



Simulating NASA Space Missions with Vdot™



THE CHALLENGE

NASA uses Virtual Missions to simulate mission processes and resource flows. Virtual Missions also helps to uncover issues and validate procedures and software prior to executing an actual mission. NASA needed to address the time, detail, and knowledge limitations of their traditional, paper-based approach. Doing so would enable NASA to develop higher-fidelity and lower risk mission plans with less effort and in less time.

THE BENEFITS

A team from NASA, Qualis and ESI streamlined the collection of mission events, task input/output, schedules and organization responsibilities into a web accessible database. The team then automated the transformation of the NASA database into several process visualization and simulation tools including a Vdot™ process management model which enables geographically distributed participants to walk through the virtual missions and ultimately execute and manage the actual mission.

Virtual Missions have historically been paper-based processes where the teams get together over a tabletop to identify mission events, task inputs and outputs, the mission schedule, and required resources. Unfortunately there are many limitations inherent in this methodology due to the time involved, the level of detail possible and the availability of the necessary participants.

In 2010 NASA's Marshall Space Flight Center and Ames Research Center collaborated with Qualis and ESI to build a suite of software tools to support server-based Virtual Missions. The goal was to produce better mission plans, more quickly.

The NASA solution has 5 key components:

1. Web accessible process database,
2. Defined format spreadsheets,
3. Macros to produce standard file formats,
4. Suite of process/requirements tools,
5. Models & reports from the tool suite.

The web database provides a means of crowd-sourcing data collection for the mission processes. The collection of tools provides a variety of ways to view or analyze mission parameters. Once an initial crowd-sourced mission is ready, the Excel macros automatically produce a Vdot™ process model ready for distributed, human-in-the-loop Virtual Mission Simulation.

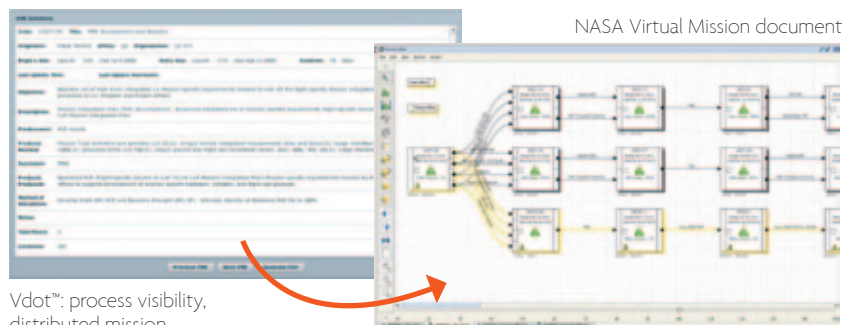
One key advantage is that the distributed Virtual Mission participants need little to no Vdot™ training. When a human task is ready, the participant receives an e-mail with a link to an interactive web page for the task. Once done, Vdot™ then orchestrates any subsequent tasks, human or automated.

The solution produces better mission plans through rapid round-trip process engineering. Vdot™ orchestrates the key activities: data capture, process analysis/improvement, simulation, and metrics gathering.

"Multiple iterations of this engineering process enable organizations to continuously improve their businesses and produce reusable process models for developing new business processes."

"The Vdot™ approach allows the participants to be geographically remote, and after refining the process models via the human-in-loop simulation, the system can evolve into a process management server for the actual process."

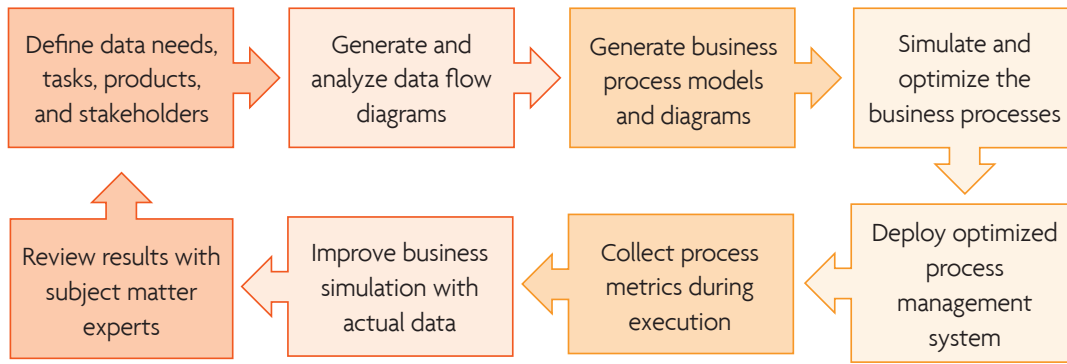
"Vdot's intuitive visual interface brings Virtual Missions to life by turning static, paper-based processes into active electronic processes that can be deployed, executed, managed, verified and continuously improved."



