

2018 APPA CONFERENCE

Addressing Deferred Maintenance with Advanced Facility Condition Assessments at the University of Arizona

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The University of Arizona



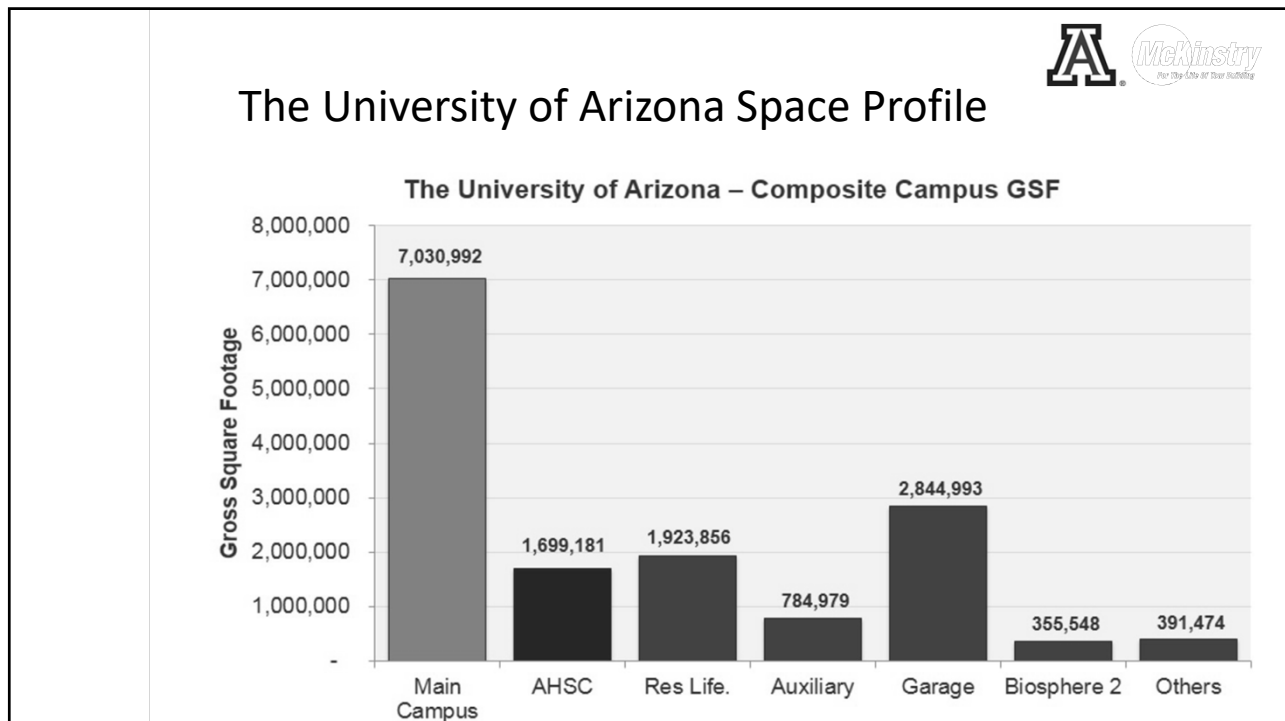
UA Campus Overview

- +43,000 Students
- 11 Million Square Ft.
- +267 Buildings
- 600 Facilities Staff
- 3 Central Plants
- 22 Chillers
- 2 Turbines
- 33% Electricity produced on site
- 300 Storage tanks ice storage



