

Value Driven Engineering Data Analytics and Audit System

Steve Kumpf,
Manufacturing Engineer

Ben Naylor,
Manufacturing Engineer

GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2018



ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING

ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING



Biography

Global Product Data Interoperability Summit | 2018

Steve Kumpf

Steve began his professional career as a manufacturing engineer with the former Global Aeronautica (GA). During that time, Steve had many roles including: ME Lead for the Wing to Body Fairing commodity; ME Core Team Lead; 1 year Temporary Manager for ME Core. When Boeing officially acquired GA in 2009 (Boeing South Carolina established), Steve was instrumental in helping GA transition to Boeing systems, processes, and tools during the "Get to Common" project. In his current role, Steve is working for Production Engineering and leading BSC in the 2nd Century Enterprise Systems (2CES) initiative. Steve holds a Bachelor of Science in Mechanical Engineering from the Rochester Institute of Technology (RIT), and also a Masters of Business Administration from RIT.



Ben Naylor

Ben Naylor is a Manufacturing Engineer at The Boeing Company on the 787 airplane program. In 2014, Ben relocated to South Carolina and joined the Final Assembly Derivatives team as the lead for 787-10 development. Using the skills and knowledge gained during the -9 development program, Ben led the -10 Final Assembly ME team to a successful introduction of the next 787 derivative. Ben was named Boeing South Carolina 'Engineer of the Year' for 2015 for his efforts leading this team. Prior to starting with The Boeing Company in 2010, Ben worked as an application engineer for Wastech, an industrial waste treatment system company, and as an electrical engineer for California Instruments, a programmable AC and DC power supply company. Ben graduated cum laude from Bloomsburg University of Pennsylvania in 2006 with a BS in Electronics Engineering Technology.



Data Disconnected from Process

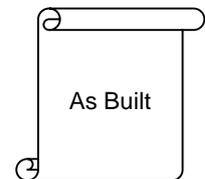
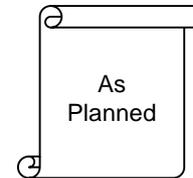
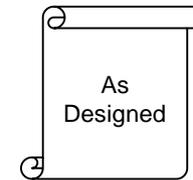
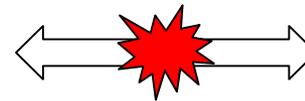
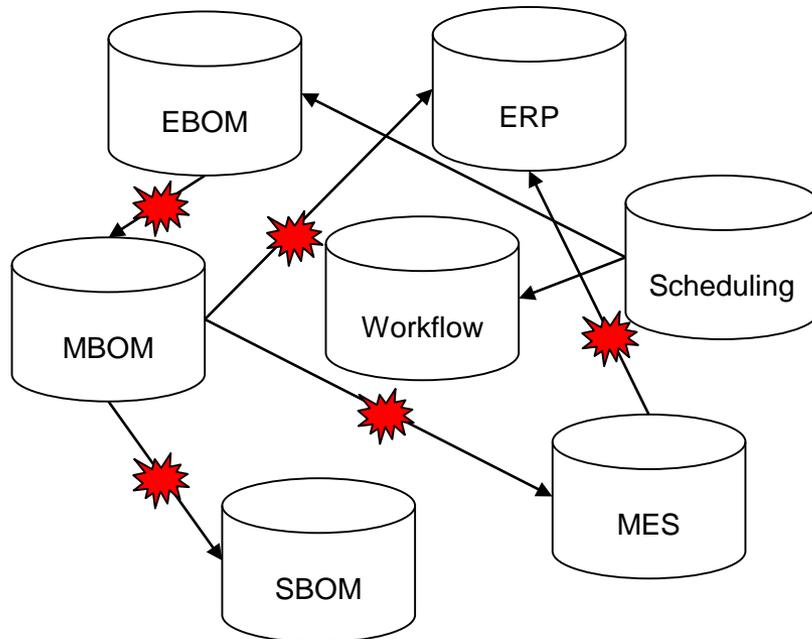
Global Product Data Interoperability Summit | 2018

Many independent software tools used throughout the value stream that are disconnect from one another and also do not enforce company established processes.

This opens up the risk of “bad data” being created and propagated through the value stream.