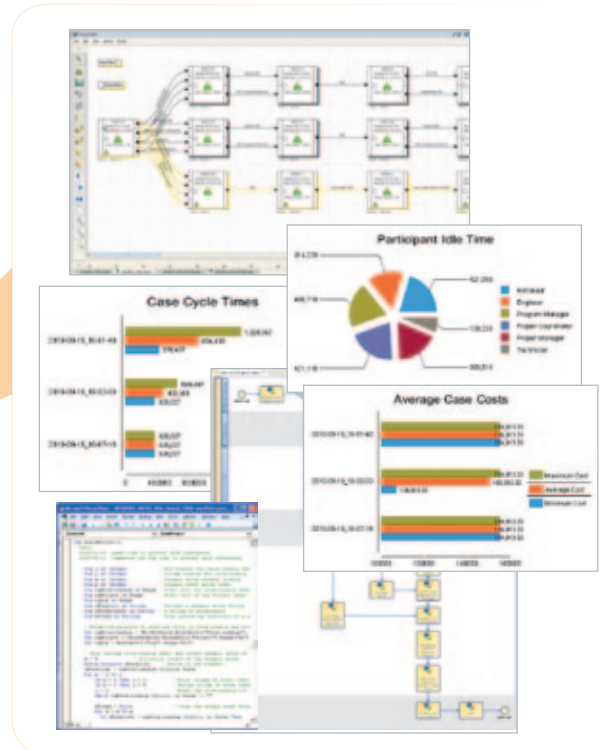
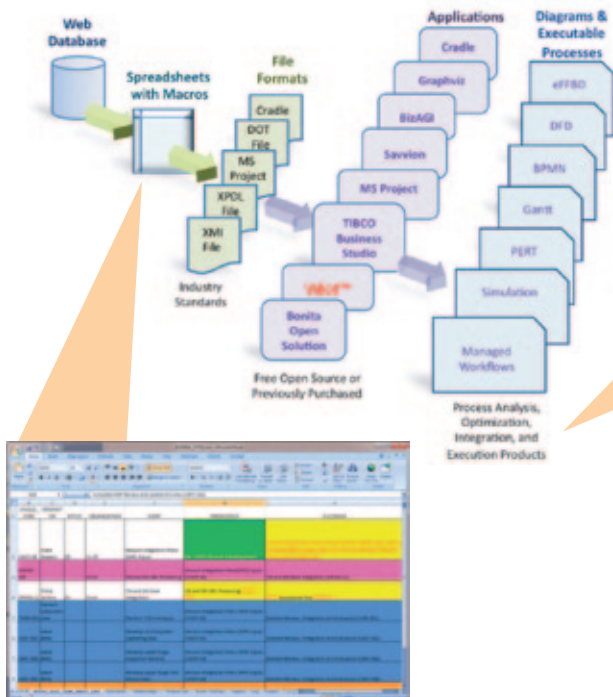
Vdot™: process visibility, distributed mission simulation and execution

Virtual Missions produce better mission plans

NASA round trip process engineering with Vdot™ Virtual Missions



NASA Virtual Mission tool suite: easily integrated with Vdot™



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For more information, please visit: www.esi-group.com/vdot

ABOUT NASA

The National Aeronautics and Space Administration (NASA) is an Executive Branch agency of the United States government, responsible for the nation's civilian space program and aeronautics and aerospace research. NASA's mission is to "pioneer the future in space exploration, scientific discovery and aeronautics research." NASA Headquarters is located in Washington D.C. For further information, visit www.nasa.gov.

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Qualis Corporation is a high technology business providing technical services in the areas of engineering analysis, design, testing, and support services to both commercial and Government customers. For further information, visit www.qualis-corp.com.

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ESI is a pioneer and world-leading provider in virtual prototyping that takes into account the physics of materials. ESI has developed an extensive suite of coherent, industry-oriented applications to realistically simulate a product's behavior during testing, to fine-tune manufacturing processes in accordance with desired product performance, and to evaluate the environment's impact on performance. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping, thus eliminating the need for physical prototypes during product development. The company employs over 800 high-level specialists worldwide covering more than 30 countries.



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