12th Annual

ENERGY/FACILITIES CONNECTIONS

WASHINGTON STATE UNIVERSITY EXTENSION ENERGY PROGRAM

Total Building Management—From Cradle to Grave

Facility Condition Assessments Basic & Enhanced:

Proactive Facilities Asset Management

Presented By: Joel Davis, Principal, Director of Research

Doug Smith, Director of Engineering

MENG ANALYSIS

Basic & Enhanced FCA
Proactive Asset Management

- Performance Assessment based on 2015 EFC Theme: “Staying Smarter than your Buildings”
- 2015 EFC Presentation “Learn what your Buildings are telling You” through “Performance Assessment” in conjunction with AM/FCA programs.
- Packed room with strong interest, but many not familiar with basic FCA; hence this 2016 “FCA Basic & Enhanced (101 & 102)” presentation.

Basic & Enhanced FCA
Proactive Asset Management

Presentation Overview

Introduction to FCA
- 2% Rule
- WA State FCA Programs: JLARC; SBCTC; DSHS
- GASB 34, FCA & PCA

Fundamental FCA
- Prepare, Survey, Report

Exercise!
- UNIFORMAT II - Assessment

Enhanced FCA
- Costs Audits, Studies & Testing

Future of FCA
- ISO 55 Asset Management
- Performance Assessment

Basic & Enhanced FCA
Proactive Asset Management

INTRODUCTIONS

Basic & Enhanced FCA
Proactive Asset Management

FCA EXPERTS

- *Local Systems*
- *Local Costs*
- *Local FCA Team*

Basic & Enhanced FCA
Proactive Asset Management



O Romeo, Romeo! wherefore art thou Romeo?....

....

What's in a name? that which we call a rose
By any other name would smell as sweet;



Basic & Enhanced FCA
Proactive Asset Management

BCE: Building Condition Evaluations

BCA: Building Condition Assessment

(qualitative buildings, + systems to 5' from perimeter)

FCS: Facility Condition Surveys

PCA: Property Condition Assessment – real estate due diligence (Purchase/Sale) - ASTM 2018

baseline PCA of commercial real estate…PCA should be conducted by a field observer…not to be construed as technically exhaustive… representative observations is to convey to the user the expected magnitude of commonly encountered or anticipated conditions…

FCA: Facility Condition Assessment

(buildings + site infrastructure + options)

process of a qualified group of trained industry professionals performing an analysis of the condition of a facility or group of facilities that may vary in terms of age, design, construction methods, and materials…

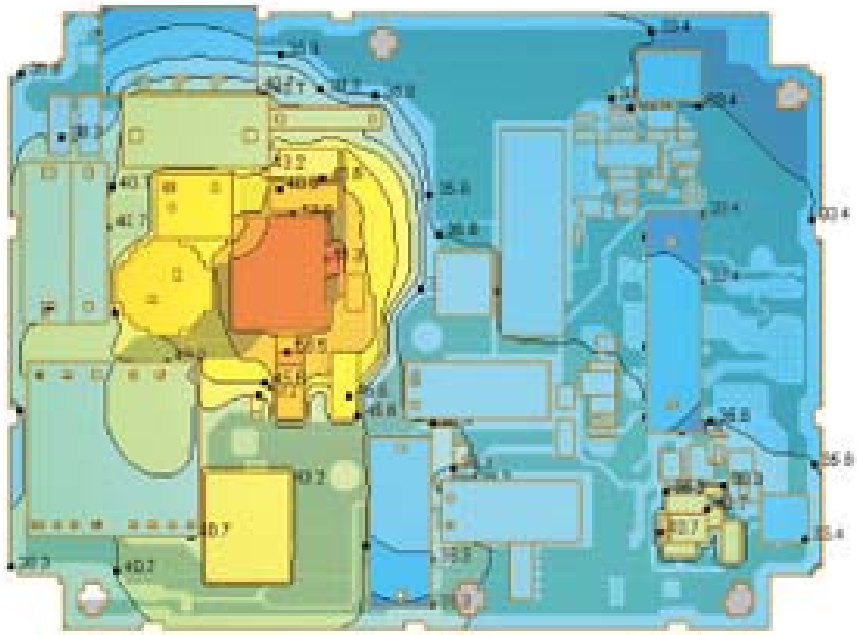
Basic & Enhanced FCA
Proactive Asset Management

TERMINOLOGY, TAXONOMY & ACRONYMITY

- OSPI: BCEF – Building Condition Assessment (BCA)
- GASB 34 – Federal Condition Assessment (FCA)
- ASTM 2018 – Property Condition Assessment (PCA)
- Navy & NASA Parametric FCA
- Facility Condition Index (FCI)
- Deferred Maintenance (DM)
- Backlog in Maintenance & Repair (BMAR)
- Current Replacement Value (CRV)
- Remaining Useful Life (RUL)
- Rapid Visual Inspection (RVI)

MUST MEASURE TO MANAGE

Basic & Enhanced FCA
Proactive Asset Management

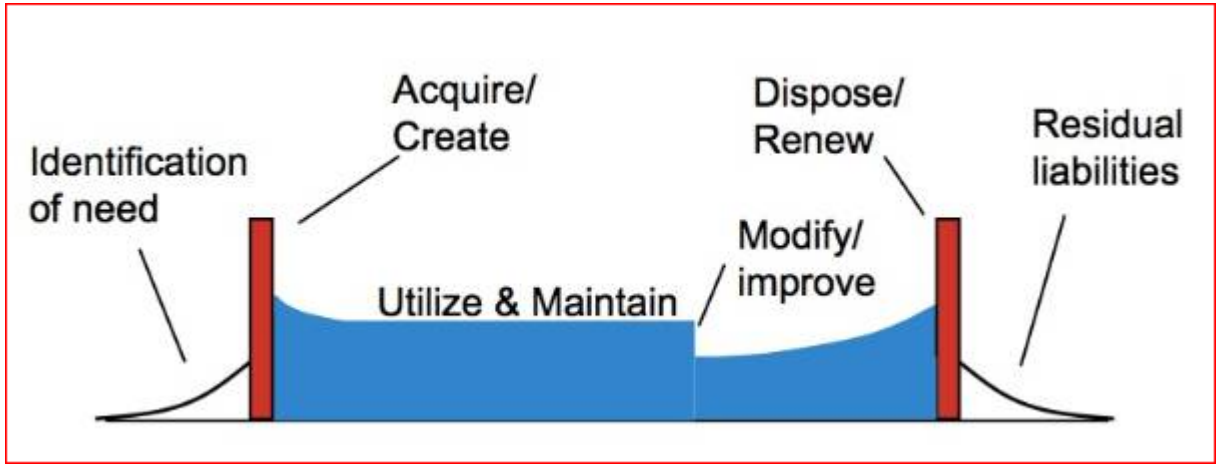


CRADLE TO GRAVE?

Basic & Enhanced FCA
Proactive Asset Management

TOTAL BUILDING MANAGEMENT: CRADLE TO GRAVE?

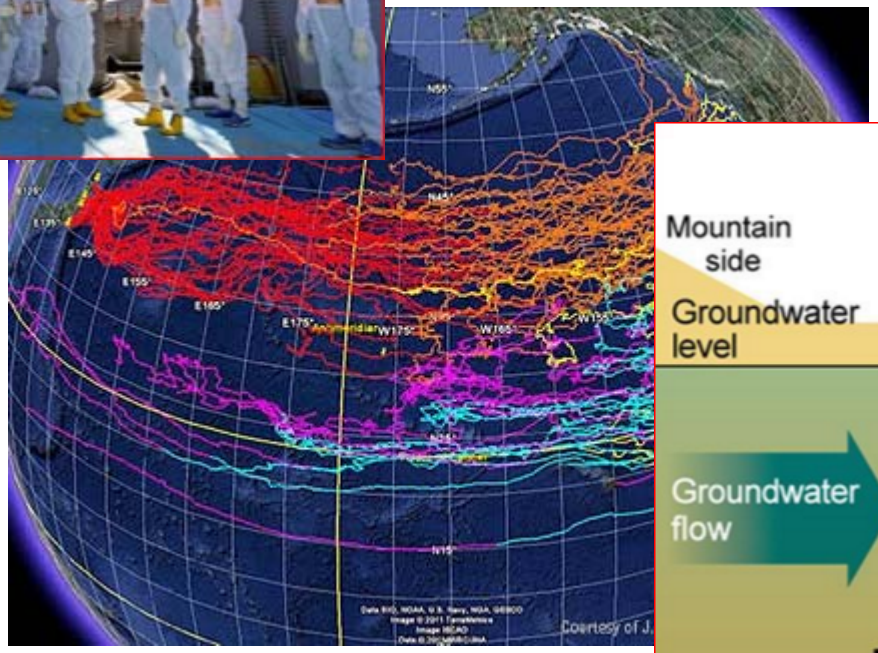
What about the fun before the cradle?

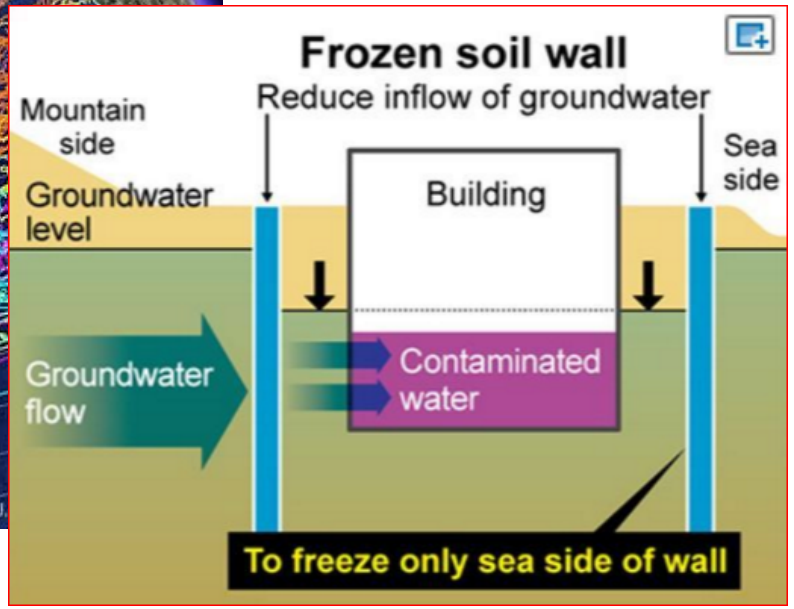


Or the lingering memories of life after death?

