



# Measuring Confidence in Air Force Building Condition Data

May 4, 2023, 9:00 a.m.



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# Measuring Confidence in Air Force Building Condition Data

Moderator: Michael Zapata, Air Force Civil Engineer Center

Speaker:

- Ben Graf, Senior Data Scientist, Air Force Civil Engineer Center





# HOUSEKEEPING NOTES & TIPS

- ✓ **Take Note of Emergency Exits**
- ✓ **Silence Your Mobile Devices**
- ✓ **Thank You to Our Sponsors!**
- ✓ **Questions will be addressed in the allotted time**
- ✓ **Presentations will be posted in the Attendee Service Center (ASC) post conference**



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San Antonio,  
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# SPEAKER



# Fun Facts

- Strategy board games
- Musical theater
- Made two family films
- Ted Lasso



# Air Force Installation & Mission Support Center



## Measuring Confidence in Air Force Building Condition Data

Ben Graf  
AFCEC/CPRD  
4 May 2023



- **Why Data Confidence?**
- **How It Works**
- **What BUILDER Data Confidence Is/Isn't**
- **Use Cases**
- **New feature: CRV Deep Dive**





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## **Poll Question**

**How familiar are you with the  
BUILDERTM Sustainment Management System  
(SMS)?**

① Start presenting to display the poll results on this slide.



# Why Data Confidence?



- Everyone who sees Air Force BUILDER data is intrigued but wonders if they can trust it
- BUILDER is being used for decisions today at all levels
- Just because some data is suspect, we should not throw out all of it
- Could we use the data itself to flag suspect data?
  - Analysts already do this!
  - Go beyond QA reports to *summarize* Data Confidence
- Could such a metric follow the data into other tools?



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# How It Works



- Characteristics of data that give us confidence in it
  - Accuracy – Is the data correct?
  - Completeness – Is all the expected data present?
  - Credibility – Is the data from a reliable source?
  - Currency – Is the data timely?
  - Validity – Is the data reasonable?

## Key 7 Inventoried

| % Systems | Confidence |
|-----------|------------|
| 80-100%   | High       |
| 60-79%    | Medium     |
| 20-59%    | Low        |
| 0-19%     | No         |

- Team identified 13 measures analysts already use to intuit data confidence
  - Each assigned rating of High, Medium, Low, or No Confidence
- Overall BCI Data Confidence for a building is *lowest* of these 13 measures

