Information Management challenges from the Aerospace Industry

Suryanarayana M. Sripada

The Boeing Company
P.O.Box 3707, MC 7L-44
Seattle, WA 98124-2207
USA
surya.sripada@boeing.com

Abstract

The aerospace industry poses significant challenges to information management unlike any other industry. Data management challenges arising from different segments of the aerospace business are identified through illustrative scenarios. These examples and challenges could provide focus and stimulus to further research in information management.

1. Overview

The aerospace industry poses enormous challenges to information management. An example of such a challenge is in the area of long-term data storage and retention. Government regulations require that the design and maintenance data of each airplane be maintained for a hundred years in order to guarantee the safety and maintainability of the airplane. Every airplane contains millions of parts designed and produced by thousands of suppliers, used and maintained by hundreds of customers. The data needs to be stored in such a way that it survives changes in operating system, hardware, application software and storage media technologies over a hundred years. It is obvious that no industry has ever solved this problem - computing technology itself has not been in existence for a hundred years. There are no IT vendor products that satisfy these requirements. In fact, a solution to the problem would involve both a technology component as well as an information management policy component that needs to be enforced by the organizations owning the data.

The sheer scale and volume of data, the variety of data sources and formats, the number of data owners, and the geographic distribution of the suppliers and consumers of data impose real challenges. More often than not, IT vendor products need to be extended with advanced solutions to meet the requirements. As an example, distribution of Boeing's product data exposed the need for distributed asynchronous transactions not supported by any COTS database products [1]. Similarly, data warehousing techniques need to be extended to meet additional challenges in a demanding aerospace environment [2].

Advanced temporal database technology has been applied to Air Traffic Control and Flow Management [3,4]. Distributed resource management in very large enterprises requires temporal database technology as well as Artificial Intelligence and Operations Research techniques. This area is mostly unexplored.

The requirement to provide the "right information, at the right time, to the right people, in the right context, in the right format" brings forth many information management challenges. Integration of database and collaboration technologies is still a largely unrealized goal.

Integrating information from heterogeneous sources continues to be a formidable challenge. Virtual data warehousing and semantic web technologies are promising trends in this area [5,6,7].

The military use of airplanes introduces further requirements where the product boundaries are extended by information and communications technologies to link the airplane with a global intelligence and information infrastructure.

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This presentation identifies new information management challenges from various segments of the aerospace industry: Product Data Management, Distributed and Collaborative Design, Supply Chain Management, e-Business and e-Commerce, Production Planning and Control, Maintenance and Support, Battle Management C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance), and Information Assurance.

2. References

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