The University of Arizona Facilities Management Department

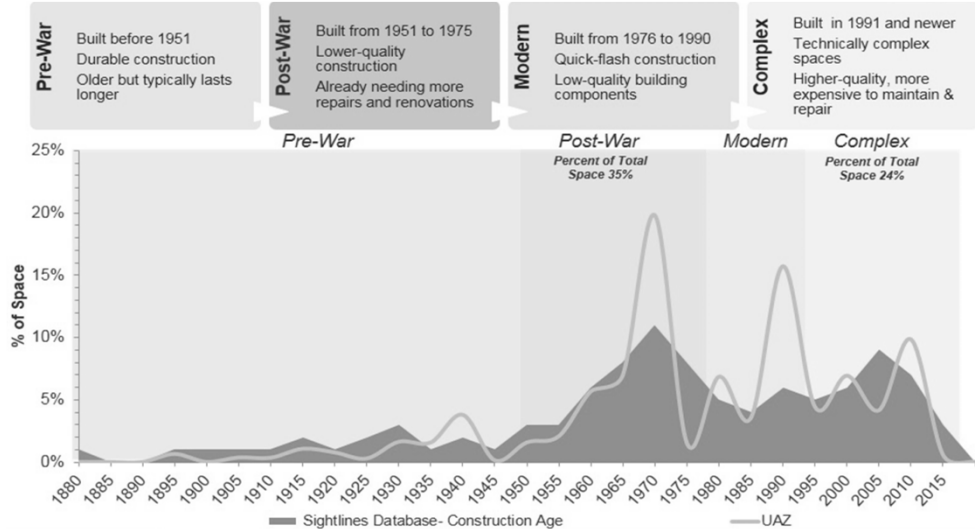






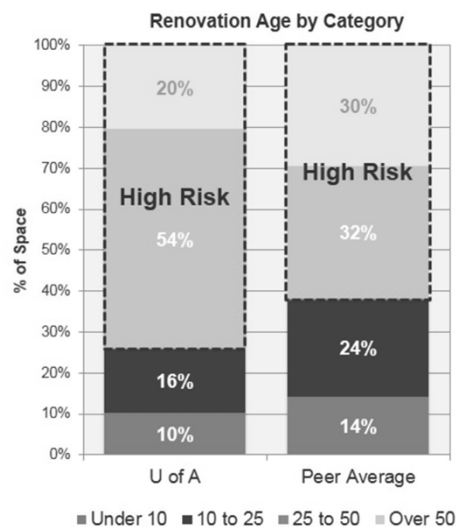
Putting Your Campus Building Age in Context

The campus age drives the overall risk profile



Campus Age Profile

Impacts of concentrated age profile



Buildings over 50
Life cycles of major building components are past due. Failures are possible. Core modernization cycles are missed.
Highest risk

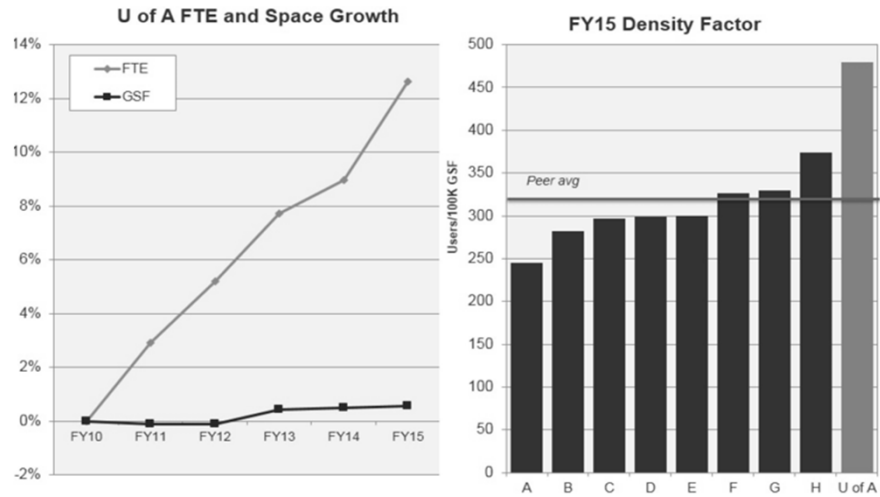
Buildings 25 to 50
Major envelope and mechanical life cycles come due. Functional obsolescence prevalent.
Higher Risk