Basic & Enhanced FCA
Proactive Asset Management

TEPCO's Fukushima Legacy





Basic & Enhanced FCA
Proactive Asset Management

TOTAL BUILDING MANAGEMENT: CRADLE TO GRAVE?

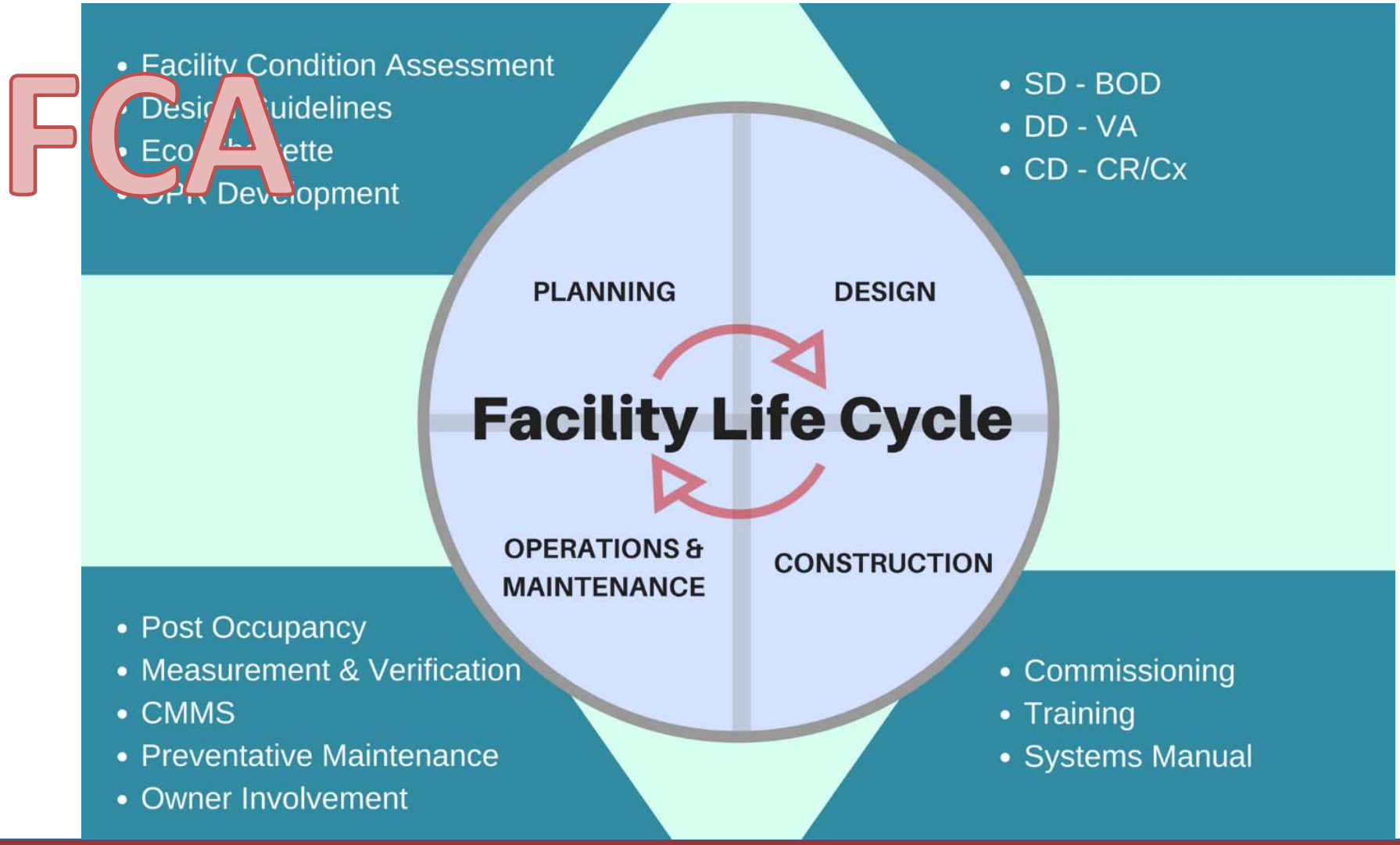
or….

From Lust… to Dust…

Basic & Enhanced FCA
Proactive Asset Management

TOTAL BUILDING MANAGEMENT: CRADLE TO GRAVE?

Basic & Enhanced FCA
Proactive Asset Management



Basic & Enhanced FCA
Proactive Asset Management

FUNDAMENTAL FCA PROCESS

Condition

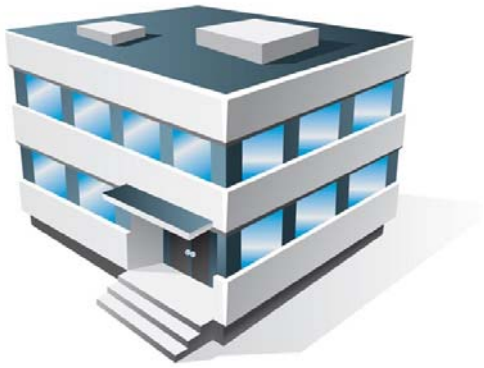
"Fair"

Collect Data

Analyze Data

Plan Budget Implement

Performance



"Excellent!"

Basic & Enhanced FCA
Proactive Asset Management

1. Preparation

- Facility List, Site & Floor Plans, Historical Data, O&M Workshop

2. Condition Surveys

- Field Survey using RVI
- Data Entry

3. Reporting

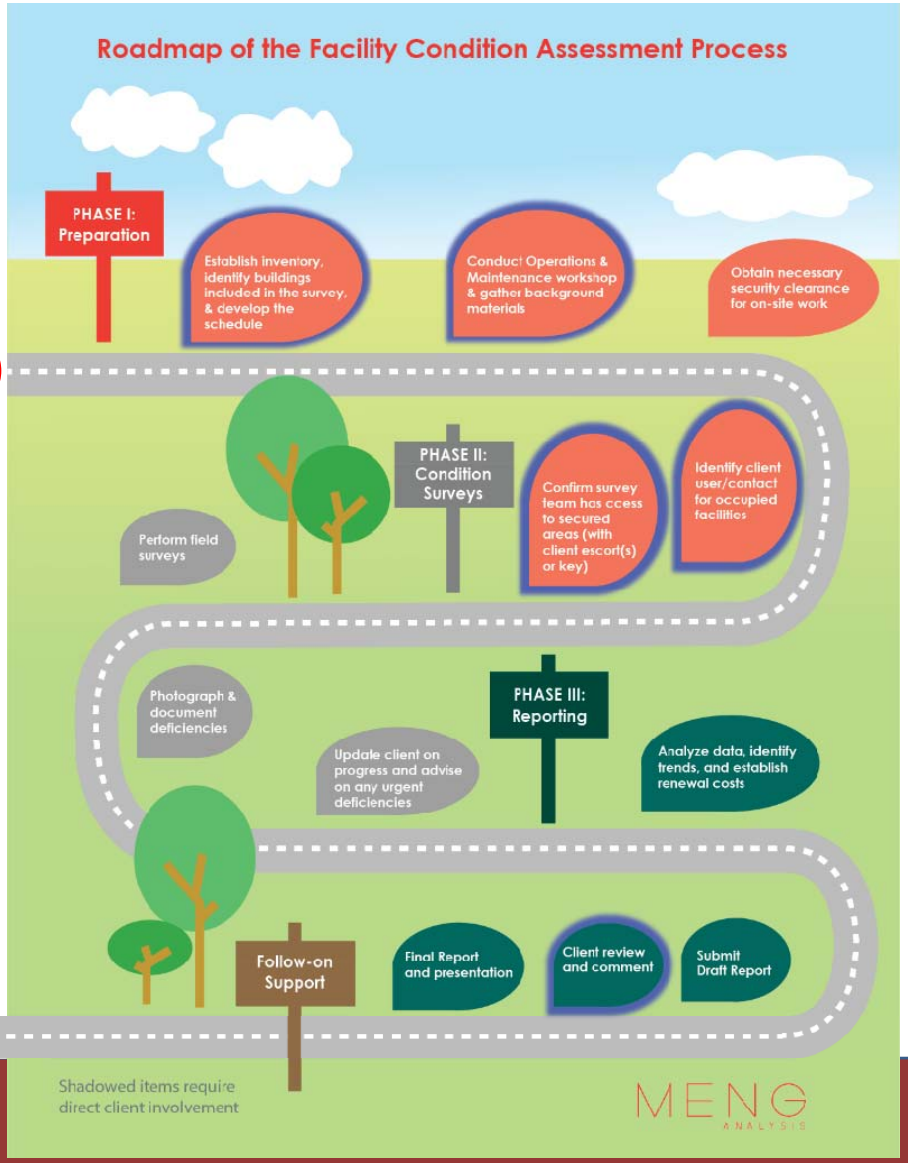
- Analysis
- Project Planning & Budgeting

