperability. To be successful, they also needed a solution they could use in the future on their own, since the Air Force expects its contractors to deliver mission-critical updates quickly and persistently. With the right solution and partnership with Tangram, the contractor intended to show its customer that they could meet — and exceed — that expectation.

Our Approach

Our team began by understanding exactly what the contractor required. Software engineers at Tangram Flex worked closely with their engineering team to clarify the key challenge areas they faced;

- **Reusability of system components**
- **Difficulty reconciling system models with software interface code**
- **Manually writing integration code and translating between messaging standards**
- **Specialized approaches required to apply assurance and analysis tools to code**
- **Barriers to DevSecOps implementation**

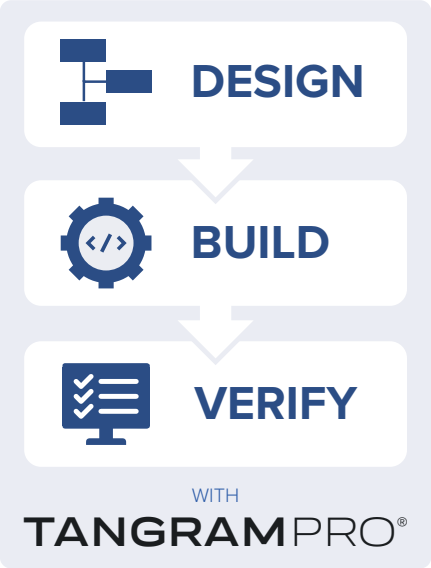
In partnership with the contractor, the Tangram Flex engineering team identified ways that our software integration platform, Tangram Pro™, could be leveraged to solve the identified problems. Together, it was determined a component library was needed where system engineers and software developers could share design requirements and develop code in one place.



Using Tangram Pro, the teammates were able to quickly establish a library of common and reusable components which promoted understanding between the system and software engineers. Tangram and the teammate determined they also needed an efficient way to produce the interface code required for the reusable components to exchange information. Within Tangram Pro, Flex language was leveraged to develop transforms between disparate message sets that allowed the components to work seamlessly against the standards. The platform made it possible to automatically generate the software interface that allowed the contractor's engineering team to connect components together without manual work and to receive readable, validated for correctness, user-owned outputs of the code. The final task included integrating Tangram Pro directly with the contractor's existing engineering pipeline for delivering updates at the point of need. This prompted Tangram Flex to provide DevSecOps integration of their platform with GitLab, GitHub, and Bitbucket. These integrations allow users to connect Tangram Pro™ directly to our teammates' delivery pipelines so that generated code could be automatically delivered for deployment without any custom work.

The Results

The contractor, leveraging the partnership with Tangram and our tool Tangram Pro, was able to prove their ability to give the USAF what it needed: confident delivery of rapidly reconfigurable autonomous systems.



Why does this matter?

The work of connecting the message sets and building a component library in Tangram Pro now enables the contractor to continue to get the Air Force – and ultimately, the warfighter — the high-powered, cutting edge technology they need in a much shorter time frame. Using a software integration platform also helps the contractor, and Government, test and sustain software components as user-owned outputs, which overcomes the vendor lock that has traditionally blocked them from rapidly integrating new technologies. They can meet the Modular Open System Architecture (MOSA) mandate and have a trusted partner in Tangram to continue to support their interoperability and integration challenges.