Example

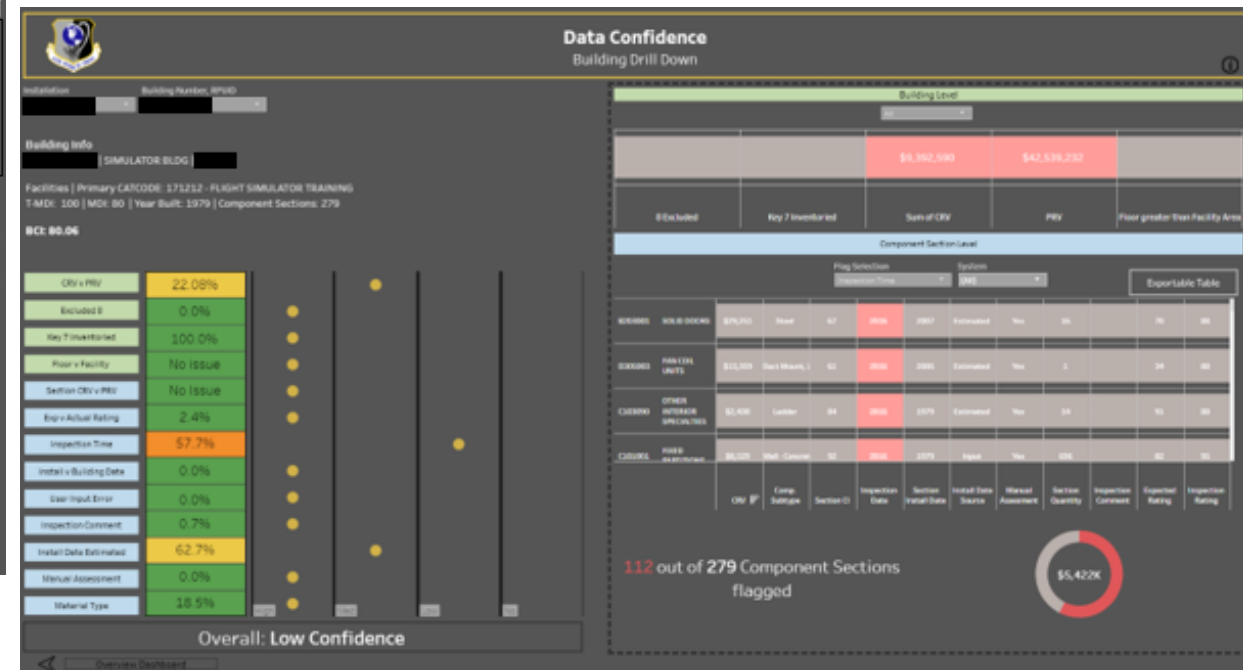
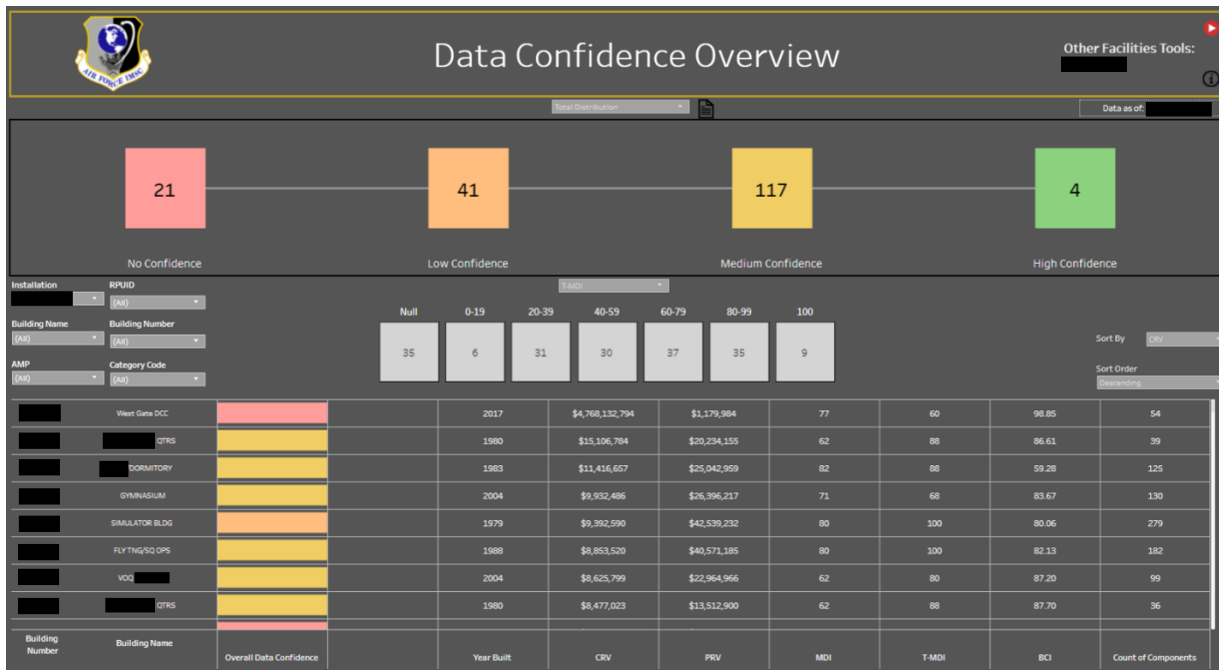




# How It Works



- Dashboard on AF VAULT for all Air Force to use
- Data refreshes from BUILDER *automatically every week*





# What **BUILDER** Data Confidence Is/Isn't



## ■ Data Confidence **is**:

- ✓ A new metric calculated from *authoritative* BUILDER SMS data
- ✓ Dashboard *automating* for all what analysts already intuit
- ✓ A *guide* to which Building Condition Indices you can trust, & which are suspect
- ✓ Useful, hopefully transformatively so
- ✓ Focused on *building level*
- ✓ Informing BCI confidence
- ✓ Pinpointing data quality issues as a second order effect
- ✓ Following BCI into other tools

## ■ Data Confidence **isn't**:

- ⊘ A new place to enter data
- ⊘ Something to be hand-calculated or adjudicated
- ⊘ A verdict on the data
- ⊘ Perfect – false positives & false negatives
- ⊘ Focused on rollups
- ⊘ Informing decision confidence
- ⊘ Replacing existing QA/QC processes
- ⊘ Another silo



