Data Quality Processes: Insurance Against Negative Operational Impacts

Fred Nannarone
Dynamics Research Corp.
HQ AFMC/A4YR
Wright-Patterson AFB, Oh.
Alfred.Nannarone@wpafb.af.mil

Purpose

To inform how the United States Air Force (USAF), by forming a data quality team, has improved the accuracy of it spare parts budget forecasts and support to the Warfighter.

Background

USAF Centralized Spare Parts 5 Year Budget Forecast

- Budget Forecast to Buy Spare Parts
- Budget Forecast to Perform Repairs
- Budget Forecasts Provided to Congress Must be Accurate

Scope of Budget

- **Repairs and/or Acquisitions Done For:**
  - **USAF Aircraft/End Items**
    - F-16's, F-15's, B-2, B-52, etc.
    - Missiles/Drones
    - Communications-Electronics (Radios, Radar, Telephone Switching Systems)
    - Aircraft Engines/Landing Gear, Aircraft Support Equipment, Trucks
  - **Army, Navy, Marine Corps, Coast Guard, NASA, etc.**
  - **Contractors**
  - **Foreign Countries**

- **Repairs Done at:**
  - **Contractor Facilities**
  - **Air Force Bases**
  - **Air Force Depots**
  - **Army, Navy, Marine Corps**

Forecasts Require Data

To Create a Budget Forecast, the USAF Needs to Gather Data on the Activities Associated with Repairs and Acquisitions.

- **Establish, manage, and maintain 100's of logistics data systems world-wide**
  - Operating on different data bases
  - Mix of real-time/Batch operations
  - Operating on Mainframes to PCs
  - Interconnected
- **Myriad of data collected**
  - Parts Consumption
  - Repair Activities
  - Historical & Future Operational Program Information
  - Parts Stock Balances
  - Item Information

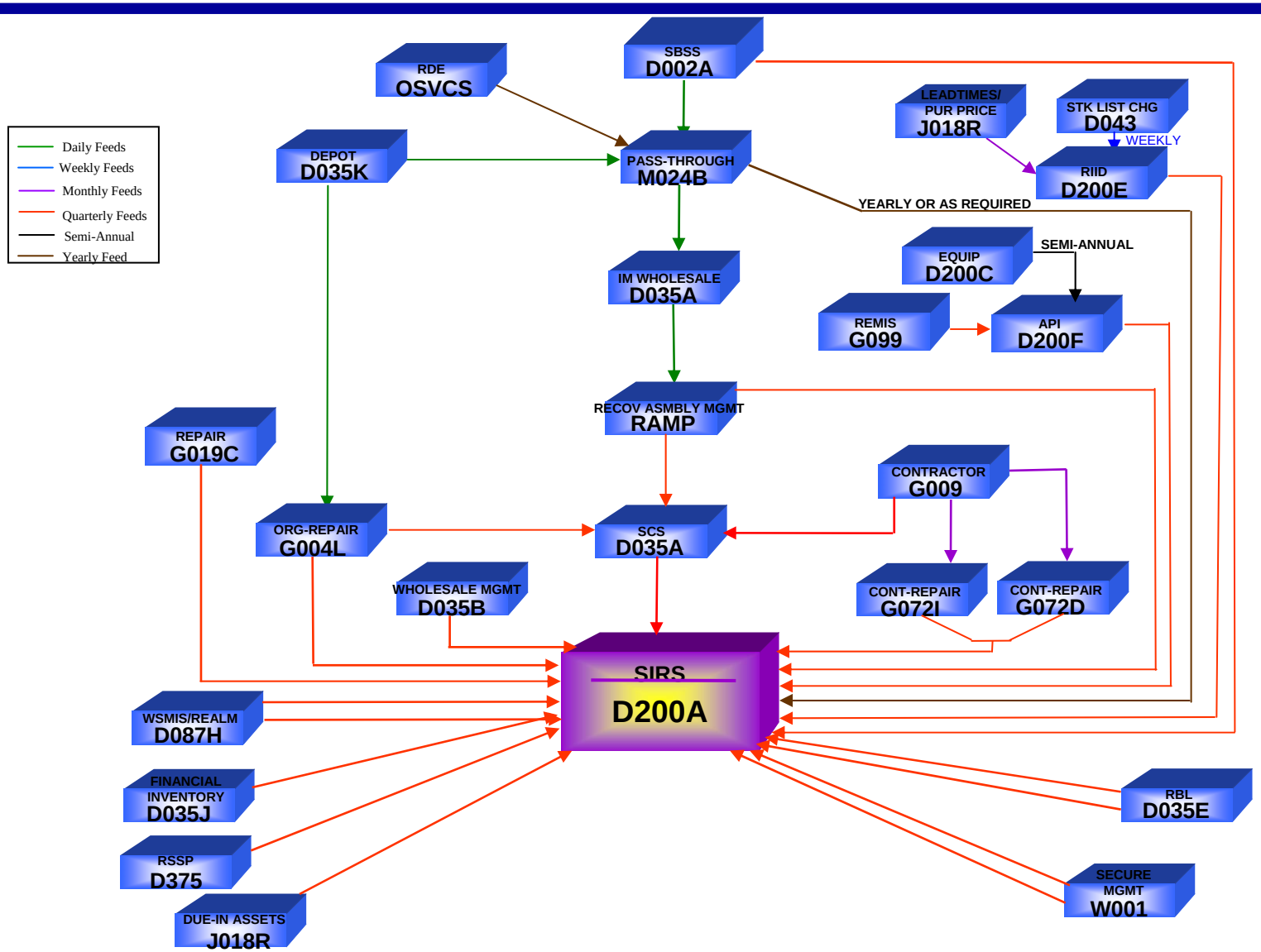
Goal: Forecast Spare Parts to Allow the USAF to Reach or Exceed a Determined Number of "Operationally Available" Aircraft and End Items World-Wide at All Times.

