# An Introduction to Asset Management

## Webinar 3: Criticality

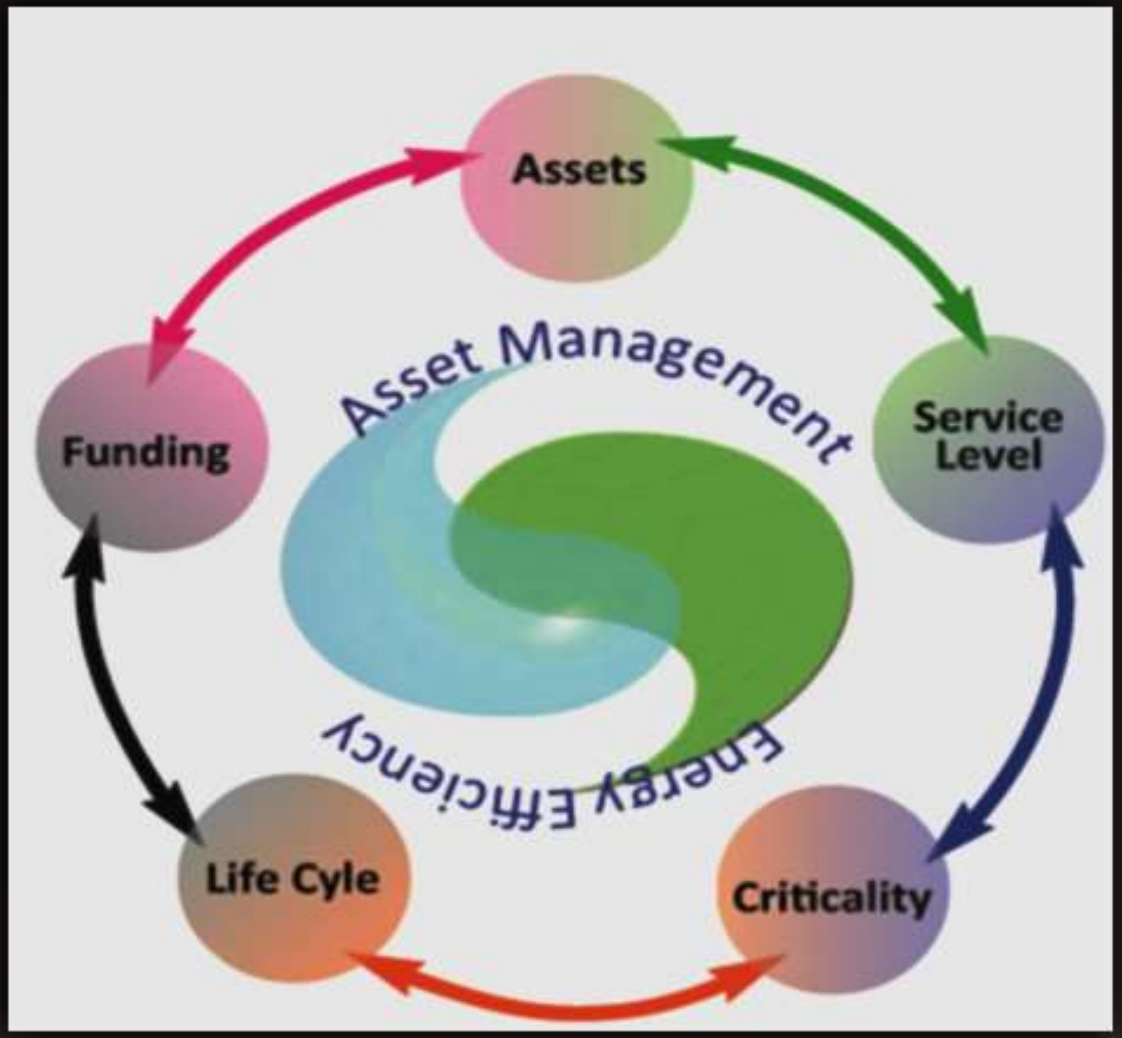
# WELCOME TO THE EFCN ASSET MANAGEMENT WEBINAR SERIES

## CORE COMPONENT 3: CRITICAL ASSETS

# WHY ASSET MANAGEMENT?

- Builds on what you already know
- Common sense approach
- Operate each asset in the most cost efficient manner
- Proactive vs. reactive operation
- Focus on understanding and managing risk

# The 5 Core Components of Asset Management



# CURRENT STATE OF THE ASSETS

What assets do I own?

