BOEING INTEGRATES DATA TO ENABLE DIGITAL TWINS

With Model-Based Systems Engineering – and MarkLogic – Boeing gets fast answers to improve airplane costs, safety, and time to delivery.

Developing complex products = Data challenges

Boeing is the world's largest aerospace company and leading manufacturer of commercial jetliners and defense, space, and security systems. A top U.S. exporter, the company supports airlines and U.S. and allied government customers in 150 countries.

With over 500,000 databases, Boeing faced multiple data-oriented challenges. They struggled with data provenance, governance, and an extreme lack of efficiency. They needed quick answers for questions like "if we use a different engine, will we get the same range?" or "in a system failure will the emergency systems deploy?" But this is hard when there are thousands of customer options, several million parts, and a high production rate. The variable data structures and inconsistent naming across organizations made even simple questions such as is "x" bolt in "y" plane very difficult to answer.

Boeing decided to use model-based systems engineering (MBSE) as a methodology. With MBSE, engineering teams have a digital representation of everything involved in the systems and parts to create a product – including documentation on the functional requirements, the design intent, the components, and how the parts work together for the device – all in one place. MBSE eliminates the inefficiencies in "paper trail" systems where knowledge is exchanged and stored using disconnected emails, slides, PDFs, and spreadsheets – all from different parts of the business.

The company also needed to ensure that they maintained the highest levels of security – including limiting access to sensitive data within the organization to only those with the "need to know."

> **"** We wanted the solution to be scalable and to keep all of our historic data and look back at any point in time to learn from it."
>
> —Developer, Boeing

MarkLogic flexibility delivers fast results

The MBSE project uses Boeing's Unified Information Management (UIM) platform, where MarkLogic serves as a metadata repository. UIM lets Boeing grab any data they need and build APIs for various business uses.

Boeing initially approached the problem of mapping their data by trying to create a huge model of all the data in the company. With MarkLogic, they could start with the data they need to make the most impact, and implement that data in a useful way. They can then add more data and adjust the model when necessary.

After a successful pilot, Boeing moved to implementing MarkLogic attribute- and role-based security, using metadata with security clearances for individuals as well as documents so the company can securely share information.
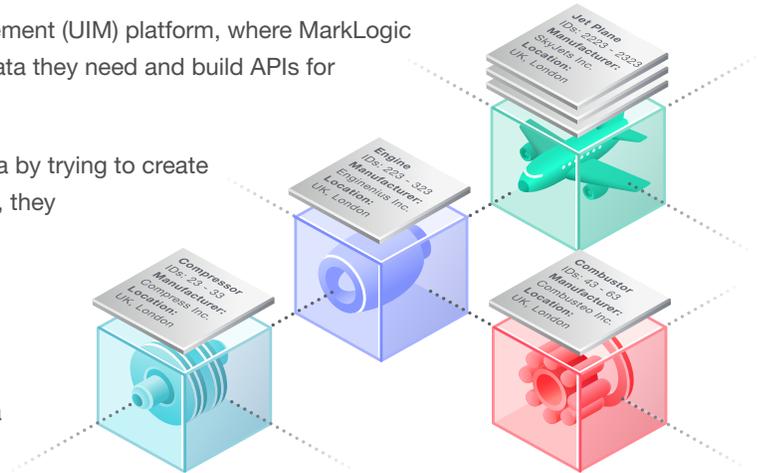
Building more planes and building them right

When building a plane with over six million parts, the engineering team can quickly understand how a tiny change in a requirement impacts the delivery of the whole product. This is incredibly valuable in terms of time, money, and safety.

What were the benefits?

- **Fast** – Complex analysis can be run in less than an hour versus a day or more
- **Agile** – Adaptability for new source data
- **Secure** – Faster, safer data sharing to support business growth
- **Success** – Centralized knowledge repository that 100+ engineers can use at a time
- **Advanced** – Instead of dispersed data that requires manual curation, tracking a paper trail, or finding a specific subject matter expert, data from all points in time can be queried in one repository

Boeing will now be able to do things that were previously impossible, thanks to MBSE – powered by integrated data in MarkLogic.

MarkLogic unleashes the power of your data

MarkLogic's Data Hub Platform empowers our manufacturing customers to more quickly achieve a unified, 360° view of their data – at less cost. Find out why leading manufacturing organizations trust MarkLogic to help them deliver innovative products, increase the value of their data, and gain a competitive edge.

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