Periodic Updates: 3 - 6 years

Basic & Enhanced FCA
Proactive Asset Management

FCA Roadmap

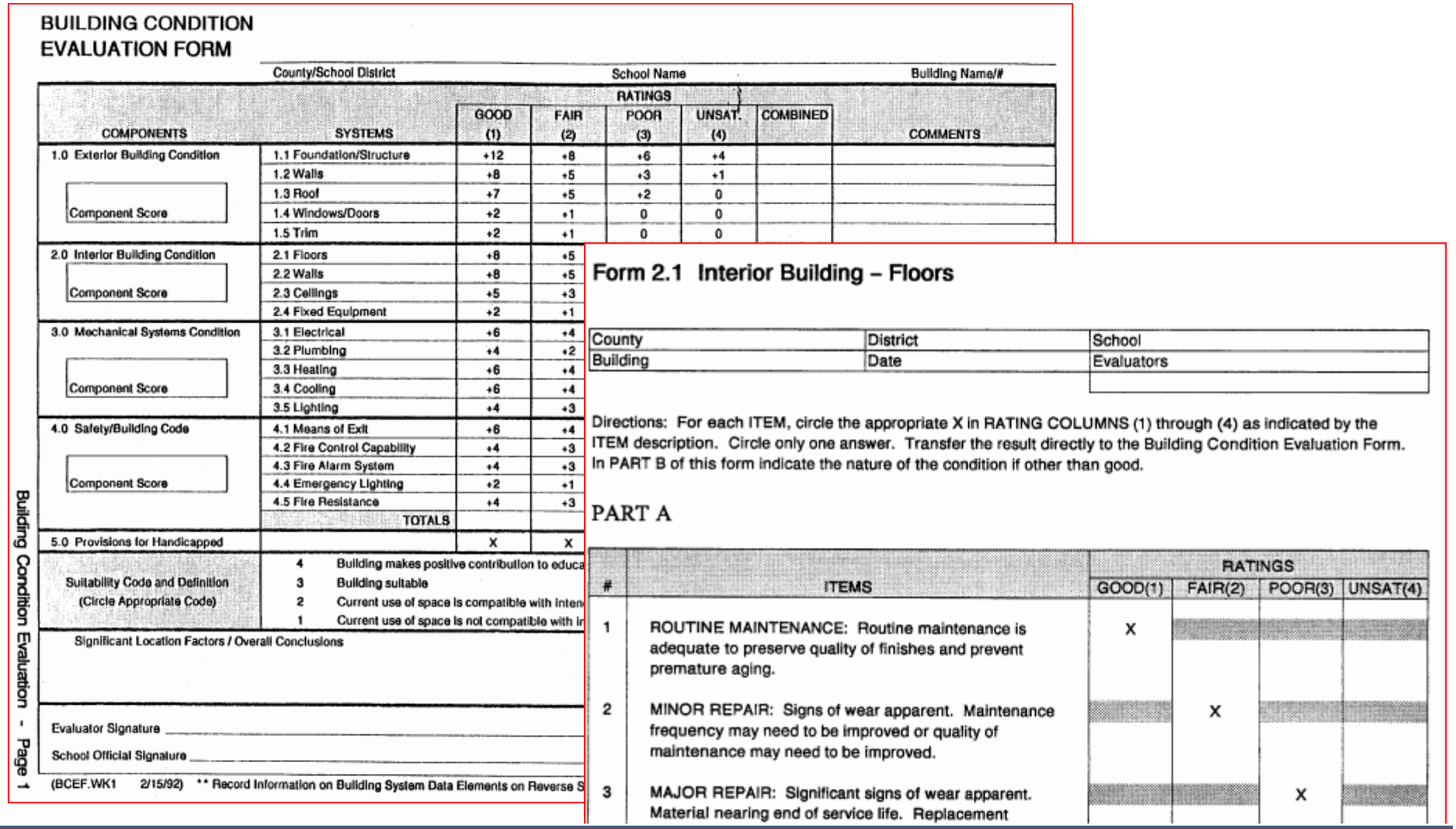
Milestones



SOW

MESSAGE

Basic & Enhanced FCA
Proactive Asset Management



BUILDING CONDITION EVALUATION FORM

County/School District | School Name | Building Name/#

COMPONENTS	SYSTEMS	RATINGS GOOD (1)	FAIR (2)	POOR (3)	UNSAT. (4)	COMBINED	COMMENTS
1.0 Exterior Building Condition	1.1 Foundation/Structure	+12	+8	+6	+4		
	1.2 Walls	+8	+5	+3	+1		
Component Score	1.3 Roof	+7	+5	+2	0		
	1.4 Windows/Doors	+2	+1	0	0		
	1.5 Trim	+2	+1	0	0		
2.0 Interior Building Condition	2.1 Floors	+8	+5				
	2.2 Walls	+8	+5				
Component Score	2.3 Ceilings	+5	+3				
	2.4 Fixed Equipment	+2	+1				
3.0 Mechanical Systems Condition	3.1 Electrical	+6	+4				
	3.2 Plumbing	+4	+2				
Component Score	3.3 Heating	+6	+4				
	3.4 Cooling	+6	+4				
	3.5 Lighting	+4	+3				
4.0 Safety/Building Code	4.1 Means of Exit	+6	+4				
	4.2 Fire Control Capability	+4	+3				
Component Score	4.3 Fire Alarm System	+4	+3				
	4.4 Emergency Lighting	+2	+1				
	4.5 Fire Resistance	+4	+3				
	TOTALS						
5.0 Provisions for Handicapped		X	X				

Suitability Code and Definition (Circle Appropriate Code)		
	4	Building makes positive contribution to educa
	3	Building suitable
	2	Current use of space is compatible with inten
	1	Current use of space is not compatible with in

Significant Location Factors / Overall Conclusions

Evaluator Signature _____

School Official Signature _____

(BCEF.WK1 2/15/92) ** Record Information on Building System Data Elements on Reverse S

Building Condition Evaluation - Page 1

Form 2.1 Interior Building – Floors

County	District	School
Building	Date	Evaluators

Directions: For each ITEM, circle the appropriate X in RATING COLUMNS (1) through (4) as indicated by the ITEM description. Circle only one answer. Transfer the result directly to the Building Condition Evaluation Form. In PART B of this form indicate the nature of the condition if other than good.

PART A

#	ITEMS	RATINGS GOOD(1)	FAIR(2)	POOR(3)	UNSAT(4)
1	ROUTINE MAINTENANCE: Routine maintenance is adequate to preserve quality of finishes and prevent premature aging.	X			
2	MINOR REPAIR: Signs of wear apparent. Maintenance frequency may need to be improved or quality of maintenance may need to be improved.		X		
3	MAJOR REPAIR: Significant signs of wear apparent. Material nearing end of service life. Replacement			X	

Basic & Enhanced FCA
Proactive Asset Management

Active Buildings	Gross SqFt	Instr SqFt	SCAP SqFt	Classrooms	Condition
Main Building	63,136	63,136	63,136	25	62.93
Portable 1	0	0	0	1	not required
Portable 2	0	0	0	1	not required
Portable 3	0	0	0	2	not required
Totals: **4**	**63,136**	**63,136**	**63,136**	**29**	print all

Details | Inventory | Condition | Log

Ratings BCA Certified by Joel Davis on 2/24/2014

Sub-Assembly	Component	Condition Rating E	G	F	P	U	N/A	Component Score	Priority L	M	H	BCA Certify
Foundations												
A1010	Standard Foundation	☐	☑	☐	☐	☐	☐	90%	☐	☐	☐	| Deficiencies | Quantities |
Slabs on Grade												
A4010	Standard Slabs on Grade	☐	☑	☐	☐	☐	☐	90%	☐	☐	☐	| Deficiencies | Quantities |
Superstructure												
B1010	Floor Construction	☐	☑	☐	☐	☐	☐	90%	☐	☐	☐	| Deficiencies | Quantities |
B1020	Roof Construction	☐	☑	☐	☐	☐	☐	90%	☐	☐	☐	| Deficiencies | Quantities |
B1080	Stairs	☐	☐	☑	☐	☐	☐	62%	☐	☐	☐	| Deficiencies | Quantities |
Exterior Vertical Enclosures												
B2010	Exterior Walls	☐	☐	☑	☐	☐	☐	62%	☐	☐	☐	| Deficiencies | Quantities |
B2020	Exterior Windows	☐	☐	☑	☐	☐	☐	62%	☐	☐	☐	| Deficiencies | Quantities |
B2050	Exterior Doors and Grilles	☐	☐	☑	☐	☐	☐	62%	☐	☐	☐	| Deficiencies | Quantities |
Exterior Horizontal Enclosures												
B3010	Roofing	☐	☐	☐	☐	☑	☐	0%	☐	☐	☐	| Deficiencies | Quantities |
B3020	Roof Appurtenances	☐	☐	☑	☐	☐	☐	62%	☐	☐	☐	| Deficiencies | Quantities |

Basic & Enhanced FCA
Proactive Asset Management

Building Inventory

AREA YEAR BUILT	DISTRICT ASSIGNED AREA	GROSS BUILDING SQ FT	GROSS INSTRUCTIONAL SQ FT	SCAP RECOGNIZED SQ FT	ORIGINAL OCCUPANCY DATE	ORIGINAL BOARD ACCEPTANCE DATE
1923	Area A	54,706	54,706	54,706		3/21/2012
1923	Area D	5,386	5,386	5,386		3/21/2012
1923	Area B	67,008	67,008	67,008		3/21/2012
1923	Area L	18,646	0	0		
1923	Area C	58,645	58,645	58,645		3/21/2012
	Building Totals	**204,391**	**185,745**	**185,745**		

Building Components

SUB-ASSEMBLY	COMPONENT	COMPONENT CODE	MAINTENANCE PRIORITY	CONDITION RATING
Foundations	Standard Foundation	A1010		62.00% Fair
	Deficiencies:	Other		
	Causes:	Other		
	Deficiency Comments:	Wear and tear		
Superstructure	Floor Construction	B1010		90.00% Good
	Roof Construction	B1020		90.00% Good
	Stairs	B1080		90.00% Good
Exterior Vertical Enclosures	Exterior Walls	B2010		90.00% Good
	Exterior Windows	B2020		0.00% Unsatisfactory
	Deficiencies:	Other		
	Causes:	Other		
	Deficiency Comments:	Wood single glazed with wood frames at original construction. Double glazed aluminum windows at additions.		
	Exterior Doors and Grilles	B2050		0.00% Unsatisfactory

Basic & Enhanced FCA
Proactive Asset Management

1) THOROUGHNESS OF ORGANIZATION

UNIFORMAT II – ASTM

UniFormat ™ – CSI

2) CONSISTENCY OF SCORING

1 – 5: Excellent - Unsatisfactory

3) TRACKING CONDITION SCORES OVER TIME

Consistent Replication of Assessment Process

Basic & Enhanced FCA
Proactive Asset Management

WHY FCAs ????