Buildings 10 to 25
Short life-cycle needs; primarily space renewal.
Medium Risk

Buildings Under 10
Little work. "Honeymoon" period.
Low Risk

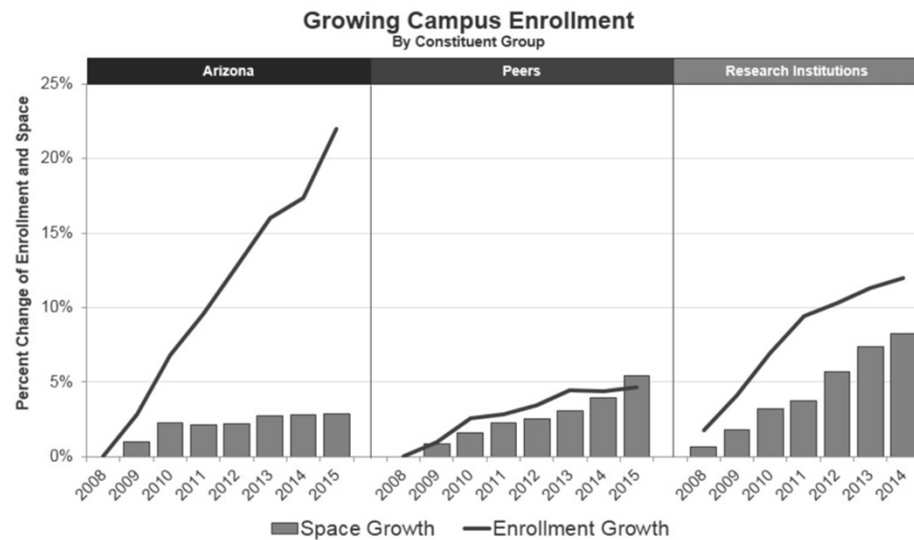


With More Users, Density Increases



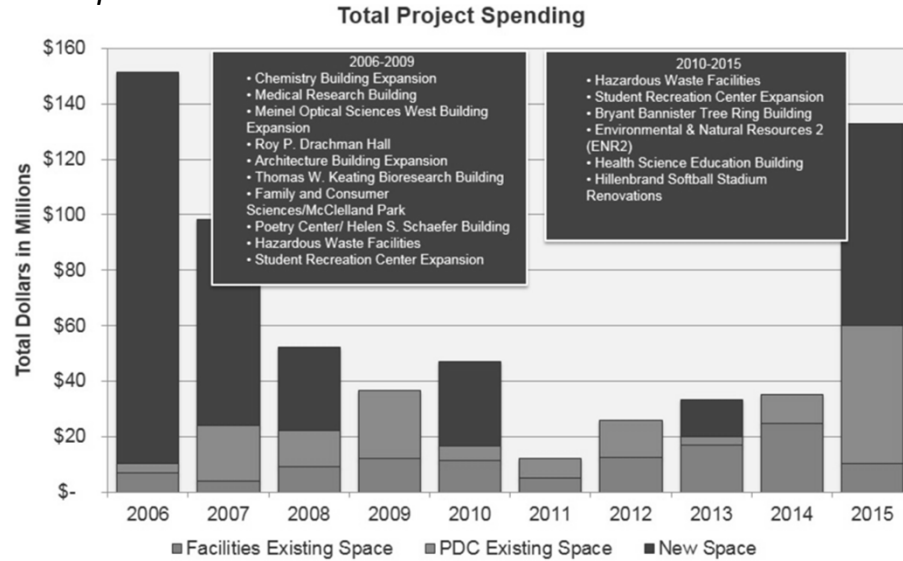
Campus Space and Enrollment

U of A's student population growing at faster pace than peers

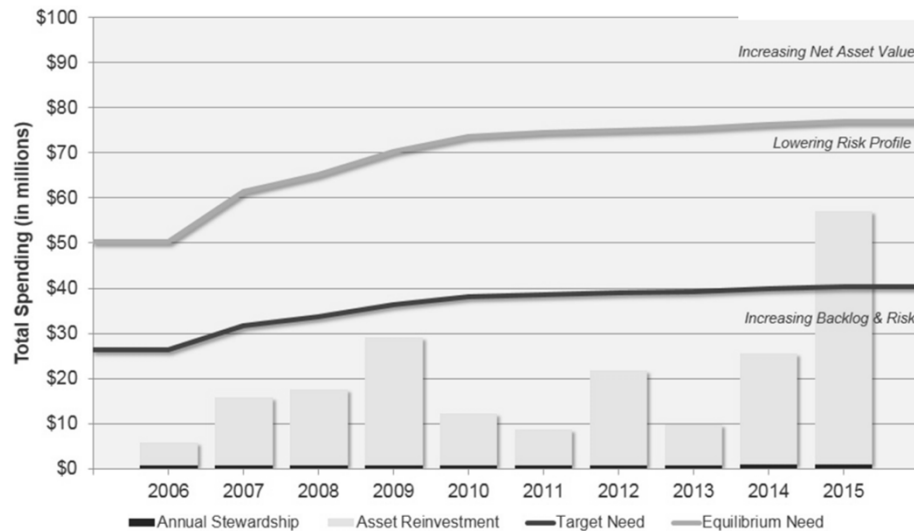




Total Project Spending Composite



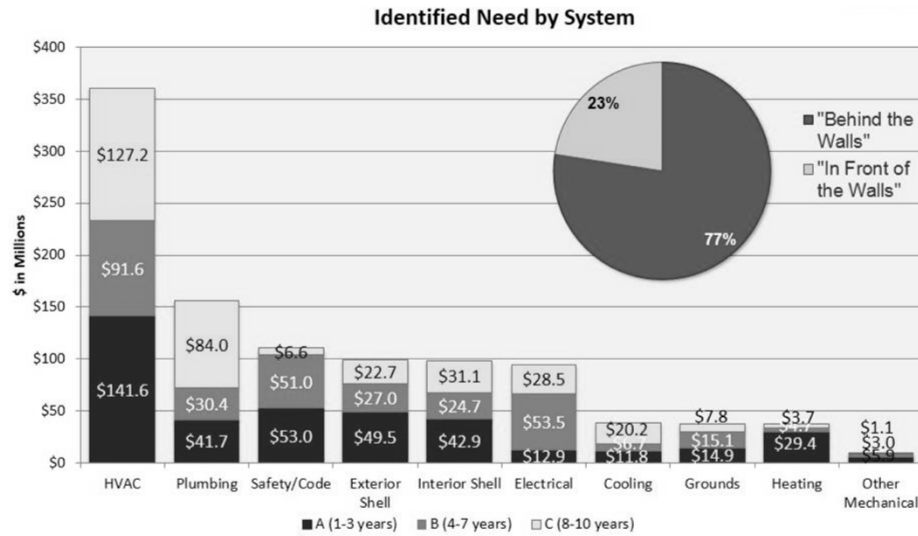
Lack of Capital Leads to Increasing Needs *Meeting target need with one-time capital*





