

**BUILDER**  
SUMMIT

**ERDC**  
U.S. DEPARTMENT OF ENERGY  
ENERGY EFFICIENCY & RENEWABLE ENERGY ADMINISTRATION

**DIGON**  
SYSTEMS

# Metrics Deep Dive

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How to explain the differences between a BUILDER BCI and FCI

Presented by Kurt Sorenson

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# Problem Statement

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Clarity is needed in the way BUILDER produces key metrics of BCI and FCI.

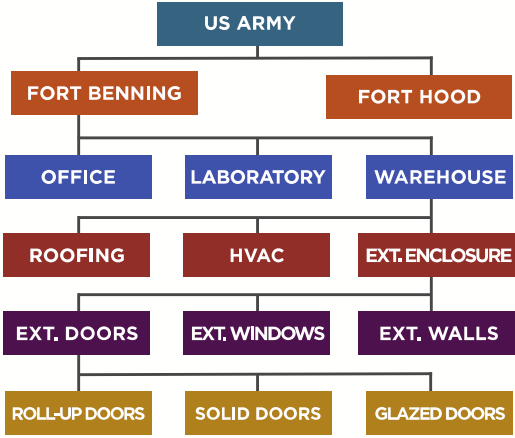
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# BUILDER Tree


Uniformat II Organization Levels

-  ORGANIZATION
-  SITE
-  BUILDING
-  SYSTEM
-  COMPONENT
-  SECTION



```


graph TD
    US[US ARMY] --> FB[FORT BENNING]
    US --> FH[FORT HOOD]
    FB --> OF[OFFICE]
    FB --> LAB[LABORATORY]
    FB --> WH[WAREHOUSE]
    OF --> OR[ROOFING]
    OF --> HVAC[HVAC]
    OF --> EE[EXT. ENCLOSURE]
    LAB --> ED[EXT. DOORS]
    LAB --> EW[EXT. WINDOWS]
    LAB --> EWALL[EXT. WALLS]
    WH --> RUD[ROLL-UP DOORS]
    WH --> SD[SOLID DOORS]
    WH --> GD[GLAZED DOORS]
    
```



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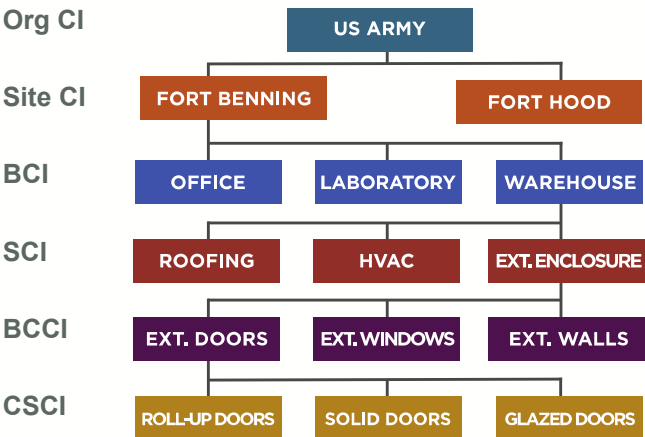
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# What is a Condition Index? (CI)

A rating that assesses an item's condition. Condition is assessed at the section level, and then 'rolls up' to create CI ratings at higher levels



```

graph TD
    US[US ARMY] --> FB[FORT BENNING]
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    WH --> GD[GLAZED DOORS]
    
```



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## Building Condition Index (BCI)

To understand BCI you must understand how condition is calculated at each piece of the building and then a cost weighted average rolls up.



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## What is a Section?

**Example:**  
Glazed Doors



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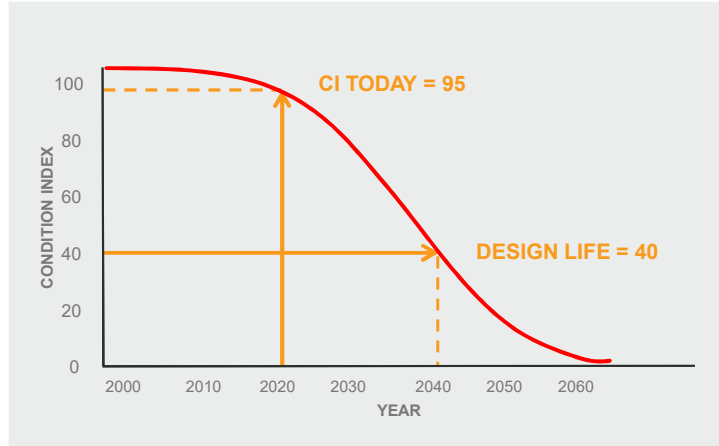