- Government Reporting Requirements (GASB 34; 2% Rule)
- Lender Financial Risk Mitigation
- Pre-Purchase Due Diligence: Real Estate Negotiation
- Establish Lease Rate Models (i.e., O&M cost recovery)
- Establish Maintenance Reserve Funds
- Capital Planning
- O&M Planning

  Beyond the Curb Appeal: O&M Funding - Victims of Success

Basic & Enhanced FCA
Proactive Asset Management

PVC w/Hydronics???

Basic & Enhanced FCA
Proactive Asset Management

System is at
End of Useful Life
…
but roof location
Is out of sight, and
Out of Mind.

Basic & Enhanced FCA
Proactive Asset Management

Pneumatic T-Stats
User Modifications

Basic & Enhanced FCA
Proactive Asset Management

Lift Station Debris

Basic & Enhanced FCA
Proactive Asset Management

Obsolete Technology
Relay vs. Digital
Elevator Controls

Basic & Enhanced FCA
Proactive Asset Management

Roof Drainage to Foundation

Basic & Enhanced FCA
Proactive Asset Management

Green Roofs

Painted Metal

Basic & Enhanced FCA
Proactive Asset Management

Basic & Enhanced FCA
Proactive Asset Management

Site Name:
Facility Name:

Group Exercise

EFC 2016 Conc
Surveyor: Surve

Interiors: Interior Finishes

Element	Evaluation Criteria Appearance, painting and staining, suitability, maintainability, adhesion	Original System Date	Last Major System Renewal	Score (1 - 5)	Remainin Useful Lif (Yrs)
Wall Finishes **C3010**	Applied wall finishes, painting, plastering, tile, acoustic wall coverings, special wall finishes. Excludes wallboard integral to interior walls and partitions. 1 – Excellent: New; No damage or defects; no finish degradation. Preventative inspection. 2 – Good: Finishes clean with no scratches or cracks. Good caulking and trim at joints. Minor preventative maintenance. 3 – Fair: Finishes are worn or soiled, minor surface cracks or dents. Preventative maintenance and minor restorative repairs of isolated items. 4 – Poor: significant staining, isolated cracks or physical damage. Restorative repairs. 5 – Unsatisfactory: Extensive damage beyond repair, fallen titles or plaster with some damage to substrate. Replacement.				

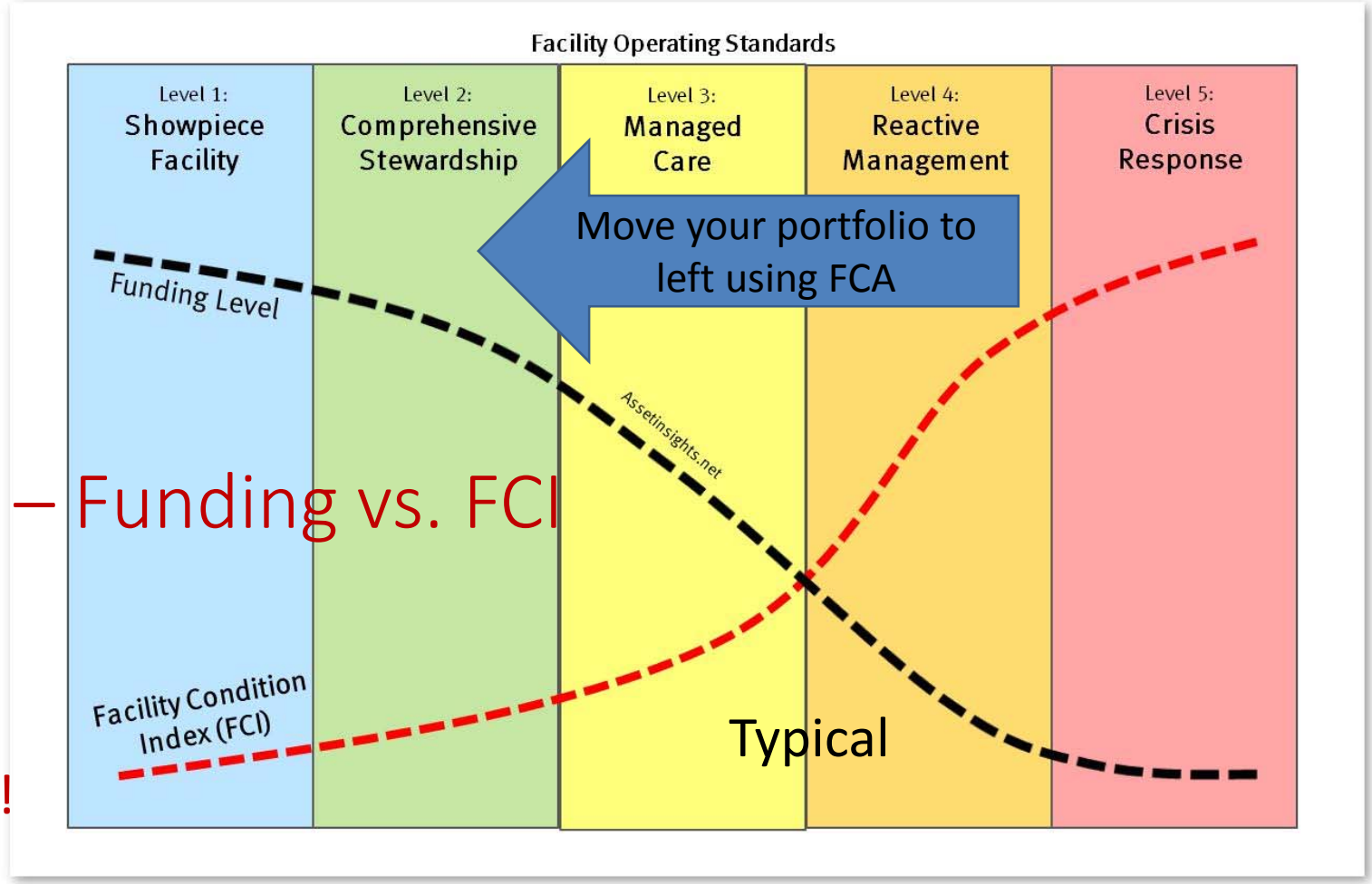
Describe the System

Deficiency present [ ]

General Comments on the System

Basic & Enhanced FCA
Proactive Asset Management

Basic & Enhanced FCA
Proactive Asset Management

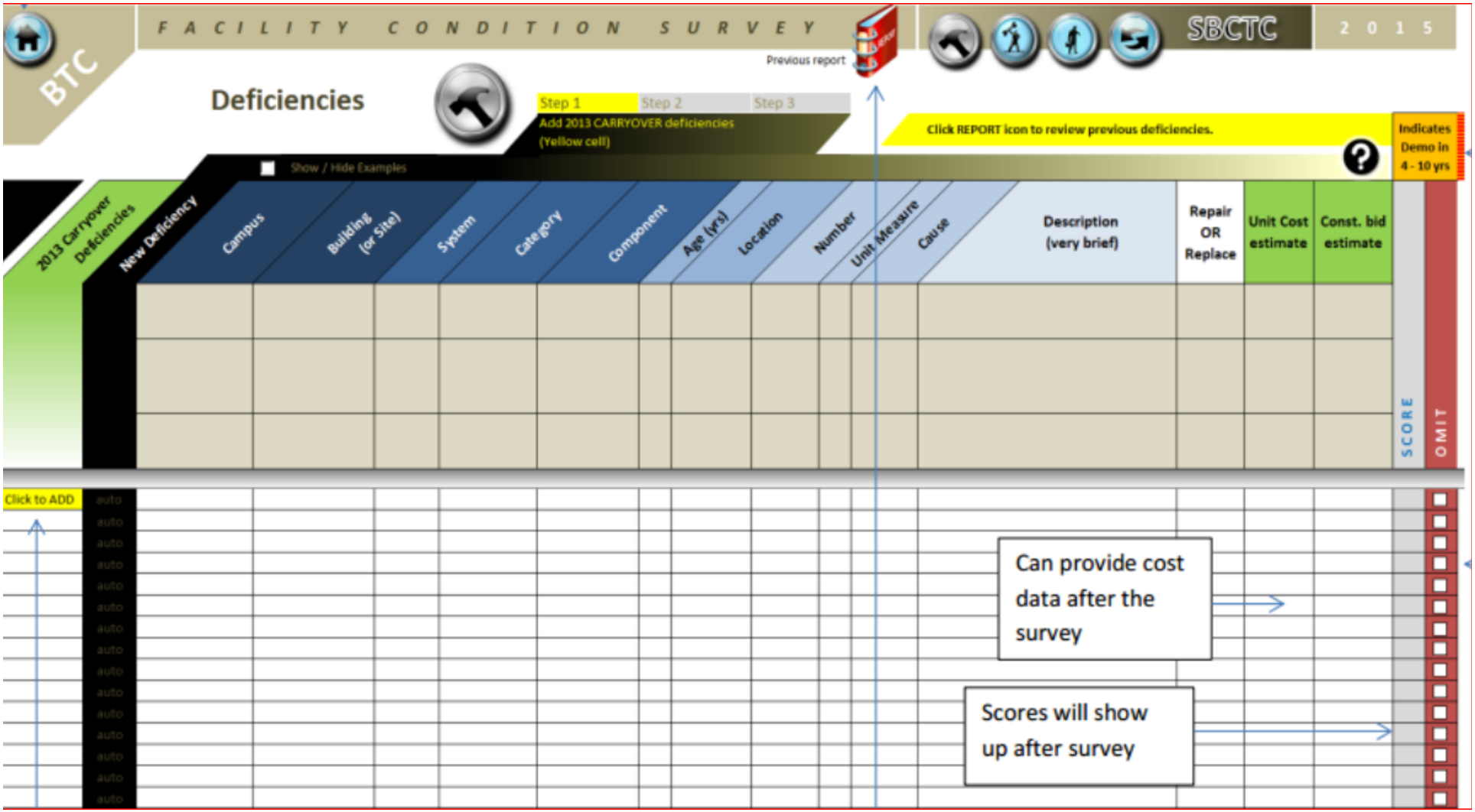


Bad!