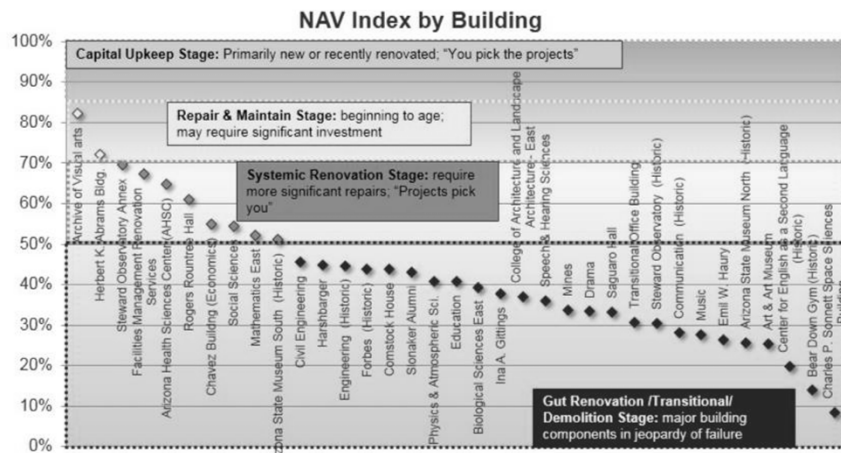
Identified Needs by System - \$1.04B

Timeframes A, B, & C only – excluding new construction



Net Asset Value

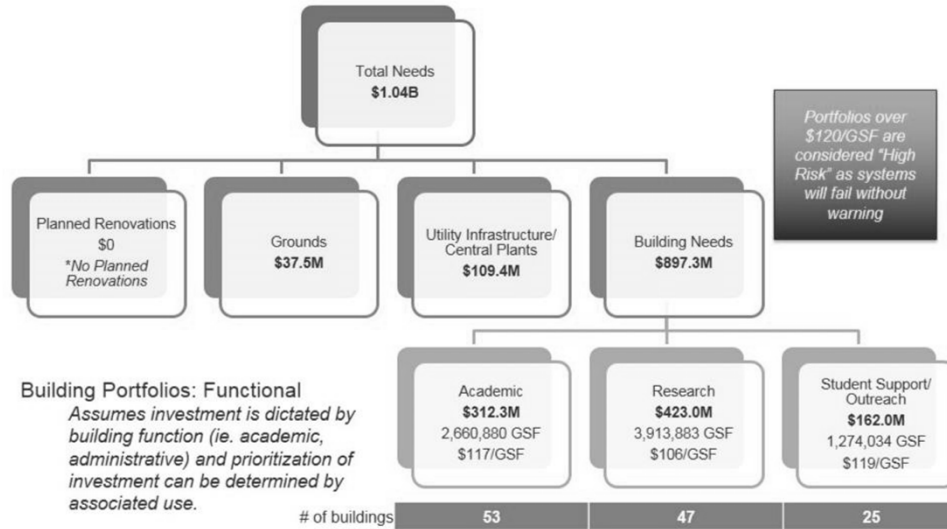
Buildings over 50 years old; average NAV of 42%



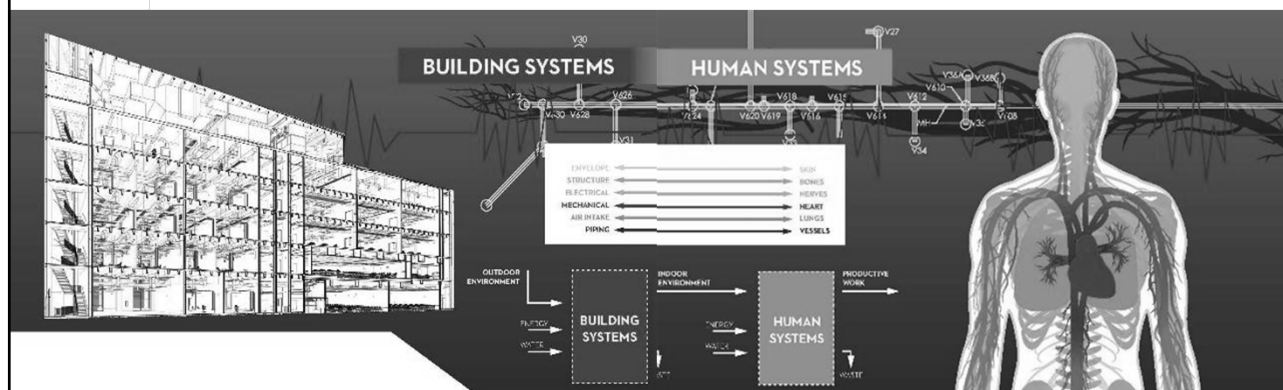
$$\text{NAV Index} = \frac{(\text{Replacement Value} - \text{Building Needs})}{\text{Replacement Value}} \times 100$$

Replacement Value: the cost of replacing a building in kind. Influenced by building function and technical complexity.
Building Needs: identified backlog of critical needs and upcoming 10 year lifecycle needs.