# Use Case Examples



- **High Confidence**
- **BCI likely pretty accurate**
- **Move forward with decision**
- **Note: BCI itself may be high or low!**

### Data Confidence

Building Drill Down

Installation: [Redacted] Building Number, RPUID: [Redacted]

**Building Info**  
[Redacted] NDI LABORATORY [Redacted]

Facilities | Primary CATCODE: 211153 - SHOP, NON-DESTRUCTIVE INSPECTION  
T-MDI: 80 | MDI: 88 | Year Built: 1972 | Component Sections: 89

**BCI: 86.64**

|                         |          |   |  |  |  |
|-------------------------|----------|---|--|--|--|
| CRV v PRV               | 54.24%   | ● |  |  |  |
| Excluded B              | 0.0%     | ● |  |  |  |
| Key 7 Inventoried       | 7/7      | ● |  |  |  |
| Floor v Facility        | No Issue | ● |  |  |  |
| Section CRV v PRV       | No Issue | ● |  |  |  |
| Exp v Actual Rating     | 0.0%     | ● |  |  |  |
| Inspection Time         | 4.6%     | ● |  |  |  |
| Install v Building Date | 0.0%     | ● |  |  |  |
| User Input Error        | 0.0%     | ● |  |  |  |
| Inspection Comment      | 6.9%     | ● |  |  |  |
| Install Date Estimated  | 38.4%    | ● |  |  |  |
| Manual Assessment       | 0.0%     | ● |  |  |  |
| Material Type           | 27.3%    | ● |  |  |  |

Overall: High Confidence

Building Level

|            |                   |             |             |                                  |  |
|------------|-------------------|-------------|-------------|----------------------------------|--|
|            |                   | \$1,694,619 | \$3,124,340 |                                  |  |
| 8 Excluded | Key 7 Inventoried | Sum of CRV  | PRV         | Floor greater than Facility Area |  |

Component Section Level

Flag Selection: All
System: All
Exportable Table

| Item ID | System                        | Value   | Category         | Section CI | Inspection Date | Section Install Date | Install Date Source | Manual Assessment | Section Quantity | Inspection Comment | Expected Rating | Inspection Rating |
|---------|-------------------------------|---------|------------------|------------|-----------------|----------------------|---------------------|-------------------|------------------|--------------------|-----------------|-------------------|
| C103001 | COMPARTMENTS, CUBICLES & TOL. | \$1,109 | Toilet Partition | 87         | 2021            | 2009                 | Estimated           | Yes               | 1                |                    | 79              | 88                |
| D401002 | FIRE ALARM DEVICES            | \$496   | Detectors w/     | 87         | 2021            | 2012                 | Estimated           | Yes               | 4                |                    | 89              | 88                |
| R201007 | EXTERIOR SOFFITS              | \$2,634 | General          | 87         | 2021            | 2009                 | Estimated           | Yes               | 708              |                    | 79              | 88                |
| D302004 | AUXILIARY EQUIPMENT           | \$1,399 | Chemical Free    | 94         | 2021            | 2009                 | Input               | Yes               | 1                |                    | 79              | 95                |






# Use Case Examples



- **Low Confidence**
- Investigation reveals flagged issue does *not* affect proposed HVAC project
- Move forward with decision



### Data Confidence

Building Drill Down

Installation: [Redacted] Building Number, RPUID: [Redacted]

Building Info: [Redacted] MISSION SUPPORT | [Redacted]

Facilities | Primary CATCODE: 61012B - BASE PERSONNEL OFFICE  
T-MDI: 68 | MDI: 59 | Year Built: 1995 | Component Sections: 73  
BCI: 82.22

|                         |          |   |   |  |
|-------------------------|----------|---|---|--|
| CRV v PRV               | 18.79%   |   |   |  |
| Excluded 8              | 0.0%     | ● |   |  |
| Key 7 Inventoried       | 7/7      | ● |   |  |
| Floor v Facility        | No Issue | ● |   |  |
| Section CRV v PRV       | No Issue | ● |   |  |
| Exp v Actual Rating     | 0.0%     | ● |   |  |
| Inspection Time         | 3.6%     | ● |   |  |
| Install v Building Date | 0.0%     | ● |   |  |
| User Input Error        | 0.0%     | ● |   |  |
| Inspection Comment      | 8.5%     | ● |   |  |
| Install Date Estimated  | 44.4%    | ● |   |  |
| Manual Assessment       | 0.0%     | ● |   |  |
| Material Type           | 43.2%    |   | ● |  |