# CSCI: Component-Section Condition Index

**Example:**  
B203002 Glazed Doors



System	Component	Section	Design Life
B20 EXTERIOR ENCLOSURE	B2010 EXTERIOR WALLS	B201001 EXTERIOR CLOSURE: Pre-Engineered Steel Wall and Panel	60
B20 EXTERIOR ENCLOSURE	B2020 EXTERIOR WINDOWS	B202001 WINDOWS: Vinyl Clad Windows	70
B20 EXTERIOR ENCLOSURE	B2030 EXTERIOR DOORS	B203002 GLAZED DOORS: General	40
B20 EXTERIOR ENCLOSURE	B2030 EXTERIOR DOORS	B203004 OVERHEAD AND ROLL-UP DOORS: General	25
D30 HVAC	D3050 TERMINAL & PACKAGE UNITS	D305006 PACKAGE UNITS: A/C Unit, Split Systems w/ Air Cooled Condenser	20
D50 ELECTRICAL	D5010 ELECTRICAL SERVICE & DISTRIBUTION	D501004 PANELBOARDS: General	50



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# What is a Component?

**Example:**  
Exterior Doors



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# BCCI: Building Component Condition Index

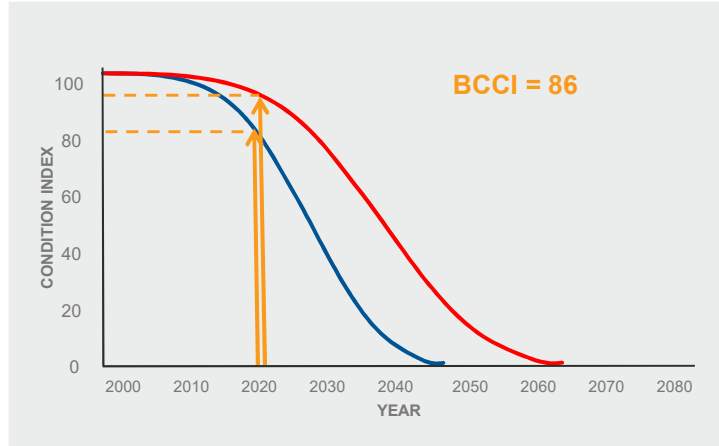
## Example:

### B2030 Exterior Doors

Glazed doors CI = 95  
Overhead doors CI = 85

2 glazed doors (\$250 ea) = \$500  
2 rollup doors (\$2500 ea) = \$5000

Weighted average  
 $(95 \cdot 500 / 5500 + 85 \cdot 5000 / 5500) = 86$



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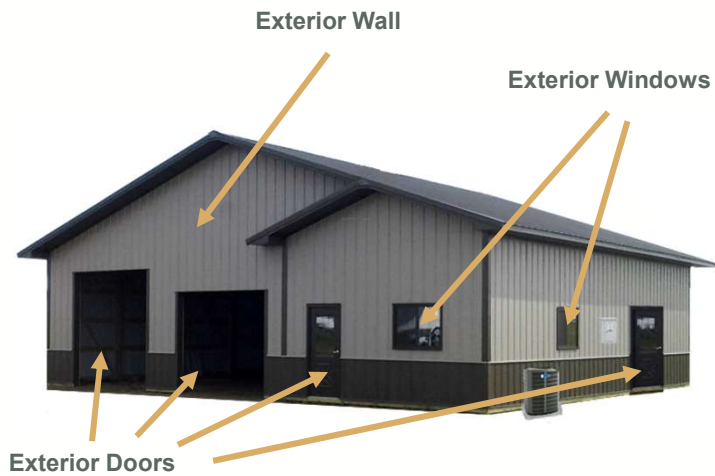
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# What is a System?

## Example:


### Exterior Enclosure



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## SCI: System Condition Index

### B20 Exterior Enclosure: Walls, Windows, Doors

↓


System	Component	Section	Design Life
B20 EXTERIOR ENCLOSURE	B2010 EXTERIOR WALLS	B201001 EXTERIOR ENCLOSURE: Pre-Engineered Steel Wall and Panel	60
B20 EXTERIOR ENCLOSURE	B2020 EXTERIOR WINDOWS	B202001 WINDOWS: Vinyl clad Windows	70
B20 EXTERIOR ENCLOSURE	B2030 EXTERIOR DOORS	B203002 GLAZED DOORS: general	40
B20 EXTERIOR ENCLOSURE	B2030 EXTERIOR DOORS	B203004 OVERHEAD AND ROLL-UP DOORS: General	25
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## What is a Building?