Where are they located?

What condition are they in?

What is their remaining useful life?

What is their replacement value?

## CORE COMPONENT 1 - A REVIEW

# CORE COMPONENT 2 - A REVIEW

*Water utilities are first and foremost customer service businesses*

**Level of Service defines how you will operate the utility (the goals of the utility)**

# CORE COMPONENT 3 - CRITICALITY


**Not All Assets Are Equally Important**

# CRITICALITY OF ASSETS

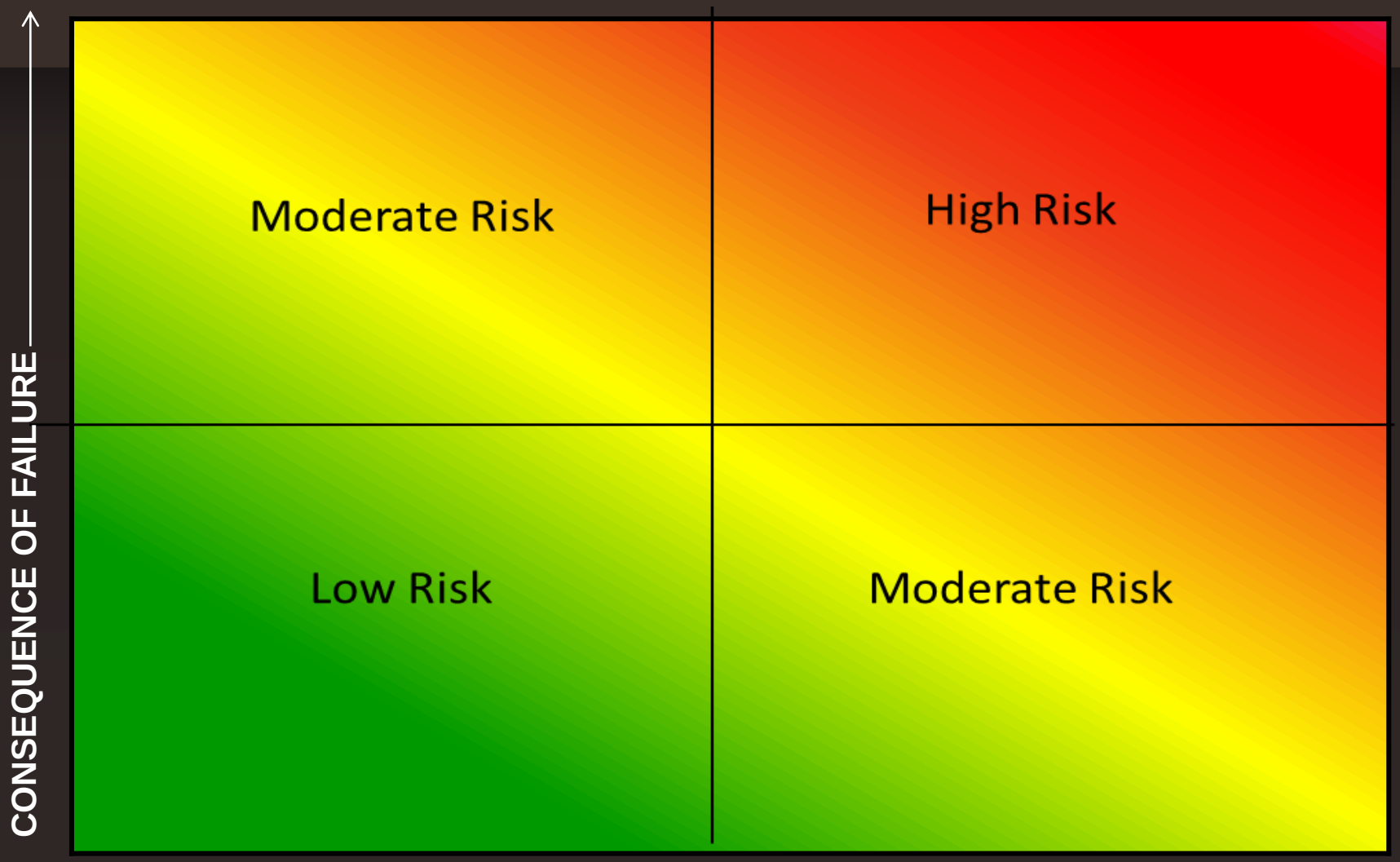
**AUDIO**


Eric Saylor,
Cincinnati, OH

What is the likelihood that an asset will fail?

What is the consequence if the asset does fail?


# ASSET RISK


Moderate Risk
High Risk
Low Risk
Moderate Risk
CONSEQUENCE OF FAILURE
PROBABILITY OF FAILURE

# FAILURE MODES

MORTALITY

LEVEL OF SERVICE

CAPACITY

FINANCIAL INEFFICIENCY

# FAILURE MODES

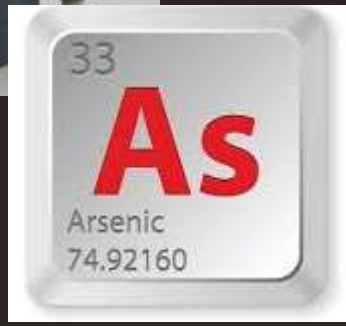
MORTALITY

# FAILURE MODES

LEVEL OF SERVICE

HAVE 4’’

NEED 6’’



# FAILURE MODES

CAPACITY

# FAILURE MODES

## FINANCIAL INEFFICIENCY

More to fix than to replace

# ASESSING CONSEQUENCES?

FINANCIAL

ENVIRONMENTAL

SOCIAL

**CONSIDER THE TRIPLE BOTTOM LINE**

# WAYS TO REDUCE RISK

| | | |
|---|---|---|
| Routine & Preventative Maintenance | Redundancy | Spare Parts |
| Specialized Training | Replace Assets Early | Monitoring |

# CALCULATING CRITICALITY

POF = PROBABILITY OF FAILURE

COF= CONSEQUENCE OF FAILURE

Redundancy Factor = RF

Criticality = POF X COF X RF

# ASSESSING CRITICALITY


# FACTORS FOR PROBABILITY OF FAILURE

| Criteria | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Age of Well | <5 years | 5 – 10 years | 10 – 20 years | 20 - 30 years | >30 years |
| Clogging History | No problems | < 1/10 yrs. | < 1/5 yrs. | 1/year | > 1/year |
| Regulatory Water Quality | No SDWA violations | < 1/10 yrs. | < 1/5 yrs. | 1/year | > 1/year |
| Aesthetic Water Quality | No complaints | <1 complaint per year | Avg. 1 complaint per month | Avg. 1 complaint per week | Avg. 1 complaint per day |
| Depth of Well | Over 500 ft. deep | 400 – 500 ft. deep | 300 – 400 ft. deep | 200 – 300 ft. deep | <200 ft. deep |

# CALCULATING CRITICALITY: AN EXAMPLE

# POF FACTORS APPLIED TO WELLS

| Well Name | Criteria 1 Age | Criteria 2 Past Clogging Problems | Criteria 3 Regulatory Water Quality | Criteria 4 Aesthetic Water Quality | Criteria 5 Well Depth | Total Score |
|---|---|---|---|---|---|---|
| Westside Well | 3 | 3 | 2 | 4 | 1 | 13 |
| Eastside Well | 2 | 5 | 2 | 2 | 5 | 16 |
| Northside Well | 4 | 2 | 3 | 5 | 2 | 16 |
| Southside Well | 2 | 1 | 4 | 1 | 3 | 11 |
| Central Well | 3 | 1 | 2 | 2 | 2 | 10 |