FCA – Funding vs. FCI

Good!

Basic & Enhanced FCA
Proactive Asset Management



Basic & Enhanced FCA
Proactive Asset Management

MAINTENANCE RESERVE FUNDS

2% Rule

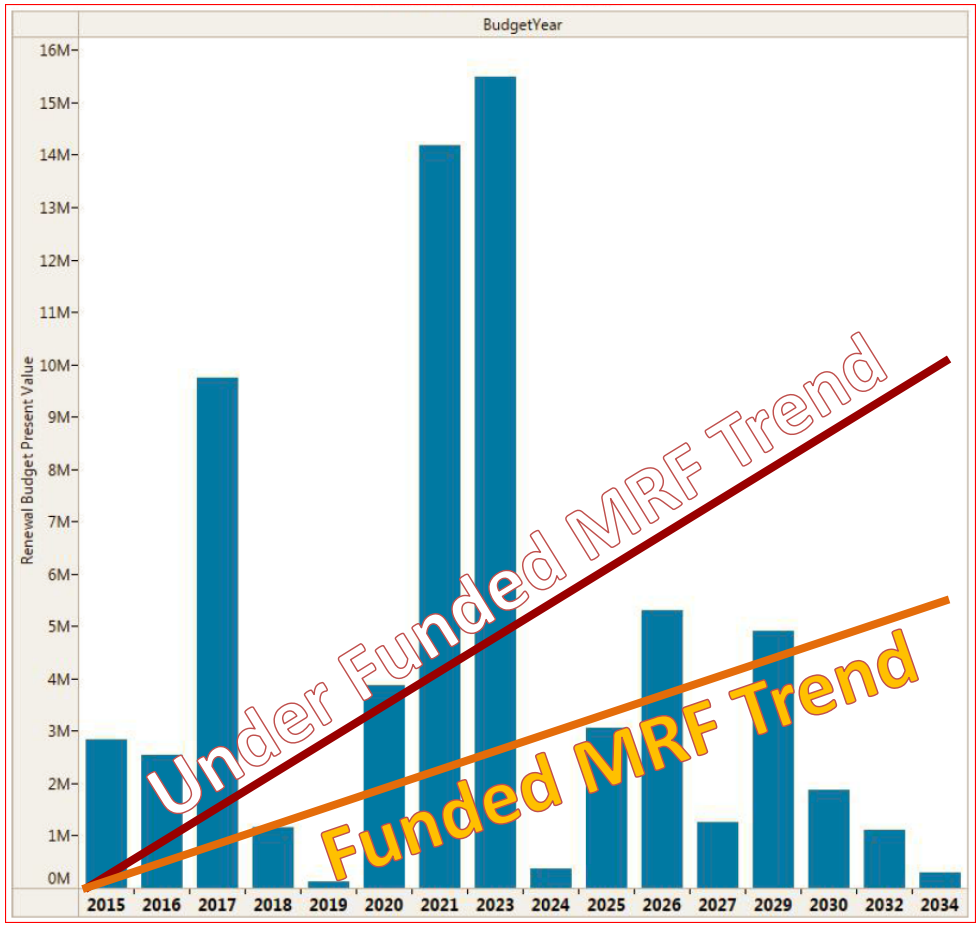
110% Capital Funding

Do Nothing

- Accelerated Deterioration
- Cost Escalation
- Compounded BMAR

CAPITAL CENTRIC

Facility Replacement



Basic & Enhanced FCA
Proactive Asset Management

STRATEGIC ASSET MANAGEMENT

BE MORE THAN A SQUEAKY WHEEL

Enhance your Message

CREDIBLE DATA & COST PROJECTIONS

SHORT-TERM COST PROJECTIONS - ODs

LONG-TERM COST PROJECTIONS - PRs

Basic & Enhanced FCA
Proactive Asset Management

REPORTING COST PROJECTIONS

- Observed Deficiencies (ODs) are short term:
  - "Boots on Ground" observed by RVI
  - Major Maintenance >$5K
  - Under 5 to 6 years
  - Reactive

Catch-up

- Predicted Renewals (PRs) are long term:
  - Major Maintenance and Repair (MM&R)
  - Theoretically based costs on original date and system life
  - AKA "life cycle"
  - Proactive

Keep-up

Basic & Enhanced FCA
Proactive Asset Management

Facility Summary Report

Facility Code	
Facility Size - Gross S.F.	23,800
Year Of Original Construction	1981
Facility Use Type	Fire Station
Construction Type	Medium
# of Floors	1
Energy Source	Gas
Year Of Last Renovation	2000
Historic Register	No

			Total Project Cost	Total Project Cost - Present Value
Weighted Avg Condition Score	**3.1**			
Facility Condition Index (FCI)	0.21			
Current Replacement Value (CRV)	$11,345,000	**Predicted Renewal Budget (6 yrs)**	$2,388,000	$2,291,000
Beginning Budget Year	2013	**Predicted Renewal Budget (20 yrs)**	$6,207,000	$5,401,000
		Observed Deficiencies (6 yrs)	$690,000	$662,000
		Observed Deficiencies (ALL)	$874,000	$801,000
		Opportunity Total Project Cost	$1,202,000	N/A

Basic & Enhanced FCA
Proactive Asset Management

Observed Deficiencies – Raw Costs

Cond.	Material Useful Life / Survey Year	Deficiency / Condition Notes	Action	Qty	Unit Cost	Unit	Direct Construction Cost
erations Center Building 1 Building			Total System Deficiency Repair Cost (Undiscounted/Unescalated):				$161,400
			Total System Deficiency Repair Cost (Present Value):				$150,508
4	3	Old main distribution frame (MDF) transfer air cooling system interfering with new system. SCADA systems transfer air cooling is unreliable.	Demo or layup main distribution frame (MDF) transfer air system. Provide ductless split cooling for SCADA.	2	$3,000.00	ea	$6,000
	2013	Computer room cooling.					
4	3	Shop air handling unit is past end of life.	Replace shop air handling unit. See "Energy Supply" Opportunity section for possible upgrade.	1	$15,000.00	ea	$15,000
	2013						
4	2	Roof well may be recirculating flue gas, exhaust, drain waste and vent (DW&V) vent to roof (VTR) sewer gas, and shop exhaust to occupied spaces.	Reconfigure HVAC system to eliminate roof well short cycling effect.	11,700	$5.00	sf	$58,500
	2013						
4	5	Mix of old and new controls.	All newer controls plus retro-commissioning (Cx) and re-TAB (test, adjust, and balance).	11,700	$7.00	sf	$81,900
	2013						

Basic & Enhanced FCA
Proactive Asset Management

RAW COSTS + MARKUPS = PROJECT COSTS

ɔs By System **2015 - 2021**

System		Direct Construction Cost	Contingency 30%	Contractor's OH & P 20%	Project Soft Cost 50%	Total Project Cost	Total Project Cost (Present Value)
Exterior Closure		$20,400	$6,120	$5,304	$15,912	$47,736	$44,200
Interior Finishes		$7,000	$2,100	$1,820	$5,460	$16,380	$14,595
HVAC		$191,082	$57,325	$49,681	$149,044	$447,132	$406,137
Fire Protection		$24,776	$7,433	$6,442	$19,325	$57,976	$55,788
Electrical		$34,067	$10,220	$8,857	$26,572	$79,717	$70,918
	Facility Total	**$277,325**	**$83,198**	**$72,105**	**$216,314**	**$648,941**	**$591,639**
Site Improvements		$124,965	$37,490	$32,491	$97,473	$292,418	$265,611
	Facility Total	**$124,965**	**$37,490**	**$32,491**	**$97,473**	**$292,418**	**$265,611**
						$941,359	**$857,250**

Project Soft Costs include:

Design Fees	13%	SnoCo Management	10%
Permitting	2%	Project Contingency	15%
Art	1%	Sales Tax	9%

Basic & Enhanced FCA
Proactive Asset Management

ODs by FACILITY

Facility	Costs ($)
Public Safety Building	15,938,228
City Hall Building	10,496,676
Old Redmond School House Community Center Building	7,885,682
Fire Station 11 Building	5,505,974
Senior Center Building	3,847,195
Hartman Park Swimming Pool Building	2,406,942
Sammamish River Business Park Building 2	2,307,485
Sammamish River Business Park Building 1	2,211,770
Trinity Building	2,041,082
Old Fire House Teen Center Building	1,846,971
Fire Station 16 Building	1,666,019
Maintenance Operations Center Building 1 Building	1,463,733
Fire Station 14 Building	1,423,631
Fire Station 13 Building	1,309,856
Fire Station 12 Building	1,115,970
Municipal Campus Parking Garage Building	1,011,989

Basic & Enhanced FCA
Proactive Asset Management

System	Cost ($)
HVAC	6,741,021
Electrical	3,118,370
Plumbing	2,385,951
Exterior Closure	1,885,365
Roofing	1,524,059
Fire Protection	1,395,562
Interior Finishes	1,351,820
Site Improvements	790,350
Interior Construction	711,609
Vertical Transportation	519,398
Superstructure	352,945
Foundations	249,171
Special Construction	160,010
Site Civil / Mechanical Utilities	85,019
Site Electrical utilities	47,611
Furnishings	43,480
Equipment	36,254
Staircases	35,112