### Example: Warehouse



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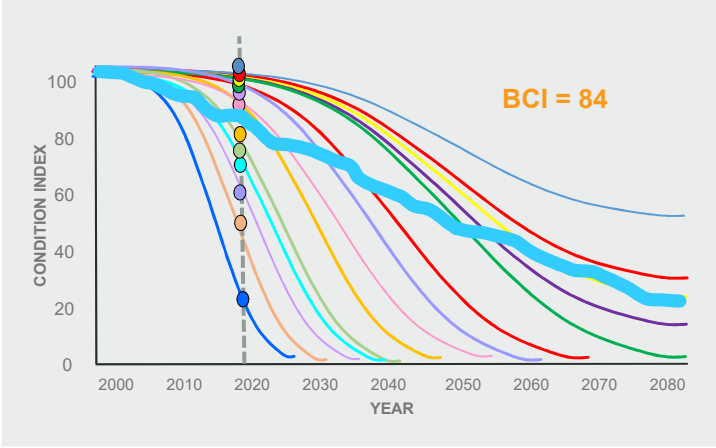
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# BCI: Building Condition Index

## All systems in the Building

1. A10 Foundations
2. A20 Basement Const.
3. B10 Superstructure
4. B20 Exterior
5. B30 Roofing
6. C10 Interior Construction
7. C20 Stairs
8. C30 Interior Finished
9. D10 Conveying
10. D20 Plumbing
11. D30 HVAC
12. D40 Fire Protection
13. D50 Electrical
14. E10 Equipment






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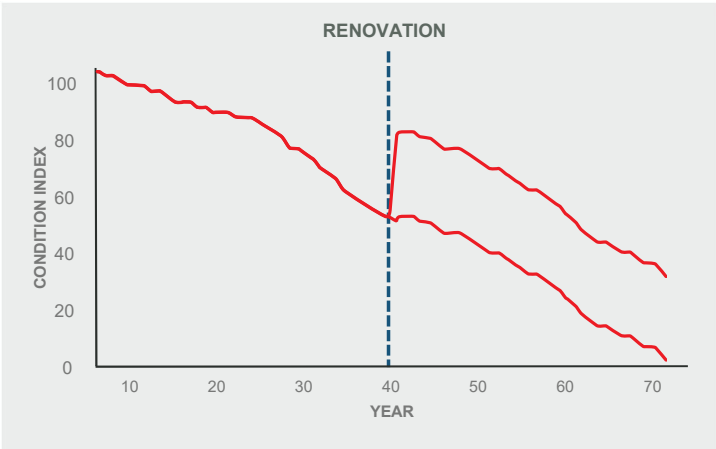
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# Investment Impact on BCI

## The effect on **BCI** of a renovation at 40 years.





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## BCI Review

The cost-weighted average of all sections within a building for a given date.

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## Facility Condition Index (FCI) (Pre-BUILDER)

- Assessor inspections generated deferred work project cost
- Total building value

$$FCI = \left( 1 - \left( \frac{\text{Deferred Work}}{\text{Current Replacement Value}} \right) \right) \times 100$$

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## BUILDER FCI

- Same equation with a new way of getting to “Identified Work”

$$FCI = \left( 1 - \left( \frac{\text{Identified Work}}{\text{Current Replacement Value}} \right) \right) \times 100$$

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## Denominator | PRV

- Replacement cost of the building

$$FCI = \left( 1 - \left( \frac{\text{Identified Work}}{\text{Current Replacement Value}} \right) \right) \times 100$$

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## Numerator | Work Identified

- System generated based on organization standards

$$FCI = \left( 1 - \left( \frac{\text{Identified Work}}{\text{Current Replacement Value}} \right) \right) \times 100$$

