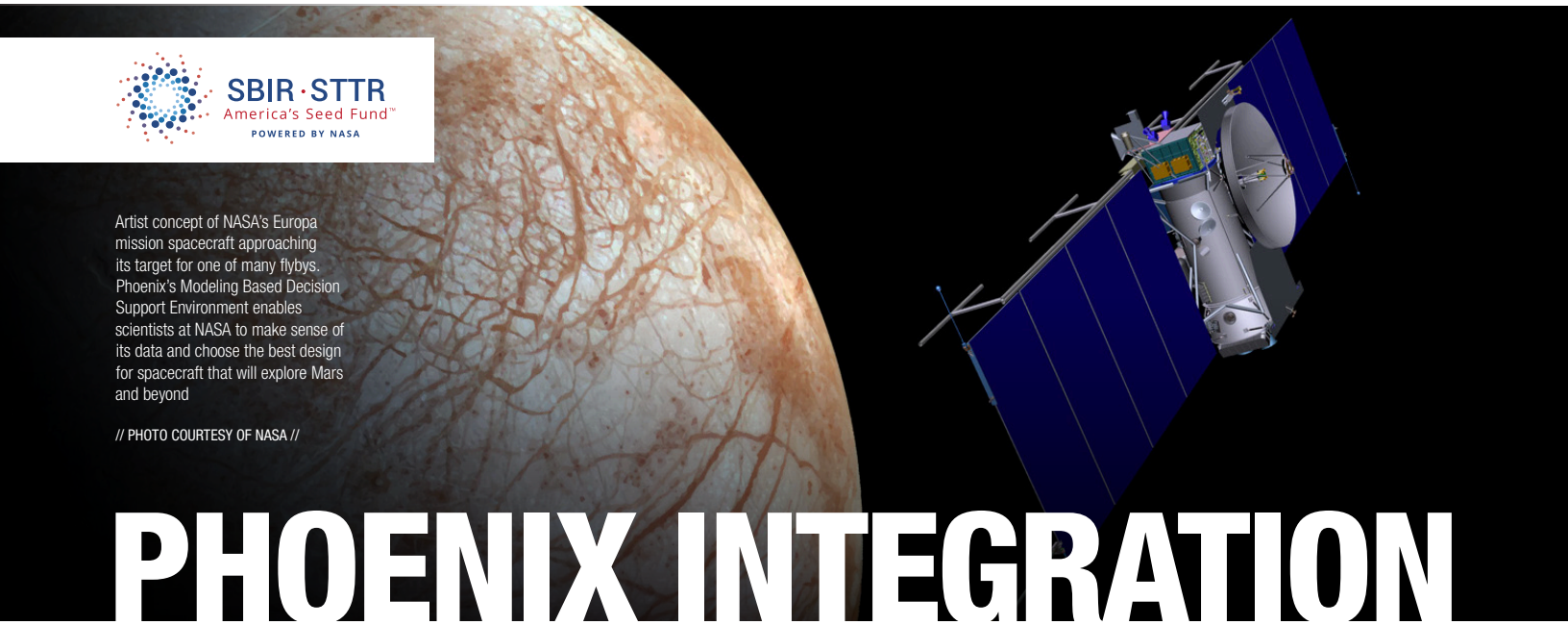

Artist concept of NASA's Europa mission spacecraft approaching its target for one of many flybys. Phoenix's Modeling Based Decision Support Environment enables scientists at NASA to make sense of its data and choose the best design for spacecraft that will explore Mars and beyond

// PHOTO COURTESY OF NASA //

PHOENIX INTEGRATION

Scientists and engineers at NASA are constantly inundated with raw data and numbers in an attempt to choose the best design option for future spacecraft. Since you can't design a space vehicle by looking at one engineering discipline alone, multiple components need to be considered simultaneously in order to select the best choice. What would be the most fuel-efficient option? Are there lighter materials that could be used? Which design would be ready to launch the soonest?

PROJECT
Modeling Based Decision Support Environment

MISSION DIRECTORATE
HEOMD–Human Explorations and Operations

PHASE III SUCCESS
$1 million in sales of its SBIR-funded ModelCenter® Design Space Visualization software to NASA, the Department of Defense, and commercial customers

SNAPSHOT
Virginia-based Phoenix Integration has developed a model-based software tool used by NASA and others in the commercial industry for engineering development, design and decision-making.