Overall: Low Confidence

Building Level

All


|            |                   |             |              |                                  |
|------------|-------------------|-------------|--------------|----------------------------------|
|            |                   | \$2,169,673 | \$11,544,831 |                                  |
| 8 Excluded | Key 7 Inventoried | Sum of CRV  | PRV          | Floor greater than Facility Area |

Component Section Level

Flag Selection: Material Type System: (All)

| ID      | Description           | CRV       | Comp. Subtype | Section CI | Inspection Date | Section Install Date | Install Date Source | Manual Assessment | Section Quantity | Inspection Comment | Expected Rating | Inspection Rating |
|---------|-----------------------|-----------|---------------|------------|-----------------|----------------------|---------------------|-------------------|------------------|--------------------|-----------------|-------------------|
| D201002 | URINALS               | \$5,296   | General       | B4         | 2019            | 2005                 | Estimated           | Yes               | 2                |                    | 75              | 88                |
| C102002 | GLAZED INTERIOR DOORS | \$14,387  | General       | B5         | 2019            | 2005                 | Estimated           | Yes               | 4                |                    | 92              | 88                |
| D502001 | BRANCH WIRING         | \$124,515 | General       | B5         | 2019            | 1995                 | Input               | Yes               | 23,743           |                    | 90              | 88                |
| D202001 | PIPES & FITTINGS      | \$73,800  | General       | B5         | 2019            | 1995                 | Input               | Yes               | 960              |                    | 85              | 88                |

15 out of 73 Component Sections flagged



\$937K



# Use Case Examples



- **No Confidence**
- **Multiple flagged issues impacting decision**
- **Pause decision to resolve data confidence issues first**
- **Note: BCI = 88, so pending decision may have been to do nothing!**

### Data Confidence

Building Drill Down

---

Installation: [redacted] Building Number, RPUID: [redacted]

**Building Info**  
[redacted] POWER PRO STOR | [redacted]

Facilities | Primary CATCODE: 442257 - BASE HAZARDOUS STORAGE  
T-MDI: 29 | MDI: 81 | Year Built: 1988 | Component Sections: 5

**BCI: 87.80**

|                         |          |  |  |   |
|-------------------------|----------|--|--|---|
| CRV v PRV               | 312.84%  |  |  | ● |
| Excluded 8              | 0.0%     |  |  | ● |
| Key 7 Inventoried       | 4/4      |  |  | ● |
| Floor v Facility        | No issue |  |  | ● |
| Section CRV v PRV       | Exceeds  |  |  | ● |
| Exp v Actual Rating     | 0.0%     |  |  | ● |
| Inspection Time         | 0.0%     |  |  | ● |
| Install v Building Date | 0.0%     |  |  | ● |
| User Input Error        | 0.0%     |  |  | ● |
| Inspection Comment      | 0.0%     |  |  | ● |
| Install Date Estimated  | 0.0%     |  |  | ● |
| Manual Assessment       | 0.0%     |  |  | ● |
| Material Type           | 93.9%    |  |  | ● |

Overall: No Confidence

Building Level

All

|            |                   |            |          |                                  |
|------------|-------------------|------------|----------|----------------------------------|
|            |                   | \$152,864  | \$48,863 |                                  |
| 8 Excluded | Key 7 Inventoried | Sum of CRV | PRV      | Floor greater than Facility Area |

Component Section Level

Flag Selection: Section CRV v. PRV System: B20 EXTERIOR ENL. Exportable Table

| B203007 | GATES         | \$143,560  | General         | 87                   | 2021                | 1988              | Input            | Yes                | 112             | 3                 | 88 |
|---------|---------------|------------|-----------------|----------------------|---------------------|-------------------|------------------|--------------------|-----------------|-------------------|----|
| CRV     | Comp. Subtype | Section CI | Inspection Date | Section Install Date | Install Date Source | Manual Assessment | Section Quantity | Inspection Comment | Expected Rating | Inspection Rating |    |