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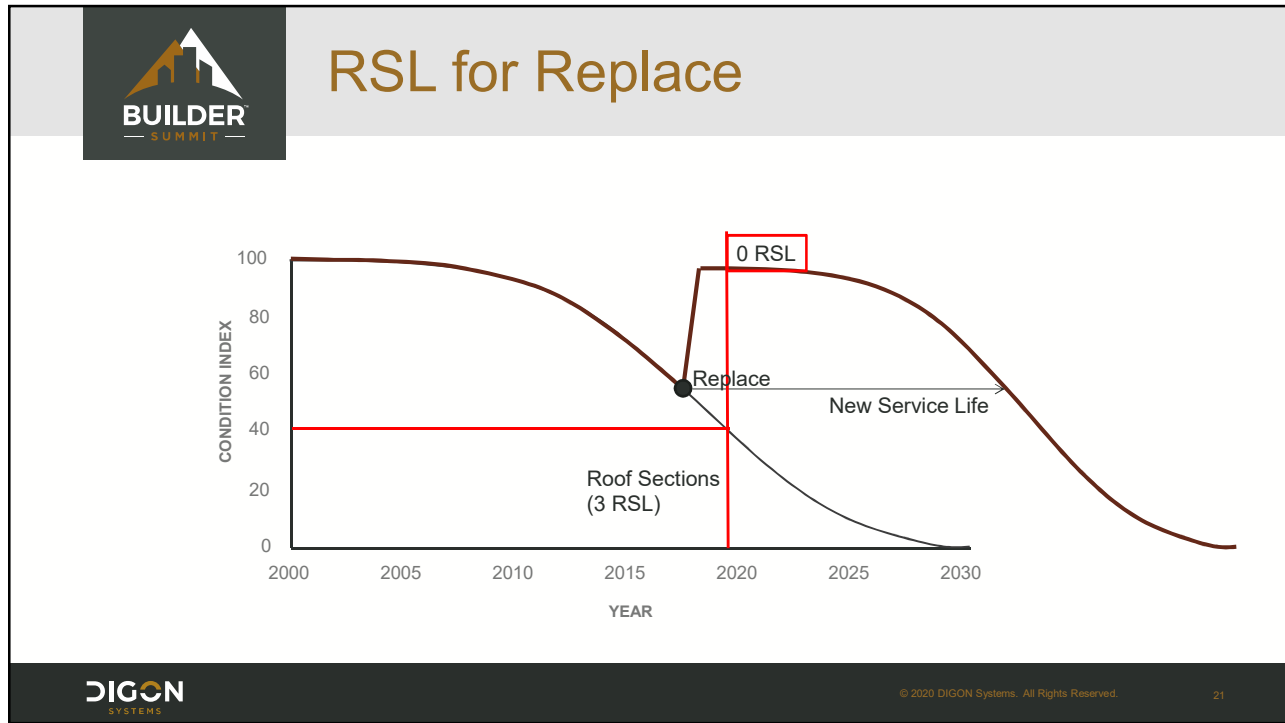