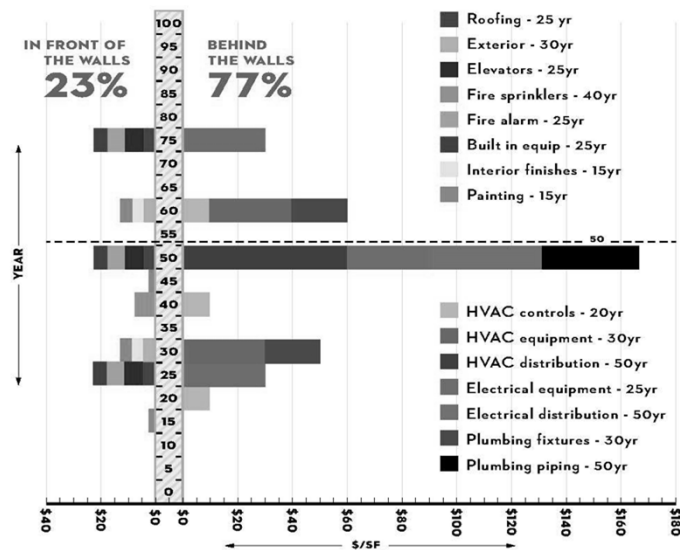
Building Portfolios



Two Systems: Buildings and Humans



Life Cycles and Periodic Renewal Costs of Building Systems



Indoor Health Issues



The effect of building health on the humans and human systems housed within is not insignificant.



Emerging research suggests long term exposure to very low concentrations of certain molds, allergens and other airborne contaminants may lead to sensitization, manifested in a broad spectrum of symptoms.



Occupants spend up to one third of their lives within the indoor environment.



Many of the symptoms associated with indoor air quality directly affect concentration and productivity.



Long term effects of temperature, humidity, pressure, noise, vibration, particulates and airborne contaminants may have direct and indirect consequences on individual health.



Buildings are communities where the knowledge, perception and concern of individuals becomes a part of the collective experience.



Indirect effects of indoor building health include recruitment, retention, productivity, and culture.



Detailed Facility Condition Assessment

When to Perform an FCA

- Aging building suffering from compounded deferred maintenance
- Increasing amounts of ongoing repairs
- Loss of functionality
- Health concerns from occupants

Goal of FCA

- Systematic identification of major deficiencies
- Generation of Building Renewal Roadmap
- Comprehensive building system assessment



Diagnosis Facility Condition Assessment



- Assemble Project Task Force Team
- Weekly meetings / interview occupants
- Coordinate and work with building manager
- Room-by-room Architect / Engineer survey
- Airflow Testing
- Fire Safety / Emergency Egress assessment
- Structural assessment

- Building Envelope / evaluation of water infiltration
- Above-ceiling survey
- Camera survey of HVAC systems
- Terminal Unit dissection
- Ventilation assessment
- Laboratory testing of contaminants (CO, CO₂, SO₂, mold spores, airborne debris)
- Energy savings

Facility Condition Assessment Results



- Cracked concrete floors
- Antiquated cold rooms
- Envelope leakage
- Asbestos fireproofing
- Deteriorated insulation
- Duct leakage
- Constant volume air handlers
- Inefficient lab exhaust
- No energy recovery
- Low air changes
- Dirty ductwork
- Interior duct lining
- Exterior standing water
- Grading / site drainage issues
- Piping dead legs
- Industrial Hygienist results