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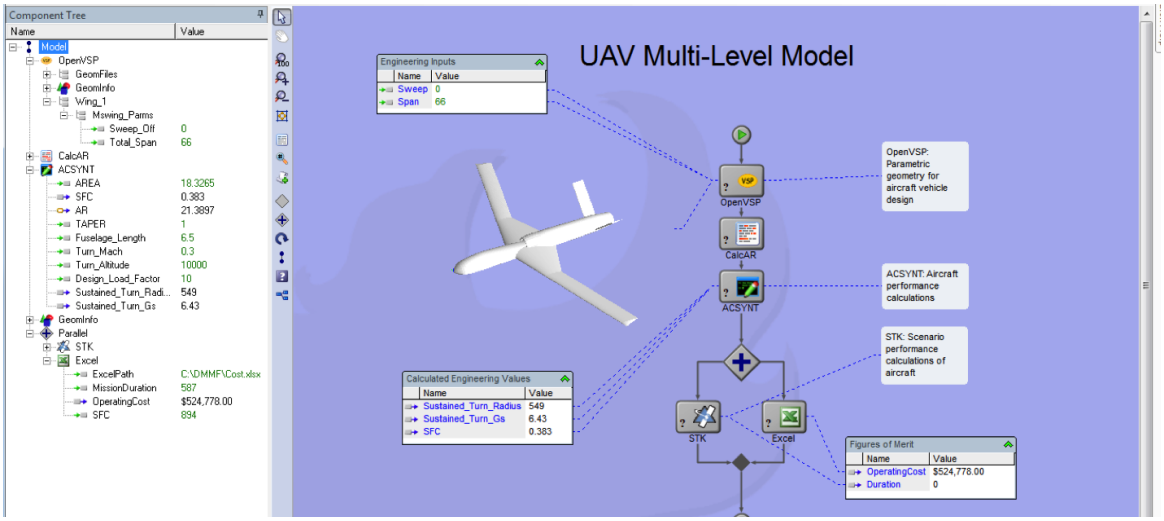
These are some of the questions that must be answered long before a vehicle is built and launched into space. Phoenix Integration, through the NASA Small Business Innovation Research (SBIR) program, has developed a means to deliver engineering information in a more coherent way. Acting much like the conductor of an orchestra, Phoenix coordinates the execution of existing NASA software tools and displays the resulting data in ways that help users make more informed decisions about design engineering. The technology can be used to accurately assess and trade off competing concepts for a wide range of mission and vehicle design initiatives.

"NASA uses our software if they want to simulate the behavior of a space probe or other complex vehicle," explains Scott Ragon, Director of Technical Business Development for Phoenix Integration. "This software takes existing simulation tools such as those that model orbital mechanics, G-load induced stresses and vibrations, launch costs, etc., and orchestrates and automates their execution. This generates a lot of engineering data. The key aspect is presenting this data to the engineers in a way that lets them make sense of it all."

During the Phase I portion of the SBIR project, Phoenix teamed with Penn State University, who had some very innovative tools for this project and were interested in partnering with Phoenix. NASA staff routinely assesses the profiles and designs of proposed missions and were able to use that expertise to gather and provide mission requirements to the Phoenix team, which was instrumental in developing a ModelCenter prototype. Phase II saw the development of a more comprehensive suite of prototype tools and the software went quickly from SBIR to success in the private sector – exemplifying the sort of commercialization that is sought after when using federal research and development funding.



RIGHT Phoenix's ModelCenter Design Space Visualization software helps scientists and engineers at NASA and the Department of Defense to determine the best design options for future spacecraft and aerospace systems.

"The technology that was funded under this NASA SBIR evolved into the product we sell today," says Andy Ko, Engineering Services Manager for Production at Phoenix Integration. "We prototyped everything in SBIR and used the supplemental commercial revenues to evolve and improve it over time."

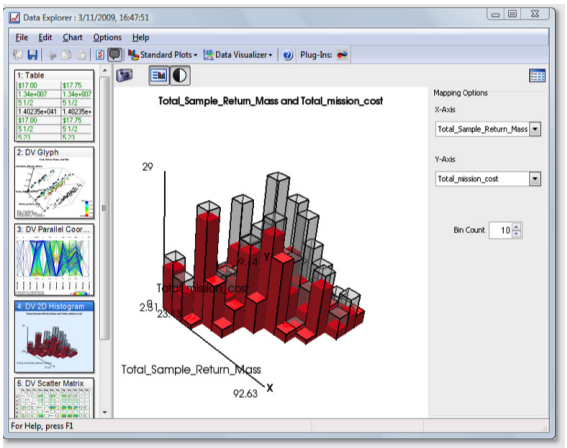
The resulting technology formed the basis for ModelCenter's® suite of design space visualization tools, and is included as part of the ModelCenter Explore module. Since ModelCenter's software integration, automation and design exploration tools streamline the design process for any complex system, the SBIR technology caught the attention of Lockheed Martin, Raytheon, Boeing, and Northrup Grumman; all of which are customers of Phoenix. French aerostructures leader Stelia also purchased ModelCenter to improve product quality and design. Stelia provides equipped fuselage aerostructures for all Airbus aircraft programs and the Bombardier Global 7000 and 8000 programs. Following a thorough testing phase focused on aerostructure stress and fatigue, Stelia proved ModelCenter's ability to share integrated processes throughout the engineering community and to improve the processes themselves by eliminating error due to manual translation.

"The technology that was funded under this NASA SBIR evolved into the product we sell today."

ANDY KO
ENGINEERING SERVICES MANAGER FOR PRODUCTION
PHOENIX INTEGRATION

The Department of Defense also uses ModelCenter for new aircraft and ship designs. At NASA, scientists and engineers at JPL, Ames Research Center, Glenn Research Center and Kennedy Space Center have all used the software to visualize design trade-offs and to share data with other users. Applications include aerodynamics, structures, multi-disciplinary design, propulsion, operations costing, advanced concepts, mission planning and design, and system modeling.

Today, Phoenix is working with NASA's Langley Research Center on continual improvements to the product suite. A recent addition to the software tool was ModelCenter® Organize, which is a digital library that enables engineers to capture, preserve, manage, share, and reuse engineering knowledge and data. Users may collaborate and share information with other team members and among stakeholders, as well as reuse engineering data on future projects.



A current Phoenix/NASA SBIR project is looking to expand on ModelCenter® by developing unique ways of further visualizing data, creating new methodologies to explore unknown design areas and democratizing shared analysis across programmatic and geographic boundaries. A representative system model is set to be tested in 2016.

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