## CALCULATING CRITICALITY: AN EXAMPLE

# FACTORS FOR CONSEQUENCE OF FAILURE

| Criteria | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| No. of people served | <100 | 101 – 500 | 501 – 1,000 | 1,001 – 5,000 | > 5,000 |
| Cost to Replace | <250,000 | 250,000 to 500,000 | 500,000 to 1,000,000 | 1,000,000 to 1,500,000 | > 1,500,000 |
| No. of critical customers served | 0 | 1 | 2 - 5 | 5 - 10 | > 10 |
| Time to repair | < 1 day | 1 day – 1 week | 1 week - 2 weeks | 2 weeks – 1 month | > 1 month |

# CALCULATING CRITICALITY: AN EXAMPLE

# COF APPLIED TO WELLS

| Well Name | Criteria 1 Number of customers | Criteria 2 Cost of Replacement | Criteria 3 Critical Customers | Criteria 4 Time of Repair | Total Score |
|---|---|---|---|---|---|
| Westside Well | 5 | 2 | 3 | 2 | 12 |
| Eastside Well | 4 | 2 | 1 | 5 | 12 |
| Northside Well | 1 | 2 | 1 | 3 | 7 |
| Southside Well | 2 | 1 | 2 | 1 | 6 |
| Central Well | 2 | 4 | 5 | 3 | 14 |

## CALCULATING CRITICALITY: AN EXAMPLE

# REDUNDACY FACTOR

| Score | Description |
|---|---|
| 0.1 | 100% or higher redundancy |
| 0.25 | 50% to 100% redundancy |
| 0.5 | 25% to 50% redundancy |
| 0.75 | 25% or less redundancy |
| 1.0 | No redundancy |

## CALCULATING CRITICALITY: AN EXAMPLE

# REDUNDANCY FACTOR

| Well Name | Redundancy Factor |
|---|---|
| Westside Well | 0.75 |
| Eastside Well | 0.10 |
| Northside Well | 0.25 |
| Southside Well | 0.10 |
| Central Well | 1.0 |