Software (COTS and Internally Developed)

Processes



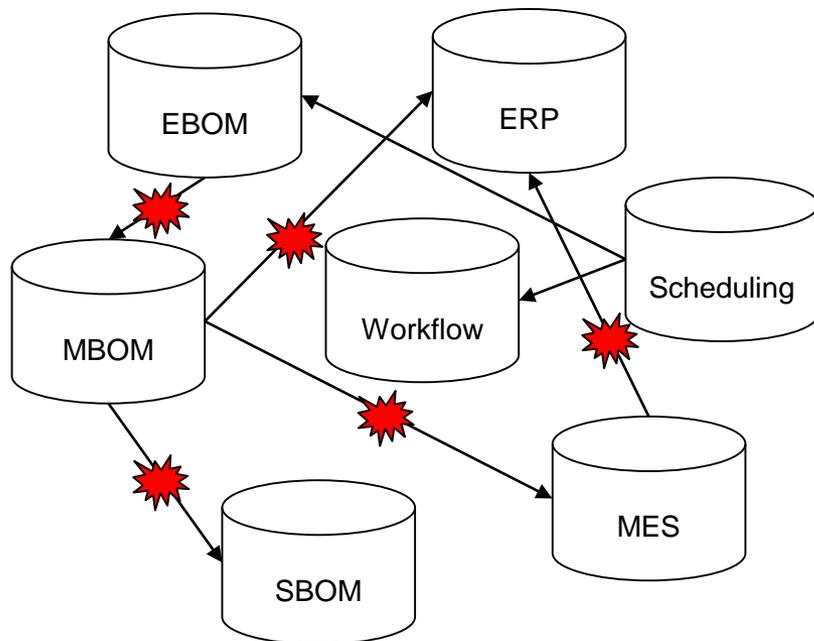
 Risk area for “bad data” creation

How do we prevent “Bad Data”?

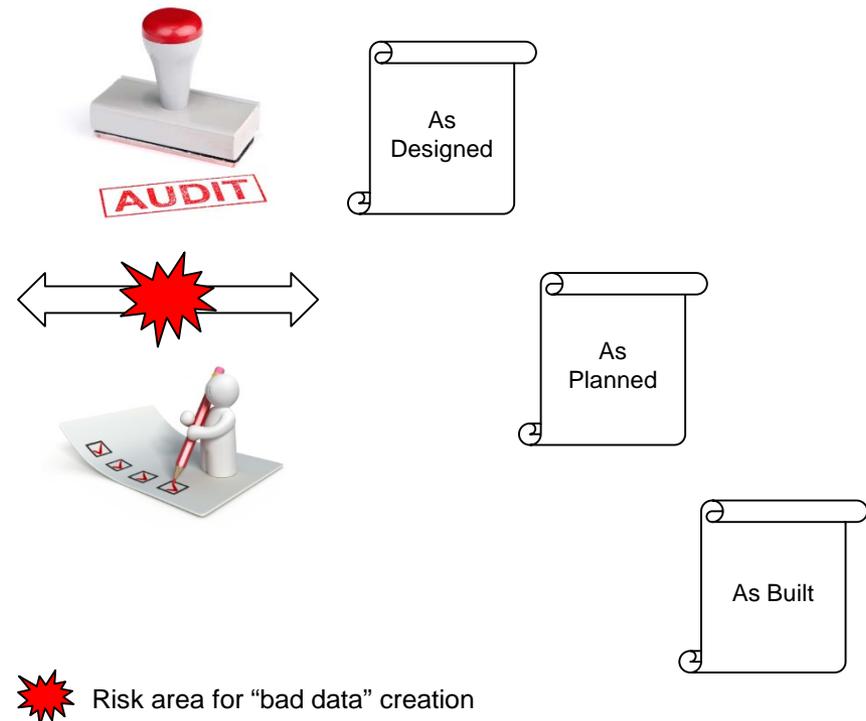
Global Product Data Interoperability Summit | 2018

Traditional methods of preventing bad data include software and process audits, usually performed manually for functional “core” personnel.

