

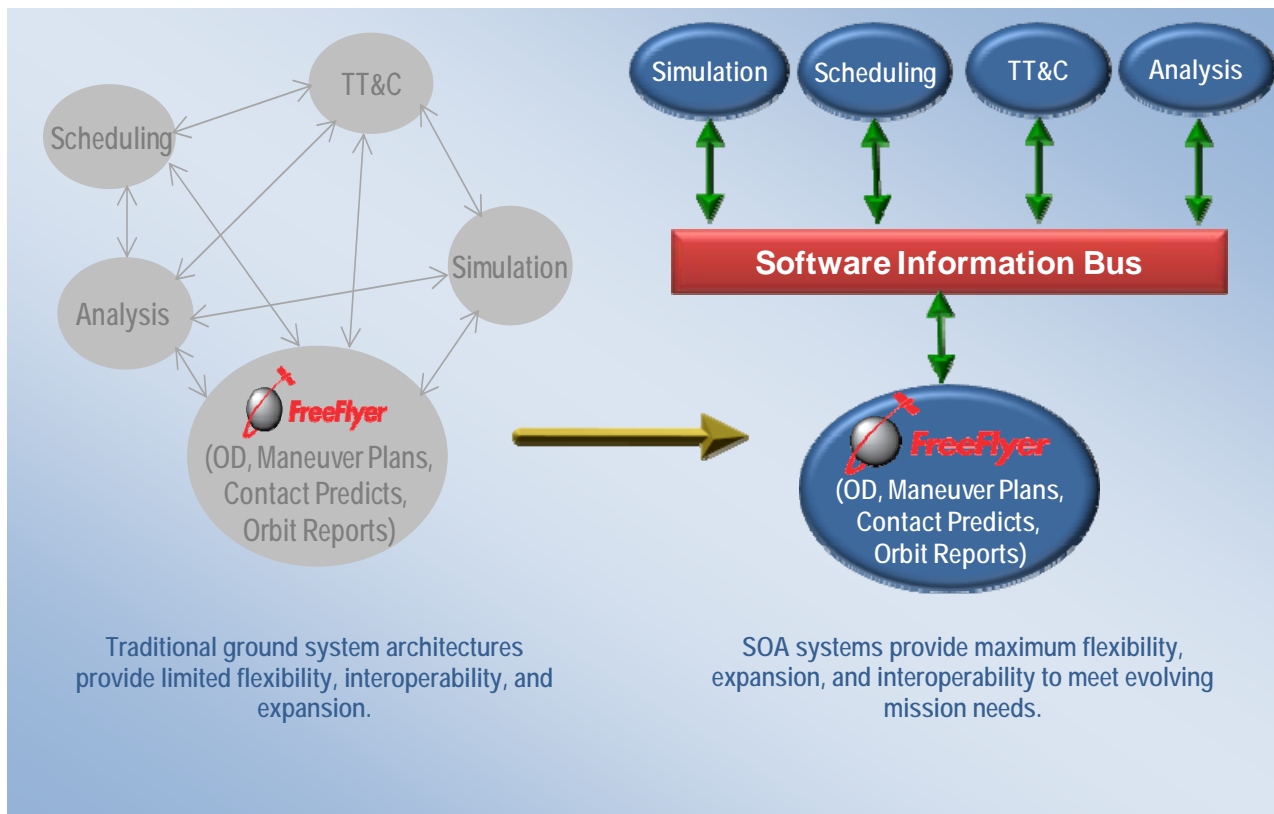


a.i. solutions

Service Oriented Architecture (SOA)

The need for developing flight dynamics systems that are flexible, expandable and provide a high level of interoperability and readiness is becoming increasingly important among mission planners. As spacecraft mission lifetimes continue to grow, and the space environment they operate in continues to evolve, ground system architectures need to be scalable and flexible to meet tomorrow's challenges.

One solution is to develop ground systems in an open or Services Oriented Architecture (SOA). Using a SOA enables a group of loosely coupled "services" to communicate with each other. These reusable services have well-defined, platform-independent interfaces. SOA places critical applications into an enterprise to allow different users to share functionality and information. This concept allows different architectures and platforms to be integrated and move information out of a stovepipe architecture and move legacy applications into a more interoperable environment.



For satellite ground systems, SOA capability allows for upgrades to core "services" such as orbit determination and maneuver planning, or for the incorporation of entirely new "services" not envisioned at the beginning of the mission. The services can essentially be "plugged in" to the ground system as the mission evolves.

a.i. solutions has capabilities that fulfill the SOA concept for satellite flight dynamics systems. For the past thirteen years **a.i. solutions** has contributed to evolving satellite ground system architectures to satisfy multiple missions. In particular, our experience of providing orbital and attitude dynamics analysis, capabilities, components, services, products and support, including operational on-console support, have provided us an opportunity to be proponents of innovative architectural flight dynamics system components and interfaces.



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a.i. solutions is currently leading the re-engineering of the Flight Dynamics Facility (FDF) at Goddard Space Flight Center. The FDF is a multi-mission satellite operations facility that provides routine orbit determination and navigation operations for 33 unique satellite missions, in addition to anomaly resolution and launch and early orbit operations support for ELVs, ISS and shuttle, and other spacecraft payload missions. The re-engineering effort will replace the stovepipe architecture currently in place in the FDF with a SOA system based on Goddard's GMSEC technology, increasing the capability to bring new missions and services into the facility. This effort includes system design, software/application development and integration. The most challenging part of which is the incorporation of legacy applications; which require an **a.i. solutions**-developed SOA adapter as well as an application specific adapter.



The transition of the Tropical Rainfall Measuring Mission (TRMM) flight dynamics system to GMSEC technology has increased efficiency, lowered costs, and corrected errors. generated by the legacy system.

a.i. solutions is the developer of FreeFlyer, a COTS software application for use in satellite mission analysis, design and operations. FreeFlyer offers complete space mission analysis and mission planning in one integrated tool. The FreeFlyer architecture can accept input from various sources, such as Database and Telemetry & Tracking Data. The user interacts with FreeFlyer's Core Application Engine via the FreeFlyer Application GUI and FreeFlyer Mission Plans (MPs). Functionality is extended through the use of the Matlab API, Sockets, and FreeFlyer Extensions. The Extensions can be designed to interface with the different types of SOA middleware. This allows FreeFlyer to interact with external resources using SOA messaging systems, direct library calls, and command line interfaces. FreeFlyer's plug-and-play functionality, coupled with our experience integrating and using other COTS/GOTS and custom applications, enable us to develop dynamic, stand-alone, solutions that can integrate with, or enhance, existing tools in our customer's desired architecture.

Inherent in a SOA design system is the ability to provide a common set of tools used for tasks common to all programs while simultaneously providing mission specific capabilities applicable to individual spacecraft or spacecraft families. Utilization of common processes shared across programs provides benefits of consolidation, information sharing, interoperability, and reduced O&M costs. Mission planners and orbit analysts benefit from increased efficiency and productivity obtained through standardized user interfaces, graphical displays, output reports, and a common look and feel spanning all programs.

a.i. solutions can bring SOA-ready solutions to your flight dynamics systems.

For more information, contact:

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