Data Quality and the Warfighter

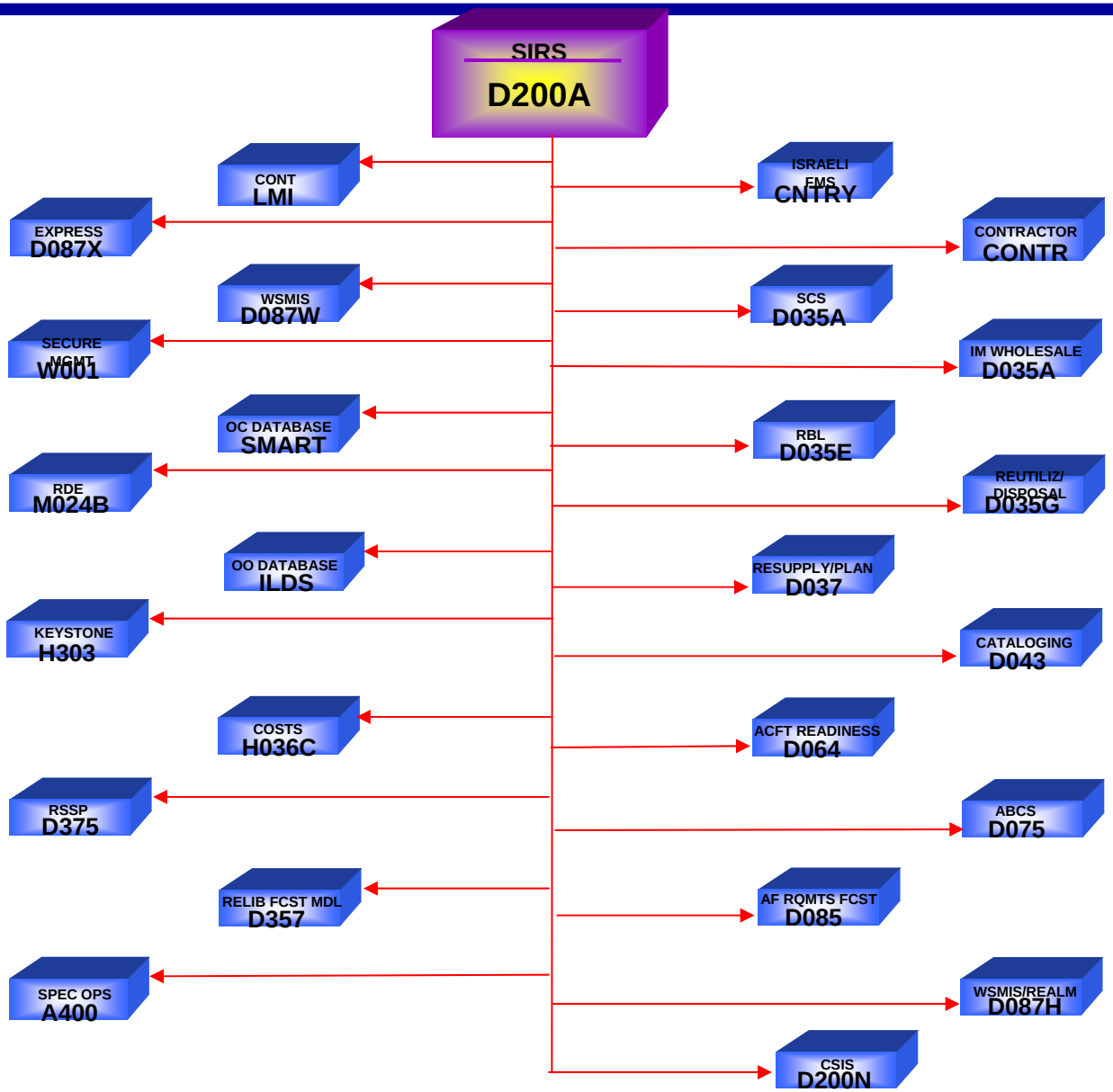
- **A Large Number of Systems Collect, Process, and Transmit Data from Around the World to the Centralized Spare Parts Forecasting System (called D200A).**
  - There is a Significant Probability of Experiencing Data Quality Problems.