ODs by System

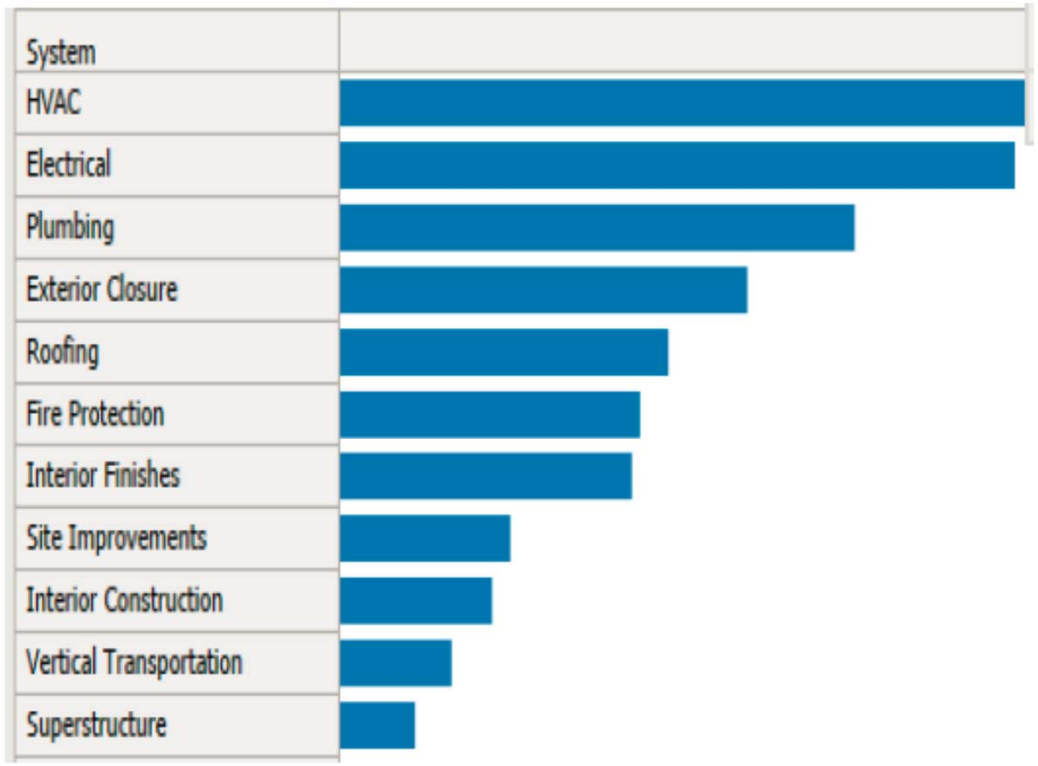


Exhibit B – Observed Deficiency Costs – by System

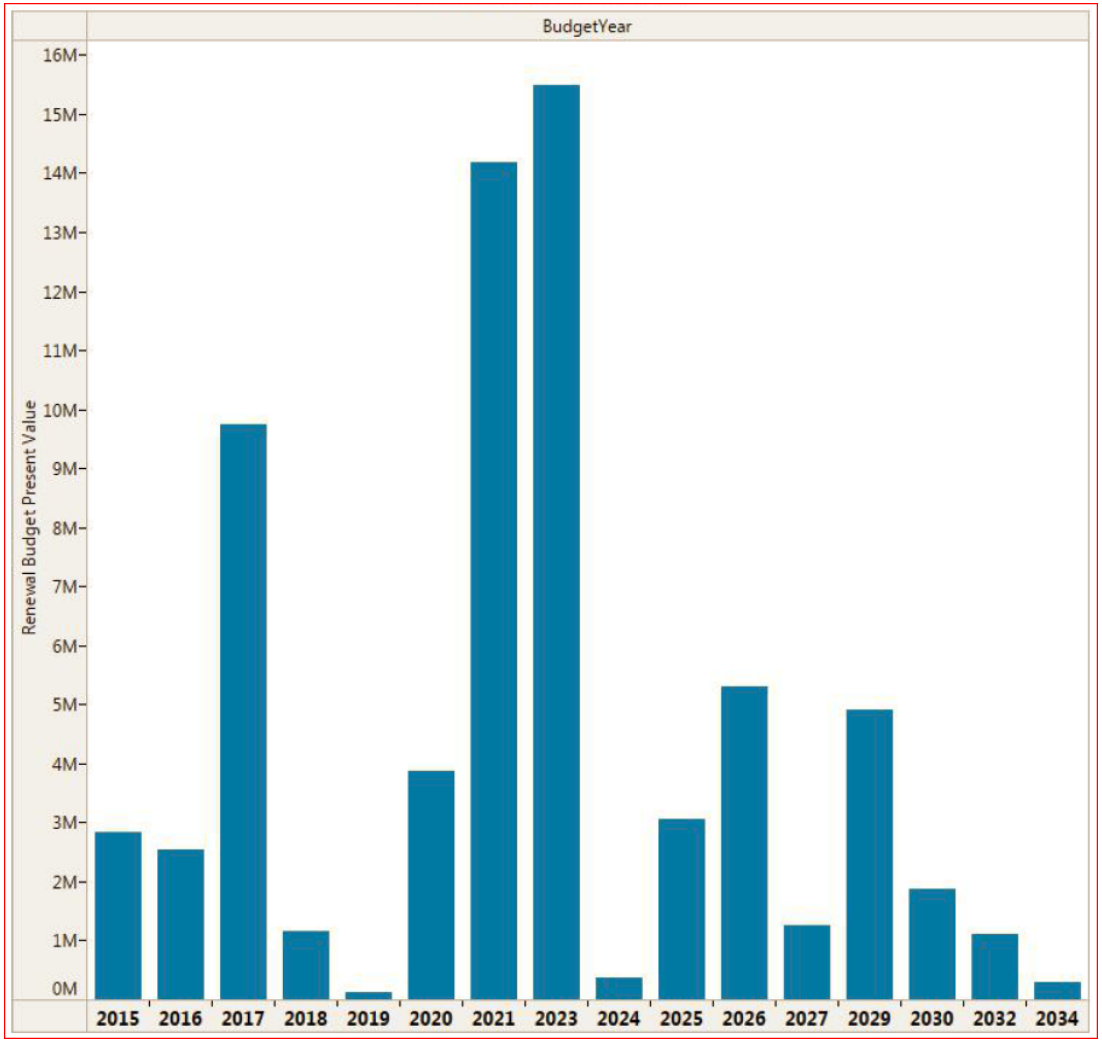
Basic & Enhanced FCA
Proactive Asset Management

Predicted Renewals

Long-Term Liabilities

Renewal Model Factors:

- **Age of System;**
- **Condition Scores;**
- **Typical Lifecycle;**
- **Adjusted Lifecycles;**
- **CRVs**



Basic & Enhanced FCA
Proactive Asset Management

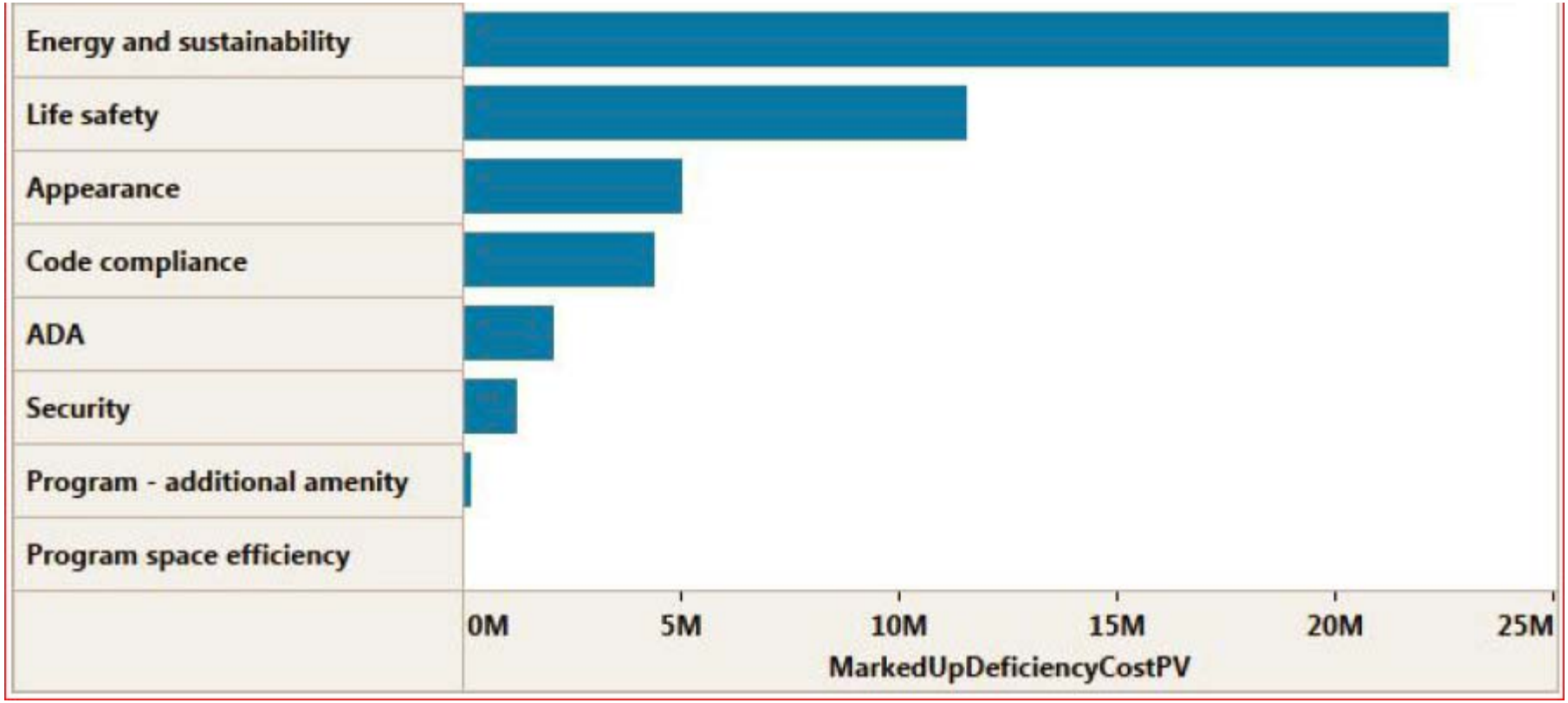
- By Building or Use Type
  - Public Safety
  - Revenue Generating
  - General Use
- By System Type
  - Life/safety
  - Productivity

Priorities

1.
2.