Software (COTS and Internally Developed)



Processes



 Risk area for “bad data” creation

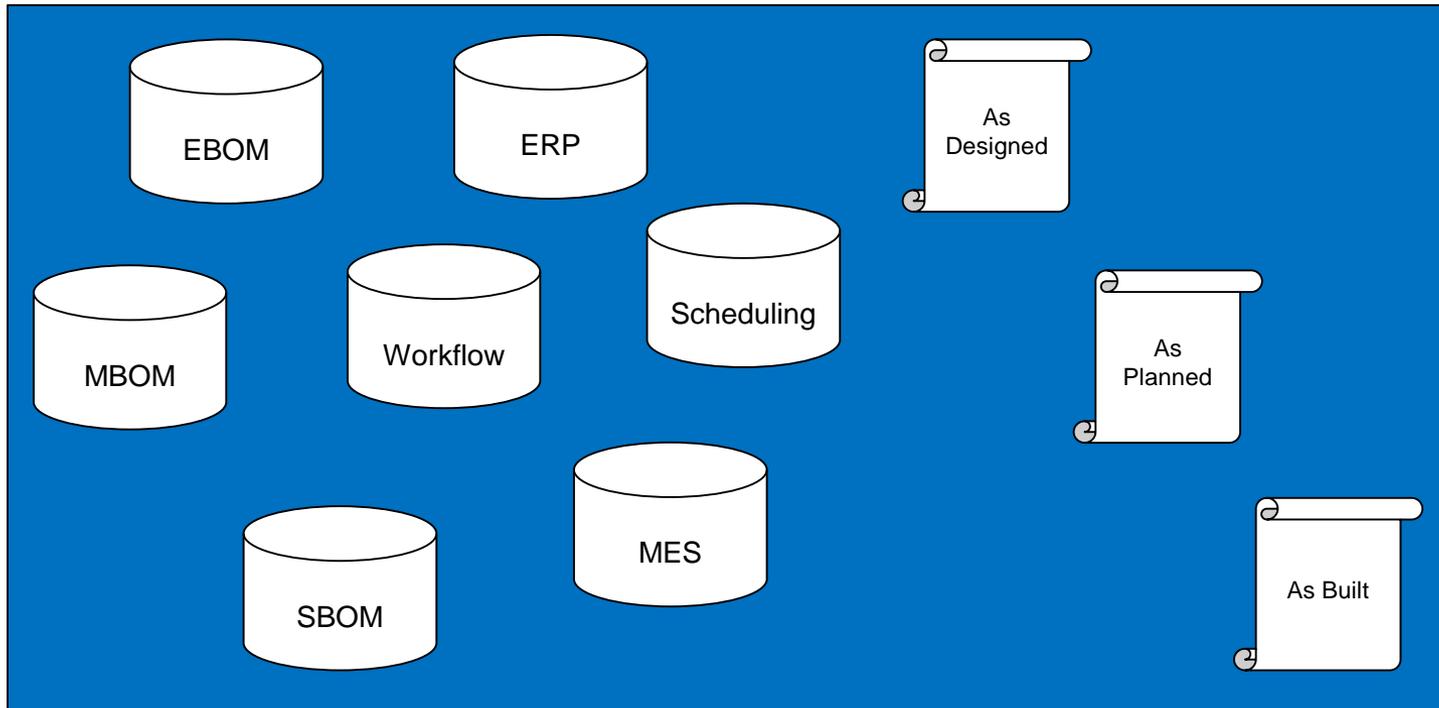
How do we prevent “Bad Data”?

Global Product Data Interoperability Summit | 2018

Ideal Solution

Stand alone software functionality would be connected and not allow users to violate published business processes.