- **In Response to Concerns Over Data Quality, USAF Created a Team to Identify and Clean-Up Inaccurate Data: RIPIT**

System Interfaces To D200A



D200A System Outputs



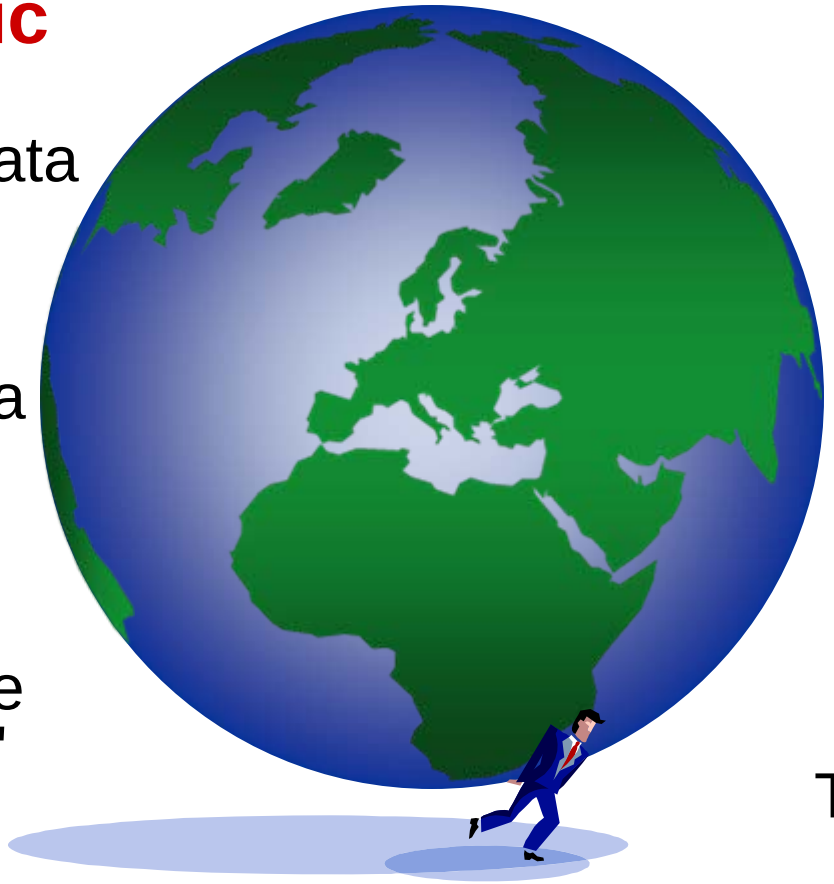
DQ: A Functional Issue, Not an IT Problem

The Rhetoric

"Who cares? Data is IT's problem."

"IT should lead a data-quality program."

"Just throw some technology at it."



The Truth

IT does not feel the pain.

IT does not know the business rules.

IT does not own the subject matter experts.

Technology alone won't work.

Enabler: IT is Critical to Success and Must be Involved.