Basic & Enhanced FCA
Proactive Asset Management

Prioritization of Deficiencies



Basic & Enhanced FCA
Proactive Asset Management

RAISING THE BAR

Messaging Need:

- Project Packaging
- Prioritization

Opportunities: “Step up” with non-condition related improvements.

Basic & Enhanced FCA
Proactive Asset Management

OPPORTUNITIES

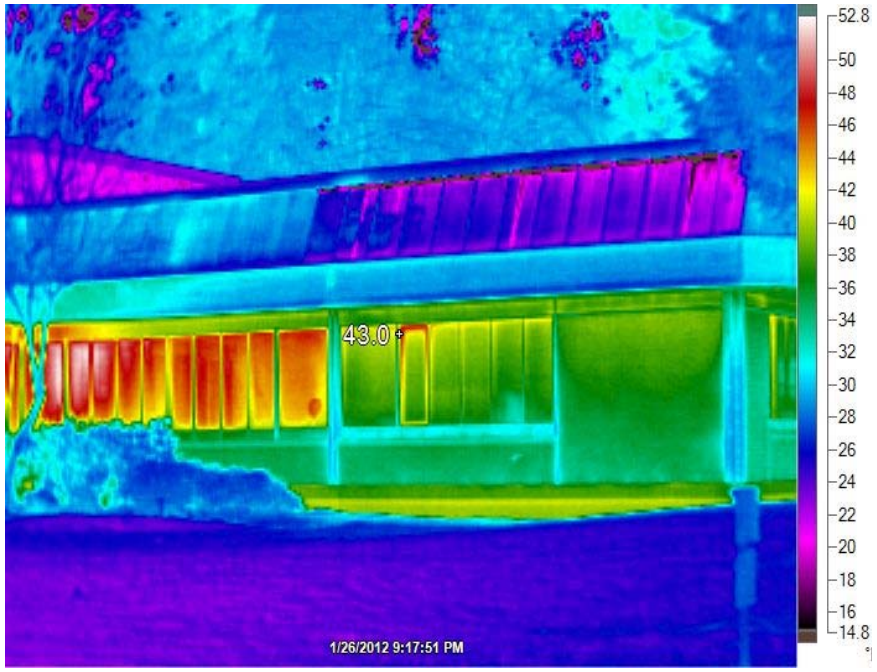
FCA Opportunities – A chance to do better

- Non-required Code/ADA
- Energy/Utility Conservation
- Improved facility utilization
- Increased safety & security (CPTED)
- Speed-up technology
- Improved IAQ
- Environment

Step -up!

Basic & Enhanced FCA
Proactive Asset Management

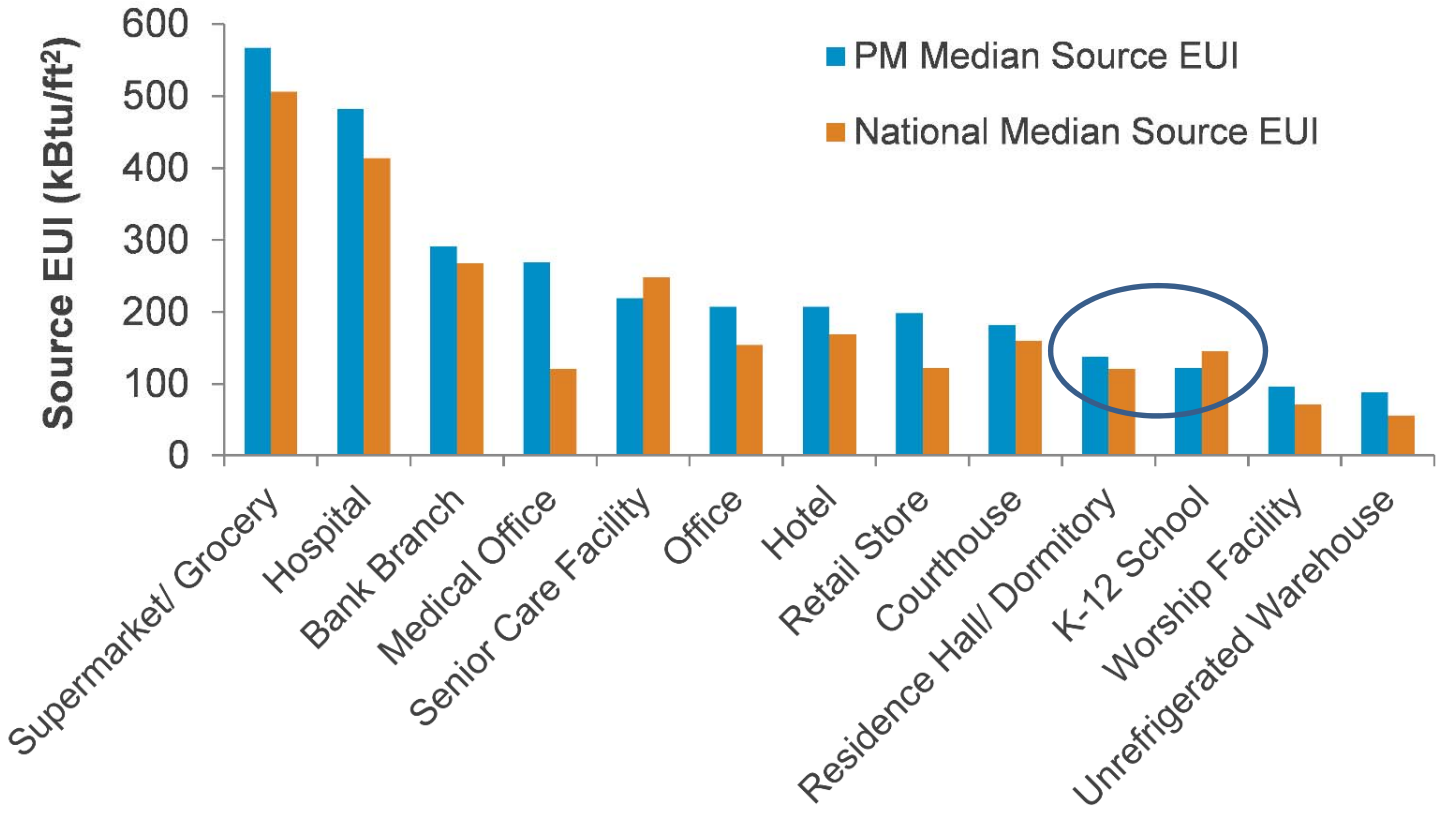
ENHANCEMENTS



- Infrared Thermography
- Seismic ASCE 41 Checklist
- ADA Assessments
- Energy Audits
- CPTED/Security Audits
- Inventory/CMMS
- Critical Areas / Risk Assessments
- Preventive Maintenance Analysis
- Building Envelope - Air Barrier Testing
- Planning: Utilization; Level of Service; Educational Adequacy

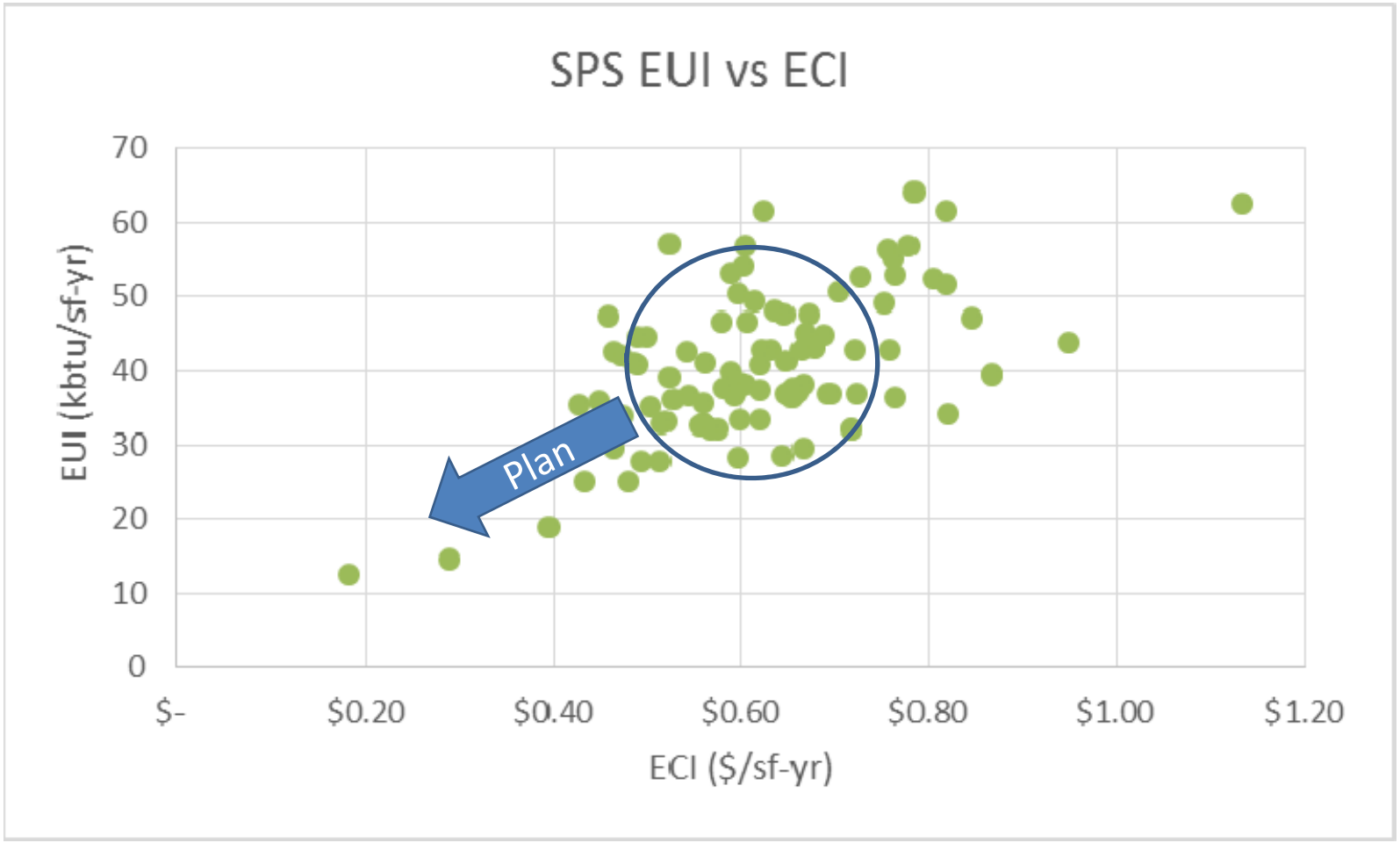
Basic & Enhanced FCA
Proactive Asset Management

