

INVESTIGATION ORGANIZER

ENGINEERING
FOR COMPLEX
SYSTEMS



CHALLENGES

Current NASA investigations of mishaps and anomalies struggle to deal with:

- geographically distributed investigation teams
- diverse, extensive information that must be organized, analyzed, and shared
- no standard and efficient methods or tools for information storage, management, dissemination or analysis
- lack of formally trained team members for mishap investigation
- lack of learning from past anomalies and mishaps by broader NASA constituents

OBJECTIVES

- Enable systematic investigation processes through improved storage and structuring of information gathered and analyzed by distributed teams
- Help optimize investigation directions and tasks by tracking the investigation state through system framework and causal models

CUSTOMERS & COLLABORATORS

Columbia Accident Investigation Board
CONTOUR Mishap Board
HELIOS Mishap Board
IMT tools will be broadly applicable to the full spectrum of Agency customers, and to customers external to the Agency; particular focus to NASA Engineering Safety Center. DoD and NTSB have expressed interest in the tool. Xerox is currently commercializing this tool.

CONTACT INFORMATION

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IMPACTS

Through the fusion of accident investigation methodology with collaborative, information sharing technology, the Investigation Organizer tool enables key elements of successful investigation:

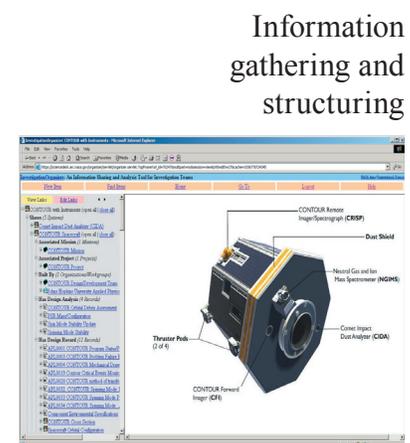
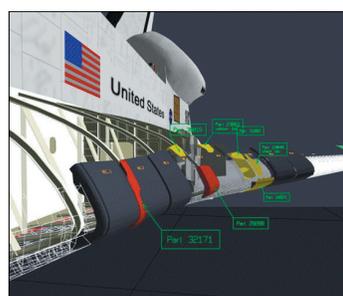
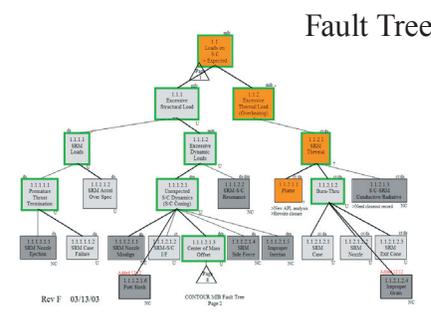
- gathering and sharing disparate types of information
- identifying the relationships between pieces of information
- understanding the significance of such relationships
- preserving the evidential chain
- providing a systematic workflow to improve investigation integrity & efficiency

With investigations like SwissAir 111 consuming 4.5 years and \$40 million dollars and future investigation likely to increase in size and complexity, tools that can improve the effectiveness and efficiency of investigators and investigative teams are not only desirable but vital.

TECHNOLOGIES USED

The tool enables the first element through a web-based application that can be accessed by distributed teams to store and retrieve any type of digital investigation material in a secure environment. The second is accomplished by making the relationships between information sources explicit through the use of a semantic web—a structure that literally allows an investigator or team to “connect -the-dots.” The third element, the significance of the correlated information, is established through causality and consistency tests using a number of different methods embedded within the tool, including fault trees, event sequences, and other accident models. And finally, the evidence gathered and structured within the tool can be directly, electronically archived to preserve the evidence and investigative reasoning.

This initial architecture provides the foundation to develop intelligent software agents that can assist in the investigation process by testing hypotheses, suggesting optimum courses of investigation and other decision support activities.



Columbia wing digital reconstruction