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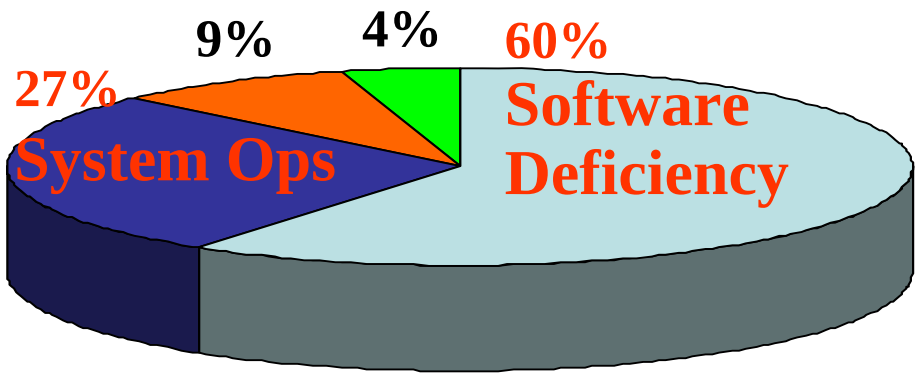
Causes of Data Quality Problems

36 Month Study Focused on D200A & its Input Interfacing Systems



Causes of Data Problems	Unique Data Problems
Software Deficiency	60%
System Operations	27%
Human Error	9%
Unknown	4%

Software Deficiencies and System Operations drove majority of data problems (>85%)

If D200A is indicator, problems likely pervade Many USAF Log. Sys.

Based on Work Done by RIPIT Team

Data Quality Process Benefits

- **Developed Successful Approach to Deal With Dirty Data for Spare Parts Forecast System**
- **Since Inception, Successfully ID'd & Corrected 100's of Significant Data Problems**
  - Got Results! Avoided 500 manyears of USAF part manager's time with 5 man years of effort from RIPIT
  - Ensured errors were ID'd and corrections made
  - Reported results to parts managers

Data Quality Dilemma

- **Why is it Important?**
  - Impact to Operations and Warfighter Capability
  - Nip in the Bud Early: Saves $ and Less Impact

- **What's The Problem?**
  - Data Quality Problems Prevalent in all USAF Logistics Systems
  - Effects are Hidden to Mgmt. & Warfighter
    - Revealing the Effects Takes Time and $
  - Senior Mgmt. Not Aware of Problems & Their Impacts Thus Can't Treat Data as a Strategic Resource

Data Quality Impacts Avoided

1.a DQ Problem: Amount of On-Hand Stock & Number of Repairs and Condemnations from Contractor Facilities Reported to a USAF Depot was Tripled (Accuracy)

1.b Operational Impacts Avoided:

- **Buy Budget would have needed $151.7M Adjustment**
  - 1,064 Stock Numbers Affected
- **Repair Budget would have needed $98.9M Adjustment**
  - 1,259 Stock Numbers Affected

The Spare Parts Forecast Would Have Incorrect Mix of Parts Acquired/Repaired Causing Parts Shortage to Ground 12 Aircraft by Forecasted Parts Need Date.

Data Quality Impacts Avoided

2.a DQ Problem: Thousands of Transactions from Annual Interservice Requirements Not Sent from Army & Navy. (Accuracy and Completeness)

2.b Operational Impacts Avoided:

- **Buy Budget would have needed $84.7M Adjustment**
  - 639 Stock Numbers Affected
- **Repair Budget would have needed $99.7M Adjustment**
  - 1,041 Stock Numbers Affected

The Spare Parts Forecast Would Have Incorrect Mix of Parts Acquired/Repaired Causing Parts Shortage to Ground 22 Aircraft by Forecasted Parts Need Date.

Data Quality Impacts Avoided

3.a DQ Problem: Three Months of Base Level Repair Data Sent, however, it was Wrong Three Months. (Timeliness)

3.b Operational Impacts Avoided:

- **Buy Budget would have needed $593M Adjustment**
  - 5,066 Stock Numbers Affected
- **Repair Budget would have needed $200.3M Adjustment**
  - 7,145 Stock Numbers Affected

The Spare Parts Forecast Would Have Incorrect Mix of Parts Acquired/Repaired Causing Parts Shortage to Ground 42 Aircraft by Forecasted Parts Need Date.

Data Quality Management Benefits

- **Saving Money Right From the Start**
  - **$1 to correct an error at data entry**
  - **$10 to correct a number of errors after the fact with batch processing**
  - **$100 cost of not correcting an error**
- **Benefits**
  - **Improves aircraft and equipment availability**
  - **Reduces time and resources to reconcile data**
  - **Prevents under/over budgeting**
  - **Prevents loss of system credibility**
  - **Eliminates system downtime**
  - **Assists with compliance issues**

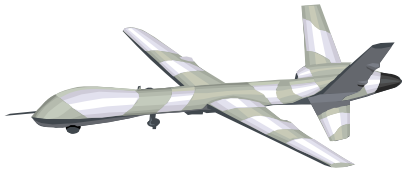
Old Saying:

"An ounce of prevention is worth a pound of cure"

Conclusion

Properly Implemented Data Quality Processes Provide:

Insurance



Against Negative Operational Impacts