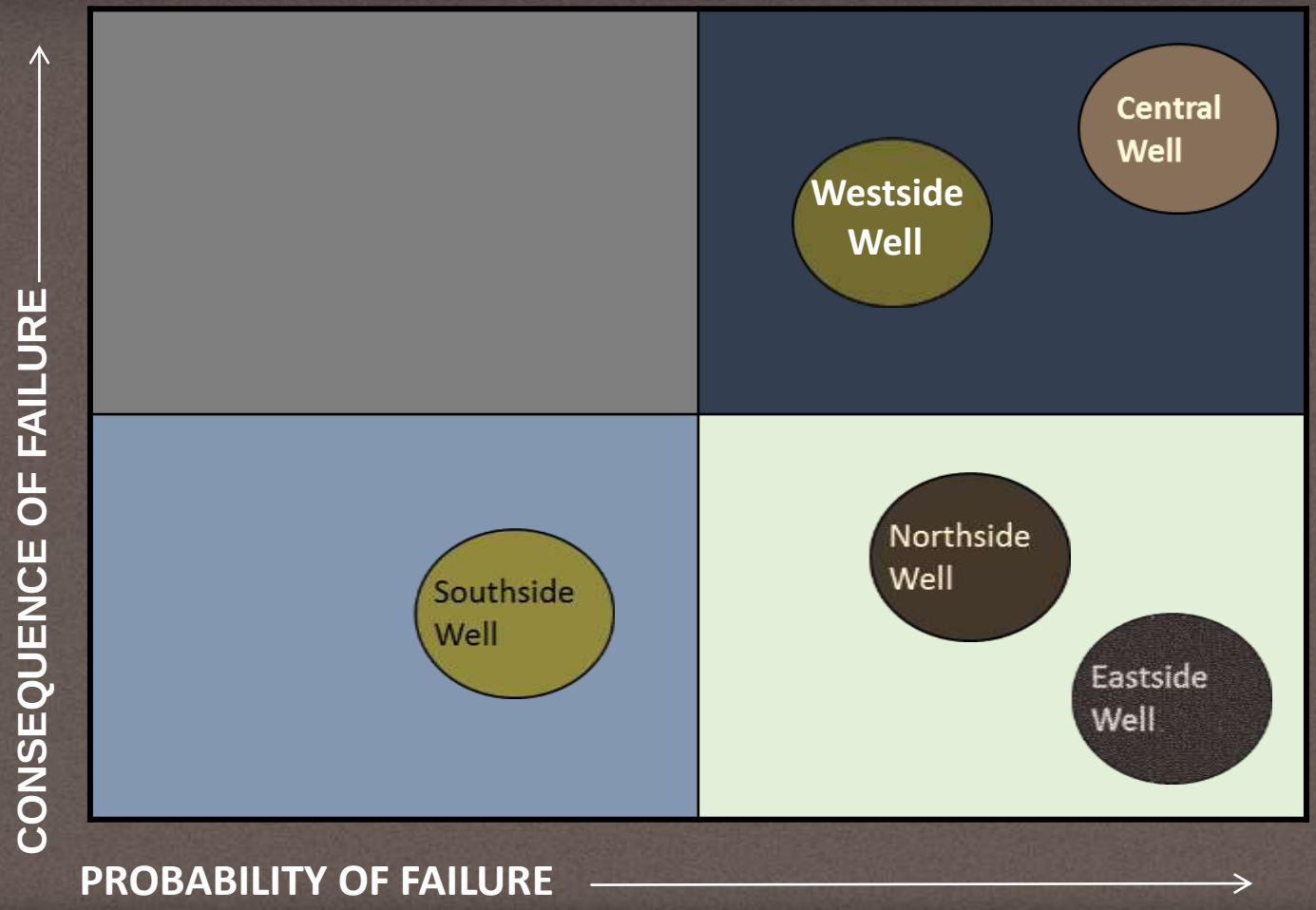
## CALCULATING CRITICALITY: AN EXAMPLE

# WELL RISK CALCULATION

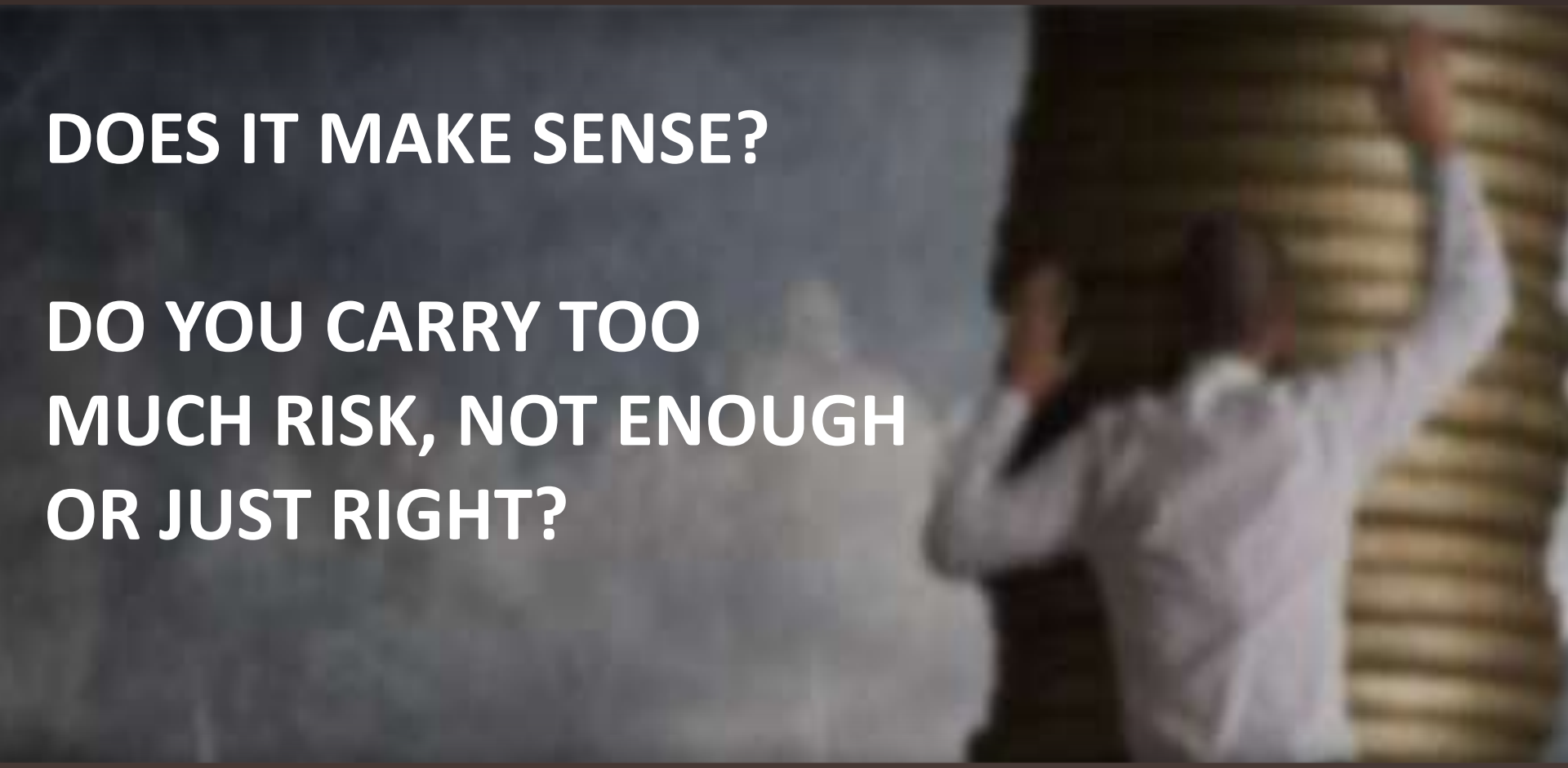
| Well Name | POF Score | COF Score | Redundancy | Total Score w/ redundancy |
|---|---|---|---|---|
| Westside Well | 13 | 12 | 0.75 | 117 |
| Eastside Well | 16 | 12 | 0.10 | 19.2 |
| Northside Well | 16 | 7 | 0.25 | 28 |
| Southside Well | 11 | 6 | 0.10 | 6.6 |
| Central Well | 10 | 14 | 1.0 | 140 |