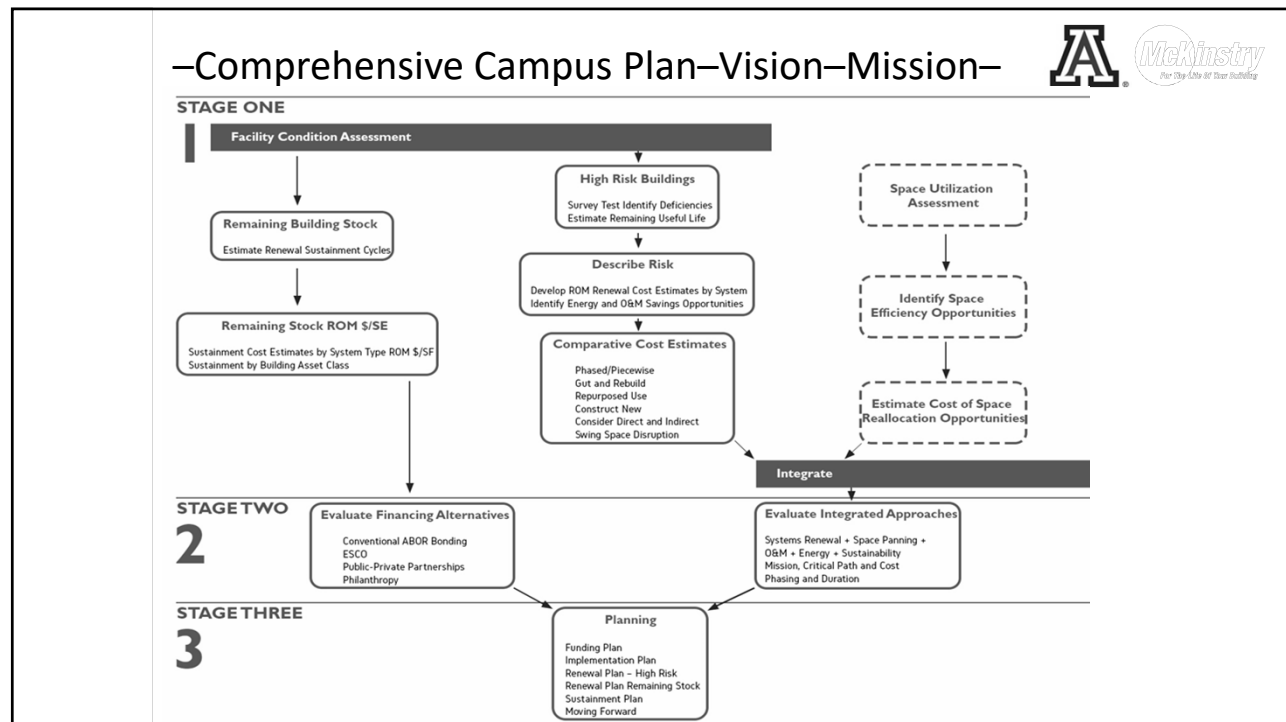




Detailed Facility Condition Assessment Mold Testing



Mold Testing / Results


- Mold is ubiquitous in nature
- No standards for testing
- No standards for acceptable levels
- Differing opinions among experts
- Differing sensitivity levels
- ASHRAE design guidelines (Standard 160)
- NYC Department of Health guidelines



Renovate or Replace?

<p>RENOVATE</p> <p><u>\$300/sf</u></p> <ul style="list-style-type: none"> • Architectural - \$44/sf • HVAC - \$194/sf • Plumbing - \$44/sf • Electrical - \$18/sf <p>Cost Factors</p> <ul style="list-style-type: none"> • Building type (lab / classroom / offices) • Quality of construction • Space usage efficiency 	<p>REPLACE</p> <p><u>\$750/sf</u></p>
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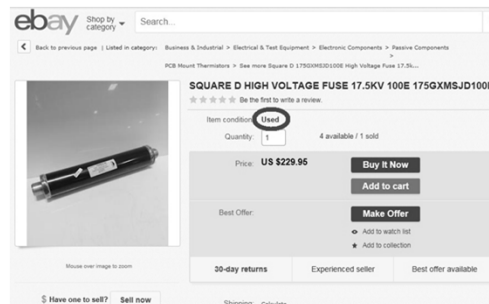




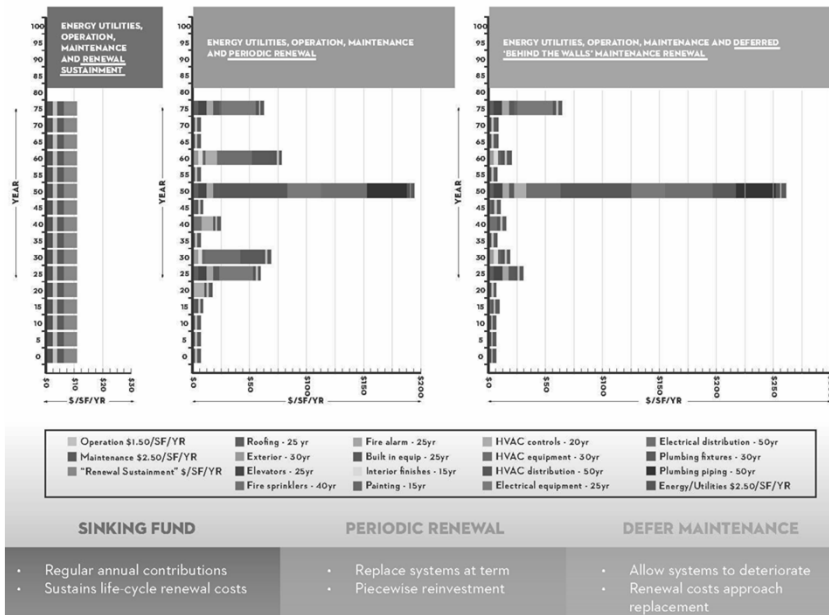
Building Renewal Funding

Planned/Holistic vs. Temporary/Piecemeal

- Temporary solutions easier to fund
 - Downfall – Higher life-cycle cost
 - Downfall – Do not comprehensively address issues
- Deferred maintenance dollars typically allocated to life safety
 - Downfall – Little left over for latent issues: Building functionality, health, energy efficiency