ENERGY COMPARSION - EUI



Some building types excluded due to inadequate data and/or EUI values beyond this range

Basic & Enhanced FCA
Proactive Asset Management



Basic & Enhanced FCA
Proactive Asset Management

- Asset Management – from reactive to proactive
- Performance Assessment – fact based decision making

Basic & Enhanced FCA
Proactive Asset Management

ISO: 55000

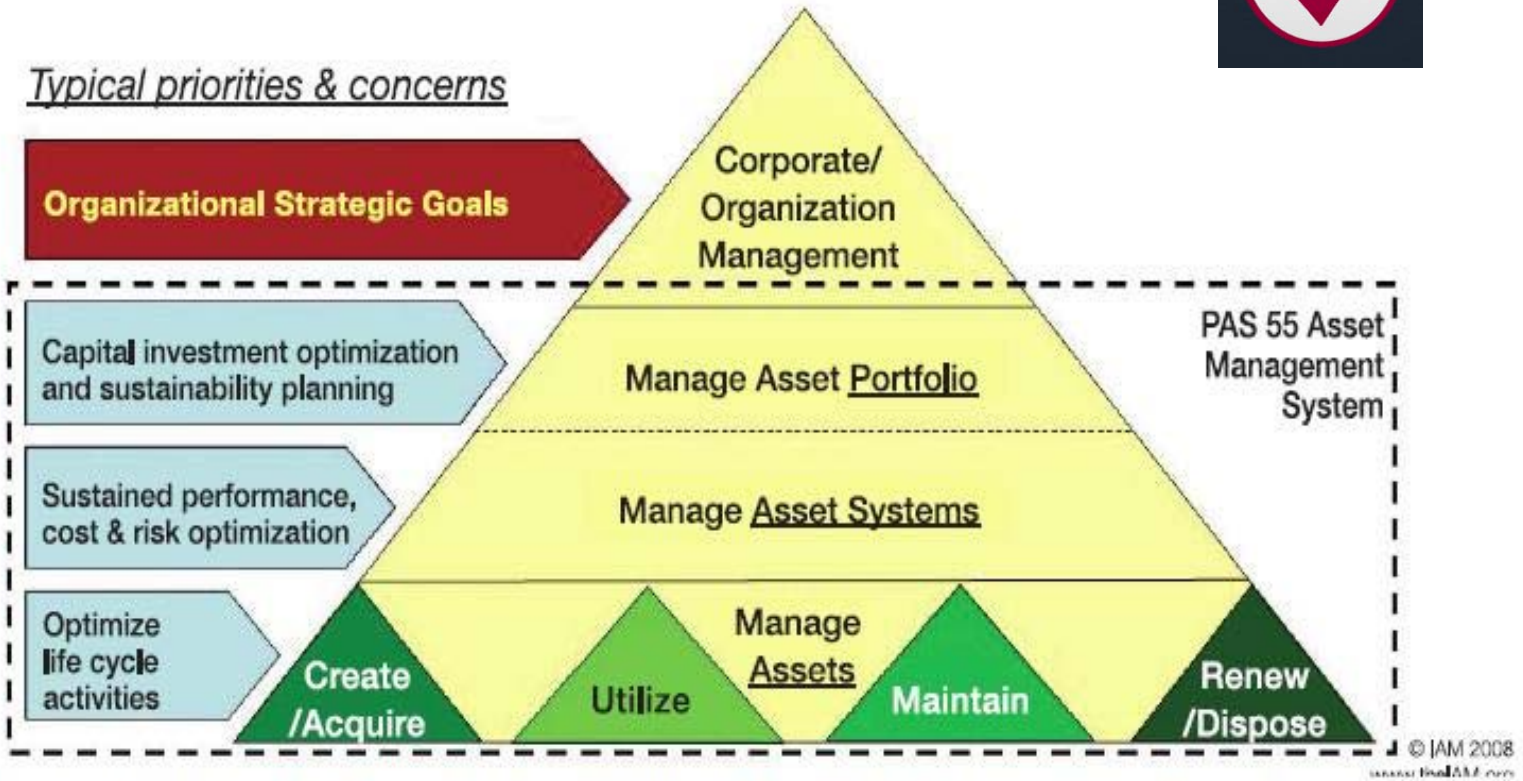
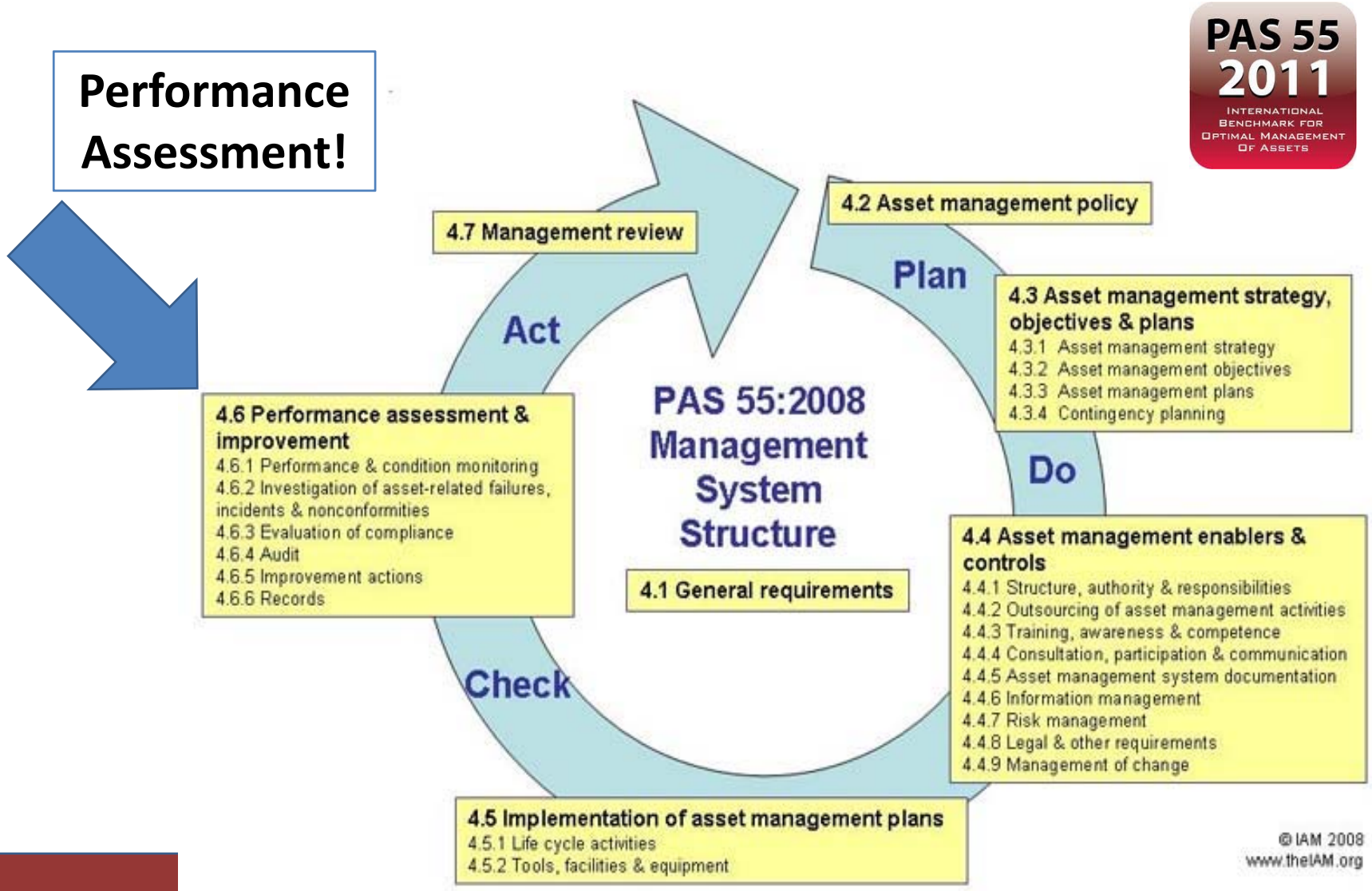


Figure 1: The typical priorities and concerns evident when integrating and managing assets and asset systems.

Basic & Enhanced FCA
Proactive Asset Management



Basic & Enhanced FCA
Proactive Asset Management

Take Aways

Basic Condition Assessments: Condition Based;
Qualitative

Enhanced FCA: Condition;
Quantitative Costs;
Options…. +, +, +,

Effective Messaging of …
Financial Risks & Liabilities

Basic & Enhanced FCA
Proactive Asset Management

Please Remove from FCA survey list!

Basic & Enhanced FCA
Proactive Asset Management

Questions?

Joel Davis, MA, MBA
joel@menganalysis.com
206-587-3797

Doug Smith, PE, CSBA
doug@menganalysis.com
206-587-3797