



Aggregate Risk Tool for Human Space Flight

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Technology Taxonomy Area (TX): 11.5.2 Tools and Methodologies for Performing Systems Analysis

TRL: Start 3 / Current 4

FY21 ICA PROJECT OVERVIEW

This project utilized Data fusion capabilities developed from the 2020-2022 Information Fusion (IFDA) IRAD to enhance functionality of a Human Spaceflight (HSF) Aggregate Risk Product developed by the JSC Flight Safety Office. The tool compiles and presents risk data from multiple Program and Commercial Provider vehicles to provide a holistic assessment of residual risk to Program Managers and Technical Authorities prior to HSF Launches. The aggregation or coupling of risks from multiple sources (Examples: PRA, variances, anomaly data bases, Program Risk Management data bases, technical review board minutes, Hazard Analysis, etc.) when analyzed, identify potential areas of elevated risk in components, systems or mission phases that would otherwise be undetected by non-integrated program risk management tools and possesses.

INNOVATION

This project developed an interactive user interface / dashboard that displays / integrates multiple HSF Program risk data sources to identify potential areas of elevated risk across Launch Vehicle and Spacecraft systems that require more in-depth engineering analysis prior to launch. The graphical projection, when “clicked on”, displays contained data, including origin of data.

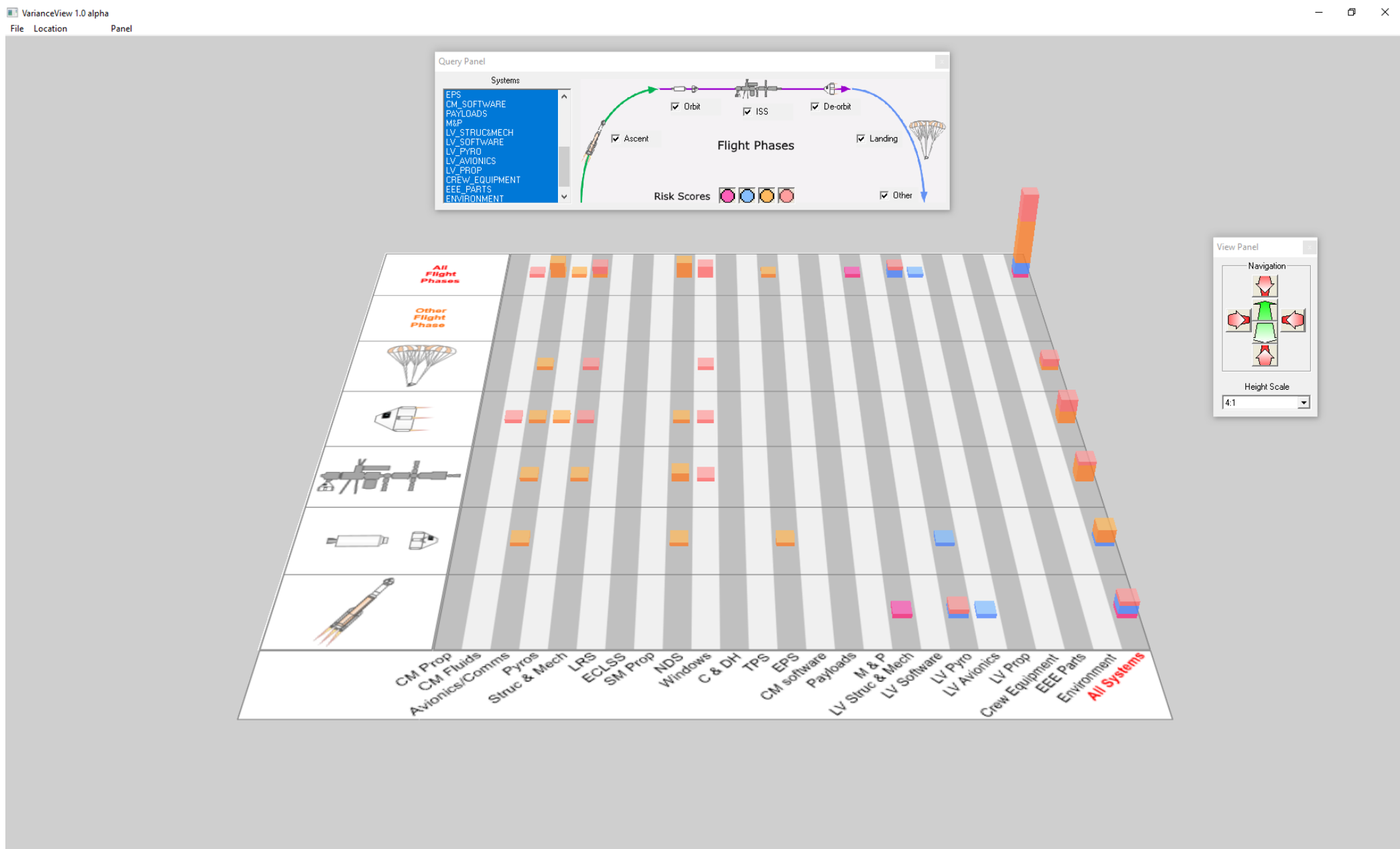
OUTCOME

The project successfully:

- Developed a working prototype that displays occurrences of elevated risk across vehicle systems and flight phases
- Identified, accessed, and evaluated additional available risk data sources, including Material Review Board dispositions and GIDEP alerts, that will be added as enhancements during future tool upgrades. These sources have not been analyzed previously due to the amount of time required to analyze this substantial amount of data.

INFUSION SPACE / EARTH

- The Commercial Crew Program (CCP) Chief Safety & Mission Assurance Officer (CSO) has accepted this tool to increase the identification of residual risk. CPP has provided access to Program and commercial partner risk data sources, and capabilities to be incorporated into future tool enhancements
- Conducted demonstrations for the following customers and stakeholders: CCP CSO, NASA SMA Division Management,, JSC SMA JTWG representative, SAIC Program and Corporate Management
- Upcoming demonstrations planned for the Common Exploration Systems Development (CESD) CSO, Artemis Campaign Development (ACD) CSO, ISS CSO, and the JSC SMA NADIR CB



Aggregate Risk Tool Data Display and User Interface
Note, data displayed is representative and not actual provider data.

PARTNERSHIPS / COLLABORATIONS

This project involved collaboration JSC the Safety & Mission Assurance, JSC Engineering Robotics Division, and the CCP CSO

FUTURE WORK

- Develop new proposal to enhance prototype through expansion to other HSF Programs, and additional risk data sources
- Work with all potential funding sources (OSMA/NA Resources, IRAD, etc.) to identify useful capability additions and associated funding
- Incorporate additional program and additional commercial partner data sources into the CCP tool based on customer feedback
- Approach other programs outside of CCP to showcase capabilities of the tool
- Add capability to display, compare and trend data across multiple missions
- Adopt / modify tool for use on other Exploration Programs (Orion, Gateway, HLS) and ISS
- Develop enhanced data analytics through incorporation of Machine Learning and Artificial Intelligence techniques

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