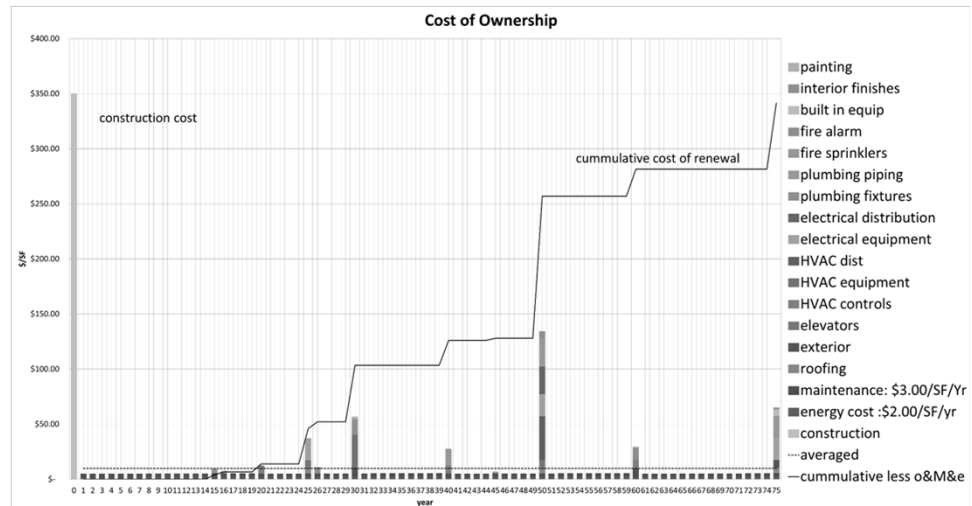


Options for Renewal Approach From a Life Cycle Standpoint





Planned Maintenance vs. Deferred Maintenance

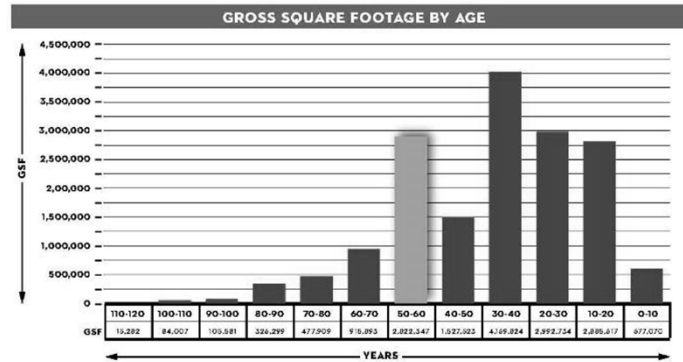


Campus-Wide Funding Needs





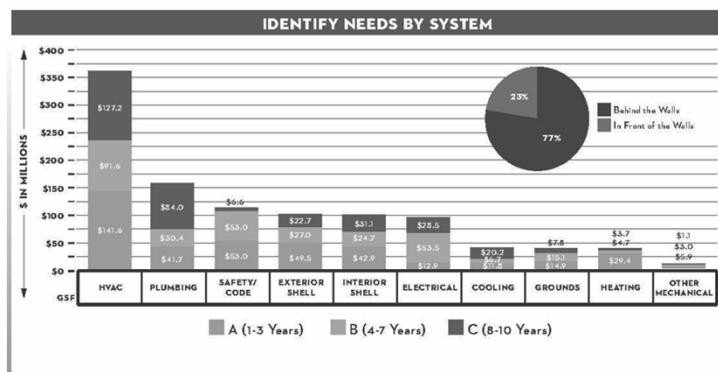
Campus-Wide Funding Needs



- In the absence of renewal, Lab Buildings from the 1950's and 1960's are becoming high risk
- Buildings from more recent decades will soon become the focus of tomorrow



Campus-Wide Funding Needs



- Building Renewal “inside the walls” represents the most urgent and highest renewal needs and costs



Two Distinct Funding Matters

Recovering From the Past

- High level of campus growth in 1960's era
- Building renewal costs now on uprise
- Similar to impending social security crisis
- Funding paradigm must adapt to current campus needs