## CALCULATING CRITICALITY: AN EXAMPLE

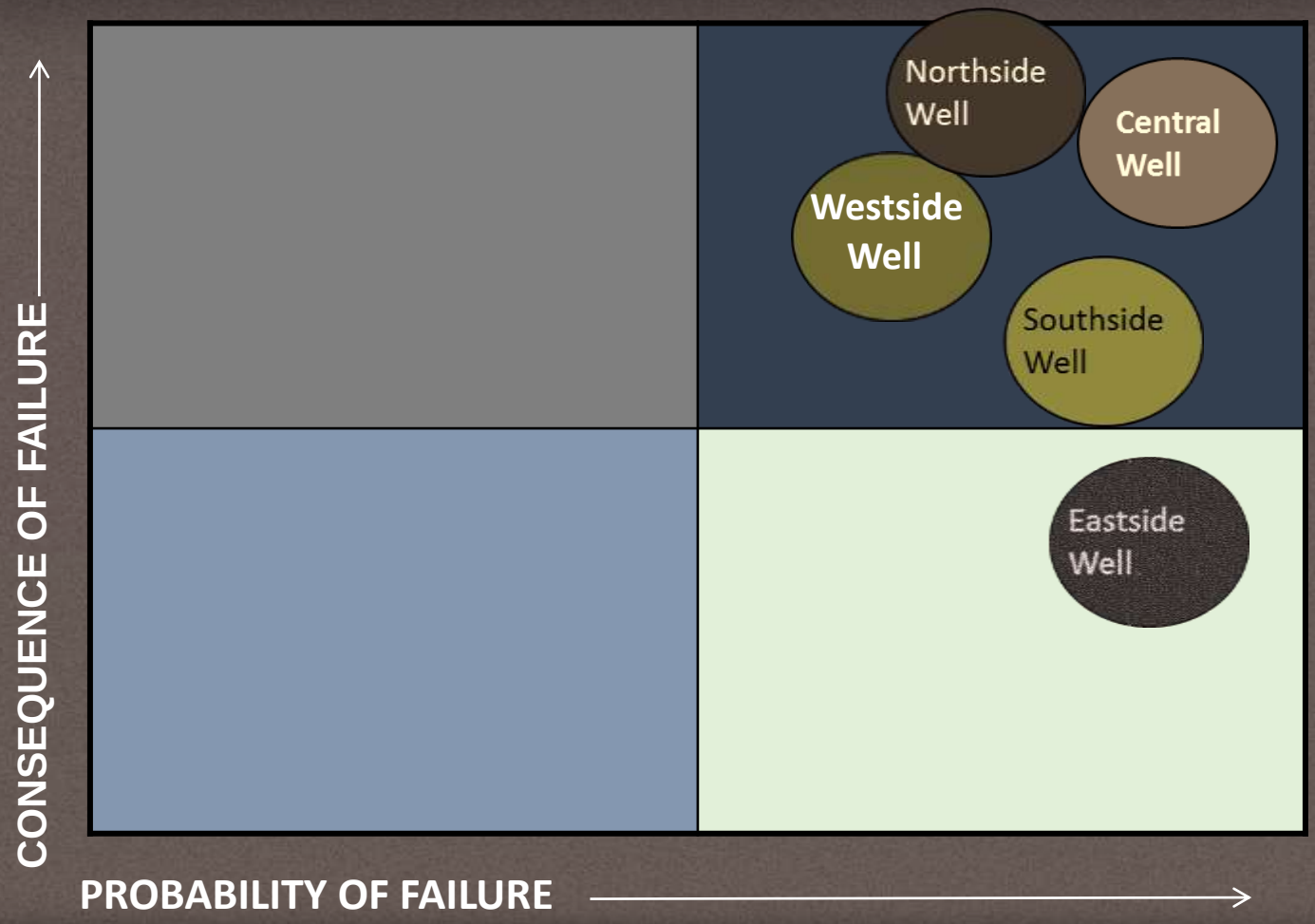