Connected software tools that programmatically enforce business processes



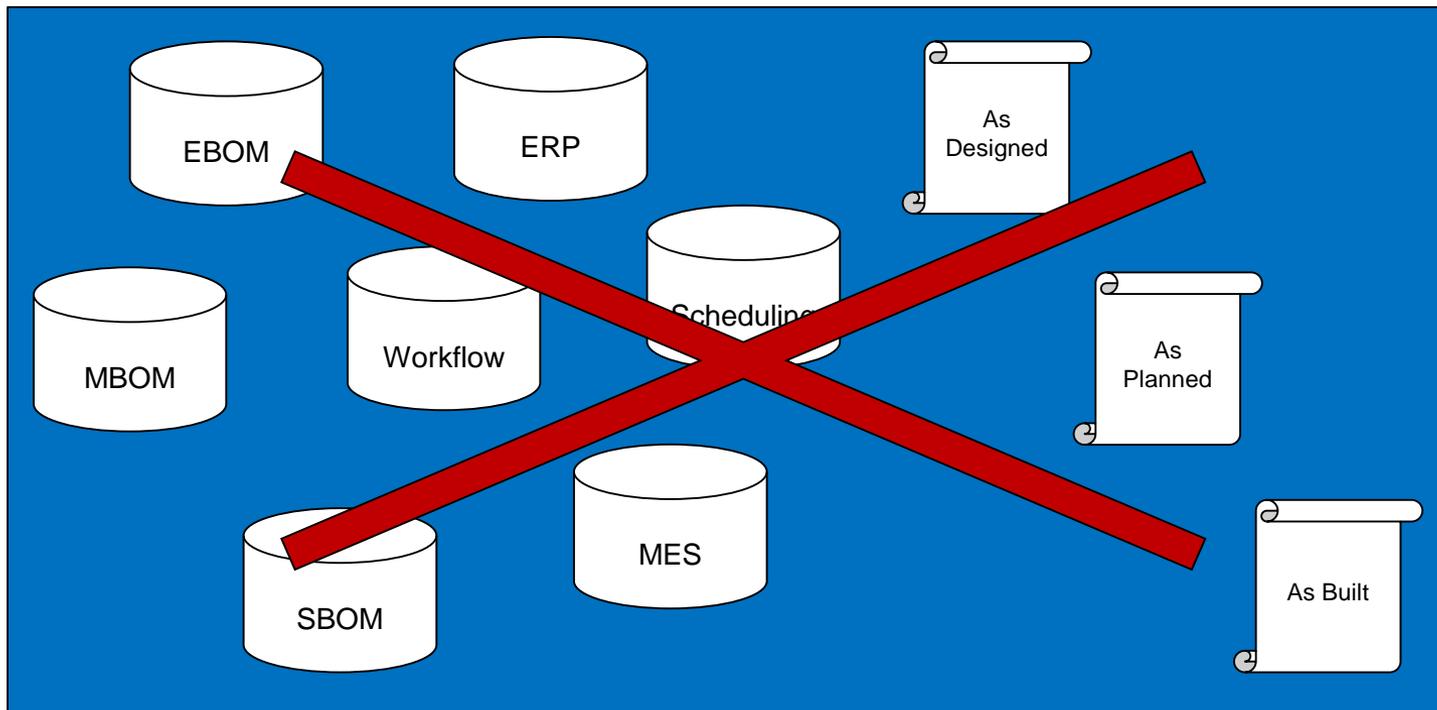
How do we prevent “Bad Data”?

Global Product Data Interoperability Summit | 2018

Ideal Solution Drawbacks

- COTS solutions cannot meet all process needs
- Highly customized and very \$\$\$\$
- Analysis time constraints
- Process variability – different programs have different business needs and requirements

