



a.i. solutions' FreeFlyer® Reduces Launch Window Analysis Time by 99%

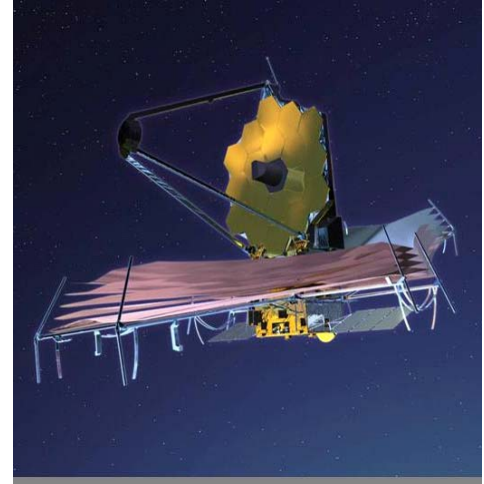
The Customer
NASA's James Webb Space Telescope Project

The Challenge
The comprehensive determination of a go/no go launch decision for the JWST is a labor intensive process. The launch window must be precisely balanced to achieve optimal science return while also maintaining the health and safety of the spacecraft.

The Solution
Automate the launch window analysis process to enable increased engineering cycles and reduce processing time.

The Results
The JWST project team is now empowered to make the most well-informed, well-balanced go/no go launch decisions for JWST.

The James Webb Space Telescope (JWST), successor to the Hubble Space Telescope, is scheduled for launch in 2011. As a NASA flagship mission, the success of JWST is a national priority. However, designing a successful mission is no easy task. One of the central requirements for success is knowing when to launch. Until recently, performing this type of launch window analysis was a labor- and time-intensive process with a daily case taking 8 or more hours to produce. This immense labor cost often limited the amount of data used to determine optimal launch windows. **a.i. solutions'** scientists and engineers responded to this challenge of improving the process for producing and analyzing launch window determination data.



With the help of **a.i. solutions**, the JWST project has experienced dramatic improvements in launch window determination analysis. Using *FreeFlyer*®, **a.i. solutions'** COTS flight dynamics tool, as the basis for automation, **a.i. solutions** developed and implemented enhancements to the process that addressed the challenges in launch window determination for JWST. For this project, **a.i. solutions**:

- **Developed high-performance algorithms that produced launch window determination cases 480 times faster than previous methods.** Using *FreeFlyer*®, analysts were able to produce a daily launch window case in 3 minutes as opposed to 8 hours using previous methods.
- **Enabled analysis that could not be done previously.** By mapping out huge, never before analyzed areas of the trade-space, scientists and engineers are able to strike a balance between achieving science goals while maintaining the health and safety of the spacecraft. These data have figured into the systems engineering in many levels including the selection of candidate trajectories that improve telescope performance, budgeting of the fuel and propulsion sizing, and project scheduling.

The Results

The analysts and scientists on the JWST project are now able to produce launch window determination analyses results orders of magnitude faster than with traditional methods. Launch windows have been identified for every day for the year 2011, and analysis has progressed to selecting out subsets that meet mission requirements. The faster processing of data provided by **a.i. solutions** and *FreeFlyer*® allows more engineering cycles to be accomplished, enabling well-informed, well-balanced go/no-go decisions based on logically consistent data.

More data. More engineering cycles. More options. Better decisions.

a.i. solutions is proud to be a part of the JWST Team.