# VISUAL DISPLAY OF EXAMPLE DATA



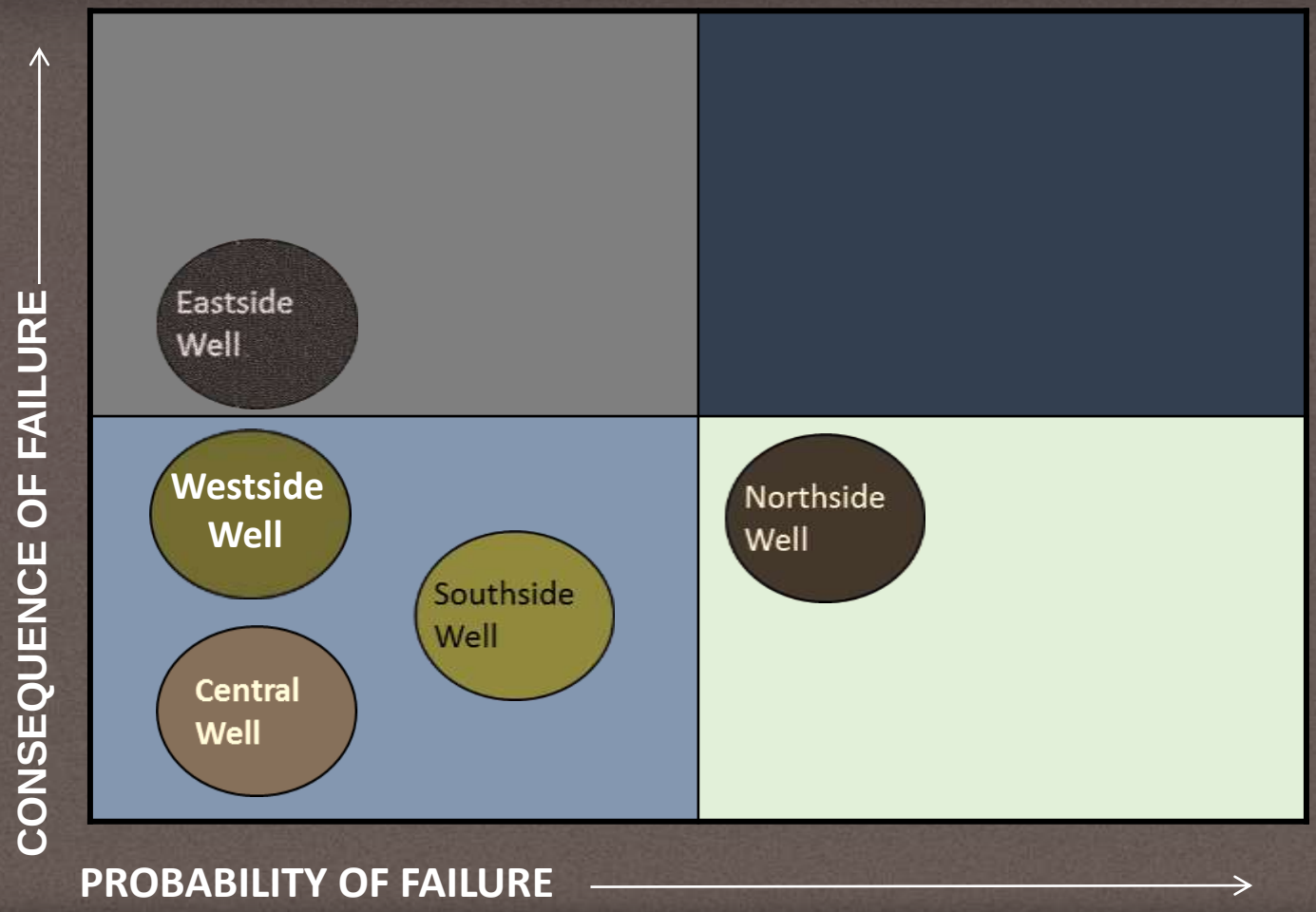
# WHAT DOES THE DATA SAY?