Connected software tools that programmatically enforce business processes



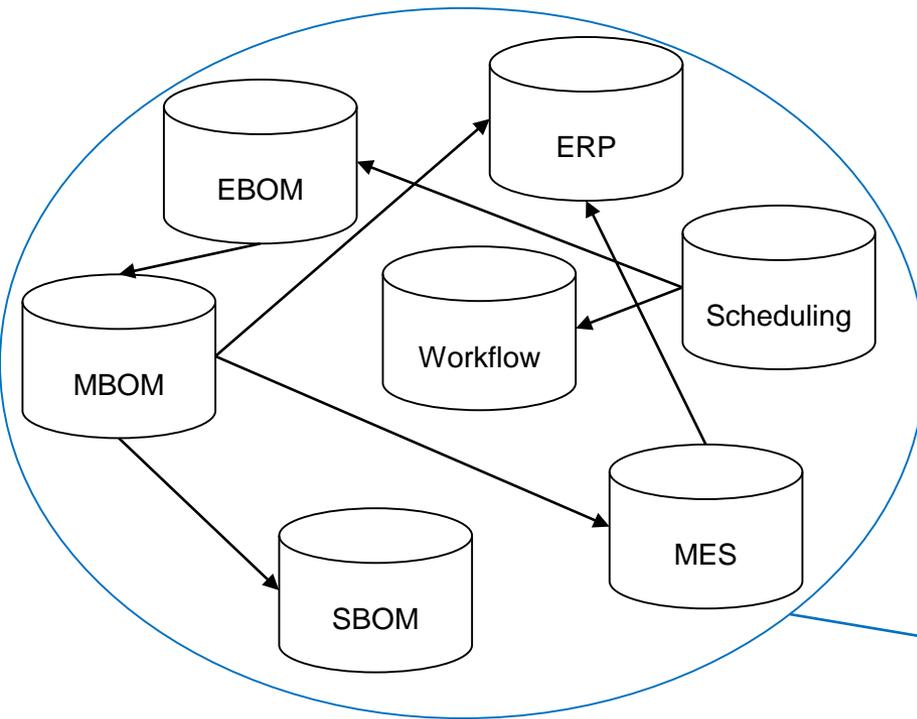
How do we prevent “Bad Data”?

Global Product Data Interoperability Summit | 2018

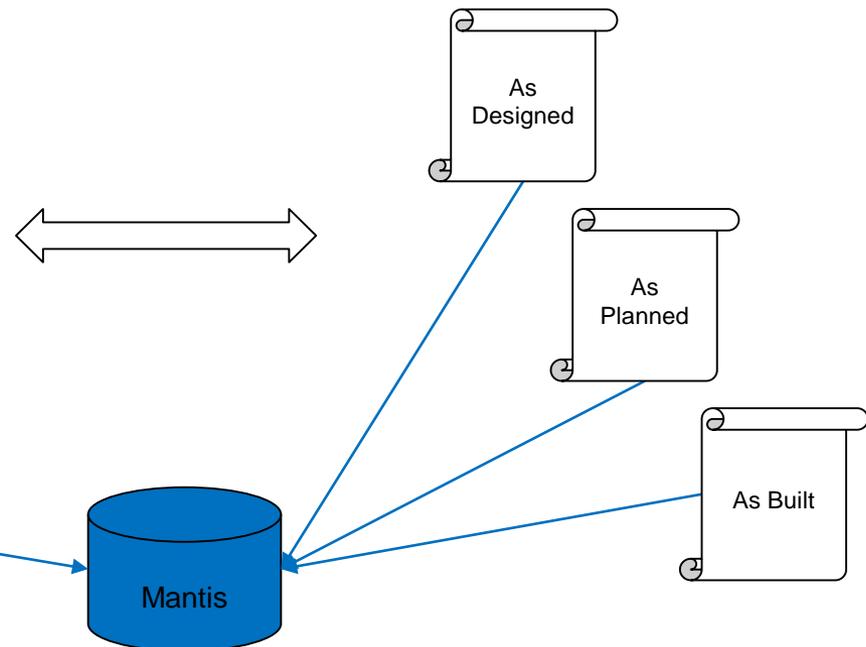
Our Approach

Mantis Database collects data from COTS and Internally Developed software and evaluates against processes en masse. Alerts users of process violations and directs them on how to fix them. Also allows for on-demand reports to be created.

Software (COTS and Internally Developed)



Processes



Features of Mantis

Global Product Data Interoperability Summit | 2018

What makes Mantis different than any other internally developed reporting and auditing tool?

Mantis is an Employee Managed Program (EMP) meaning it is not an IT managed resource.

ME Core personnel write SQL code to develop the analytics which drive the audits and on-demand reports.

Audits detect errors that will affect products that not yet built so we can prevent disruptions to production.

This enables audits to be created quickly and accurately due to the high familiarity with the processes and tools being audited.

This also allows a high degree of flexibility as processes and business objectives change and evolve.