1 out of 5 Component Sections flagged

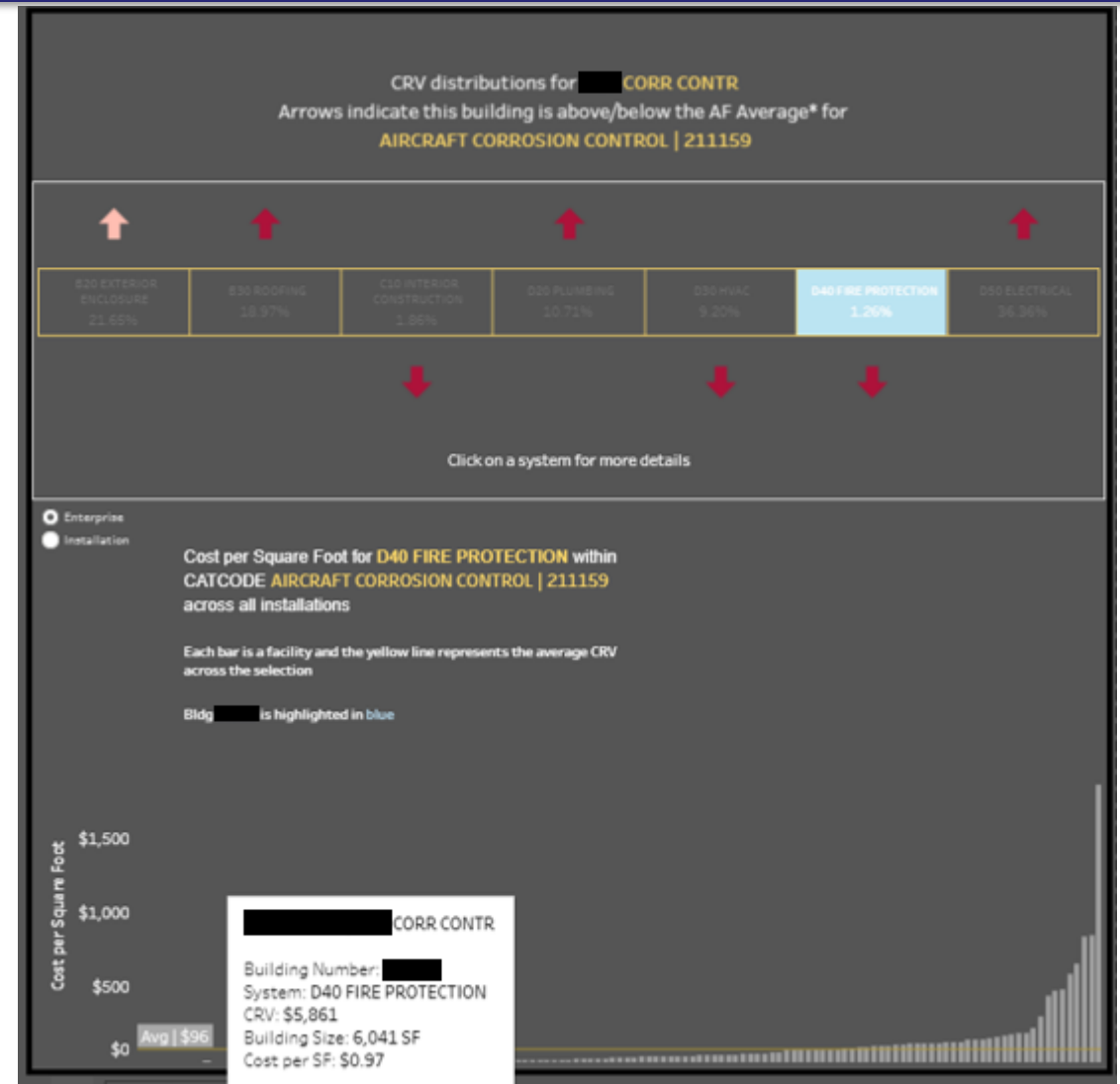
\$144K



# New Feature: CRV Deep Dive



- Most common flag is CRV vs. PRV  
(Component Replacement Value vs. Plant Replacement Value)
- Can be high or low
- High usually easy to fix
- Low ratio indicates underinventoried, but where?
- CRV Deep Dive can help figure it out





# Q&A

- Ben Graf, [ben.graf@us.af.mil](mailto:ben.graf@us.af.mil)
- John Glass, [john.glass.1@us.af.mil](mailto:john.glass.1@us.af.mil)



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