## Your Standards Set the Need for Work

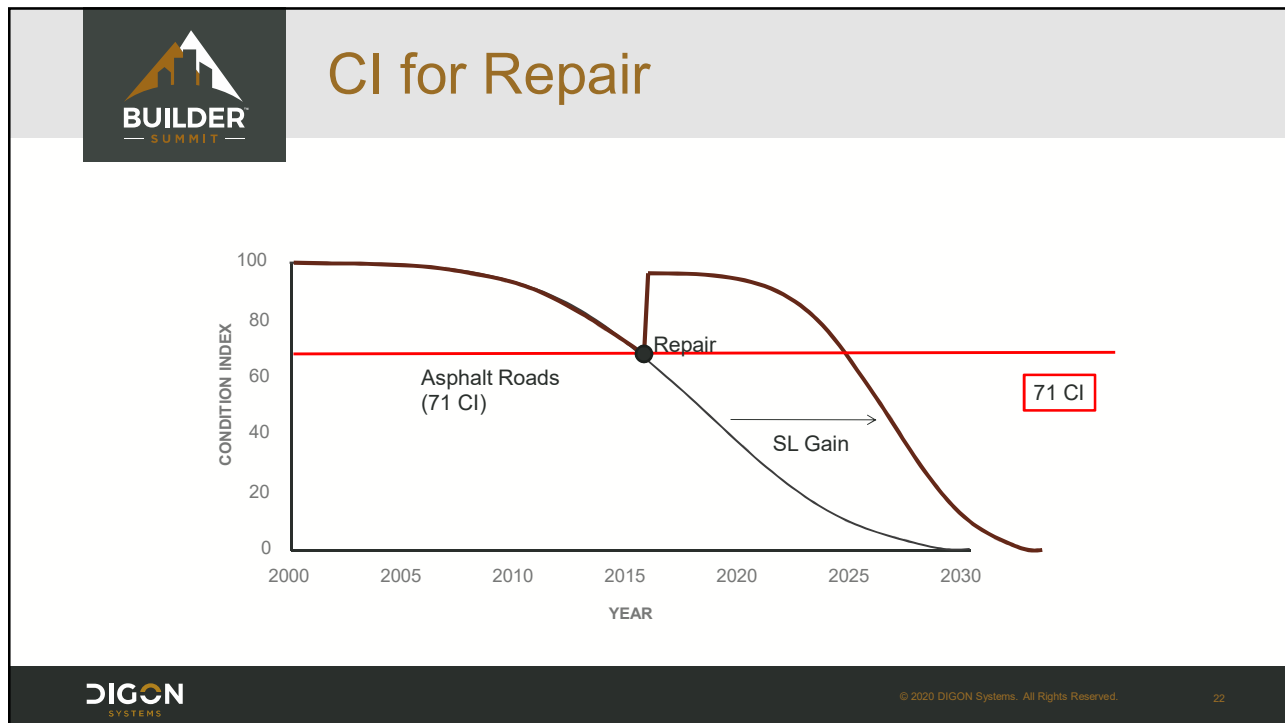
- Numerator focus

$$FCI = \left( 1 - \left( \frac{\text{Identified Work}}{\text{Current Replacement Value}} \right) \right) \times 100$$

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## Comparison Table Timeline

### Difference Between Section CI and FCI Over Time

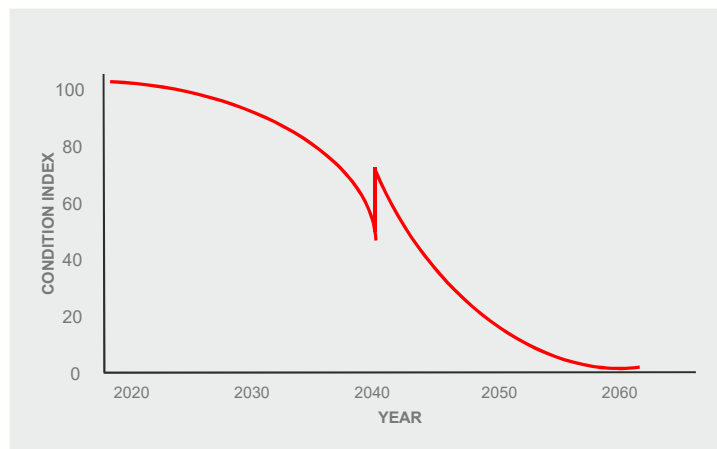
YEAR	PHYSICAL SHAPE	CI	FCI
1	New	100	100
10	50% through its life	85	100
19	Still good but needs to be replaced soon	50	100
20	Needs to be replaced	40	0
21	New because it was replaced	100	100

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## Impacts of Investment | FCI

- **FCI** improves only when work is done against BUILDER identified work items.
- **FCI** will only improve based on the estimated costs from BUILDER. Not always a real cost.



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## Impacts of Investment | BCI

- Investment can change the risk outlook of specific sections.
- Do not expect a large jump in **BCI** because the facilities have so many other sections that will be factored in the equation.


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## FCI vs BCI Review

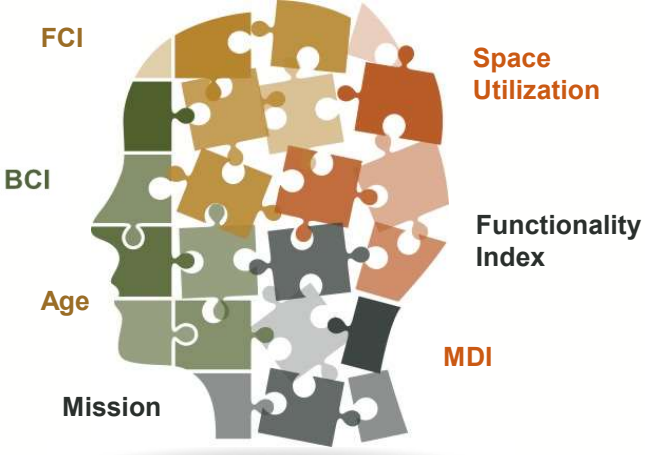
- **BCI** is a number that changes ever day as an average condition of all the different parts of the facility. Sometimes a low **BCI** is okay if the building has low condition requirements.
- **FCI** is a “financial” metric that is giving you the ratio of how much work is needed in a building compared to the building replacement cost.


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## Mosaic of Decision Metrics

- Leadership will use a mosaic of metrics to make the right facility investment decisions.
- Both **BCI** and **FCI** will play a key role in that decision






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# Thank you for attending.

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## Metrics Deep Dive

Please send feedback and future discussions to [kurt@digonsystems.com](mailto:kurt@digonsystems.com)

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