# WHAT IF IT LOOKED LIKE THIS?



# OR THIS?


CONSEQUENCE OF FAILURE
Eastside Well
Westside Well
Southside Well
Central Well
Northside Well
PROBABILITY OF FAILURE

# WHAT DOES THE DATA SAY?

# CRITICALITY CHANGES

- ✓ CRITICALITY IS NOT STATIC
- ✓ EACH DAY CRITICALITY CHANGES SLIGHTLY
- ✓ NEED TO REASSESS CRITICALITY AT LEAST EVERY YEAR IF NOT SOONER
- ✓ REASSESS WHEN MAJOR CHANGES ARE MADE (UPGRADES, REPLACEMENTS, MAJOR CONSTRUCTION, REHABILITATION, REDUNDANCY ADDED)

# CRITICALITY IN ACTION

Frank Roth, ABCWUA, Albuquerque, NM

# TAKING IT TO YOUR FACILITY

## DEVELOP YOUR TEAM

# TAKING IT TO YOUR FACILITY

COMPLETE INTERACTIVE ASSET MANAGEMENT IQ TOOL

http://southwestefc.unm.edu/assetManagementIQ/main.php

# TAKING IT TO YOUR FACILITY

PICK A CLASS OF ASSETS TO TRY CRITICALITY RANKING

# TAKING IT TO YOUR FACILITY

CHOOSE A SET OF CRITERIA FOR PROBABILITY OF FAILURE FOR THAT ASSET CLASS

# TAKING IT TO YOUR FACILITY

CHOOSE A SET OF CRITERIA FOR CONSEQUENCE OF FAILURE FOR THAT ASSET CLASS

# TAKING IT TO YOUR FACILITY

APPLY RANKING CRITERIA TO EACH OF YOUR POF AND COF FACTORS

# TAKING IT TO YOUR FACILITY

DETERMINE IF THERE IS ANY REDUNDANCY FOR THAT CLASS OF ASSETS

# TAKING IT TO YOUR FACILITY

APPLY POF AND COF FACTORS FOR YOUR ASSETS AND DETERMINE RISK OF EACH ASSET IN THAT CLASS

# TAKING IT TO YOUR FACILITY

## MAKE A VISUAL REPRESENTATION OF THE DATA

# TAKING IT TO YOUR FACILITY

THINK ABOUT WHAT THE DATA TELLS YOU


WE WANT TO THANK
EPA FOR PROVIDING
FUNDING FOR THIS
PROJECT

Smart Management for Small Water Systems

# CONTACT US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