The screenshot displays the Mantis web application interface. At the top, there is a navigation bar with a logo and menu items: Home, My Filter, My Records, Tools, My Mantis, Library, About, and Admin. Below the navigation bar, there is a secondary navigation bar with a similar menu. The main content area features a table with columns: Details, Occurrences, Title, Batch Number, Group Code, and Report Id. The table contains several rows of audit records, each with a 'Go' button in the 'Details' column. Below the table, there is a section titled 'Take Control of Your Data' with four cards: Macro-Audits (200+ Million data points audited per day), Auto-Checking (Multiple layers of checklist automation), Reporting (Ad-hoc, subscription, & mobile), and Your Business (From reactive to proactive).

Details	Occurrences	Title	Batch Number	Group Code	Report Id
Go	10	SOI Preview Not Performed - Alert	285888	C8401	269
Go	20	SOI Preview Not Performed - Alert	285888	C8406	269
Go	10	Check of IRC CMK Consumption to FAD IP Consumption	285402	C8844	365
Go	10	IRM Release By Date & Group	285404	1410	155
Go	10	IRM Release By Date & Group	285404	C6601	156
Go	9	IP Applicability Ending	285373	C8843	111
Go	1	IP Applicability Ending	285373	C8410	111
Go	2	IP Applicability Ending	285373	C8300	111

Sustain the Gains

Global Product Data Interoperability Summit | 2018

Mantis has become a platform that employees outside of ME Core who are interested in learning SQL can get involved with and start developing audits of their own.

Training class developed and offered for employees to learn SQL programming language.

Other functions using the system outside of Manufacturing Engineering, including Liaison Engineering, Design Engineering, Change Management, and more.

What's Next

Exciting Projects in 2017

- Total Change Compliance Auditing
- Metrology Data Automation
- Expansion to LE, SM, & Ops
- Mobile Capabilities Introduced

2018 & Beyond

- Grow Mantis as a Platform across Boeing
- Further 3D Analytics (CATIA, 3DVIA)
- MBU Performance Management & Quality Auditing Automation
- 787 Part Ancestry Methods
- 2CES PLM/MOM Development & Integ



Mantis | 2012-2016



Mantis | Vision 2017+



Intro to CDW and SQL Programming.pptx - PowerPoint

FILE HOME INSERT DESIGN TRANSITIONS ANIMATIONS SLIDE SHOW REVIEW VIEW DEVELOPER ACROBAT STORYBOARDING Naylor, B. -

Clipboard New Slide Section Slides

Layout Reset Font Paragraph Drawing Styles Editing Share WebEx This File WebEx

Day 3 - Joins

Different Types of SQL JOINS

Here are the different types of the JOINS in SQL:

- **INNER JOIN:** Returns records that have matching values in both tables
- **LEFT (OUTER) JOIN:** Return all records from the left table, and the matched records from the right table
- **RIGHT (OUTER) JOIN:** Return all records from the right table, and the matched records from the left table
- **FULL (OUTER) JOIN:** Return all records when there is a match in either left or right table

INNER JOIN LEFT JOIN RIGHT JOIN FULL OUTER JOIN

Table1 Table2 Table1 Table2 Table1 Table2 Table1 Table2

Most often used Rarely used

Click to add notes

SLIDE 15 OF 35 NOTES COMMENTS 64%

Future of Mantis

Global Product Data Interoperability Summit | 2018

Mantis fits into Boeing's AnalytX strategy and will be incorporated into Boeing's 2nd Century Engineering Systems (2CES) initiative.

Finding the balance between Employee Managed and IT Managed Program
Pros of EMP

- Fast, agile, flexible development
- Rapid prototyping of audits, reports, and improved internal software systems

Cons of EMP

- Personnel fluctuation
- Lack of experience in development
- Alignment of EMP with Production Engineering strategy and future tools

BOEING ANALYT X

What is Boeing AnalytX?

Before it was cool—before it was a buzzword—Boeing used its knowledge and insight of all things aerospace to drive innovation, encouraging people to dream and businesses to realize their full potential. Now it's time to put a name to the pioneering solutions of thousands of Boeing data scientists and mathematicians working to benefit the aerospace industry: Boeing AnalytX.

We believe analytics transforms data to reveal insights that empower a world of limitless possibilities.

Bringing together the portfolio of analytics-driven products and services provided by Boeing and its family of companies, Boeing AnalytX powers these and other

Questions?