Systematic Planning for Future

- Mitigate issues of deferred maintenance moving forward



Resolution Strategies

Strategy for Increasing Deferred Maintenance Funds

- Building users / College
- University level
- State level

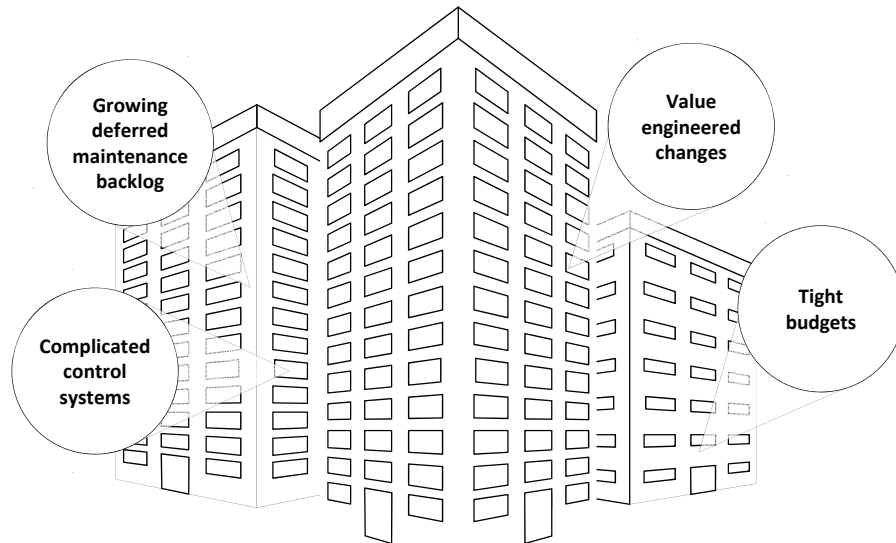
Strategy for Decreasing Current Demands

- Campus-wide space mining
- Space usage efficiency planning

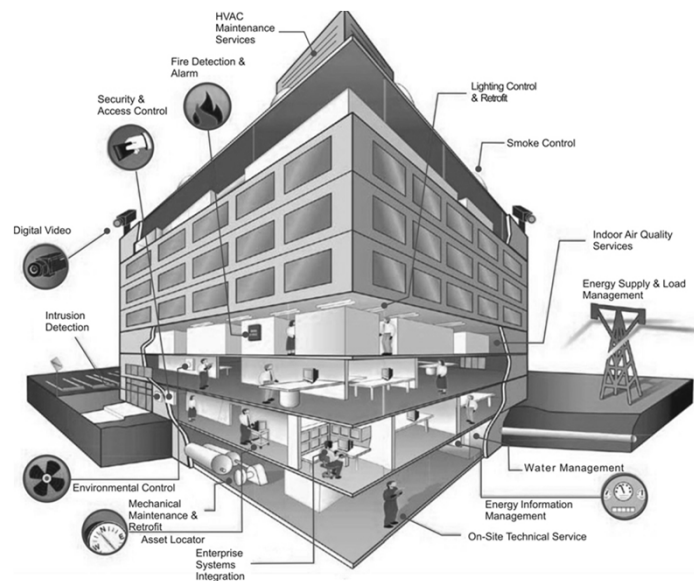




Facilities Are More Complex Than Ever

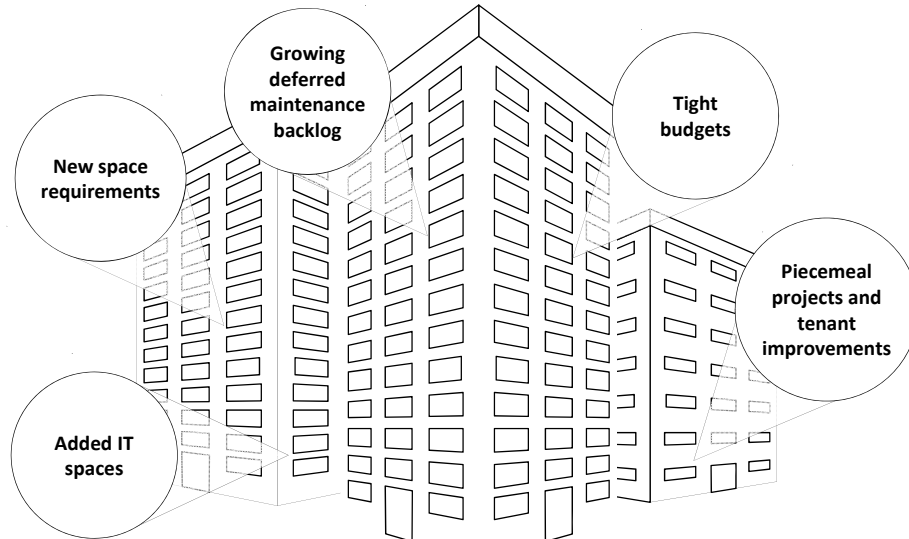


Building Complexity





Facilities Change Over Time

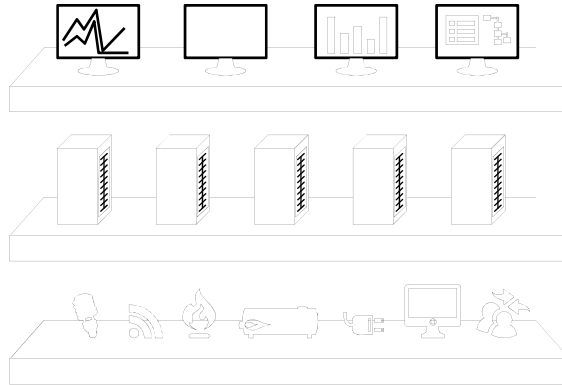


Creative Re-Use

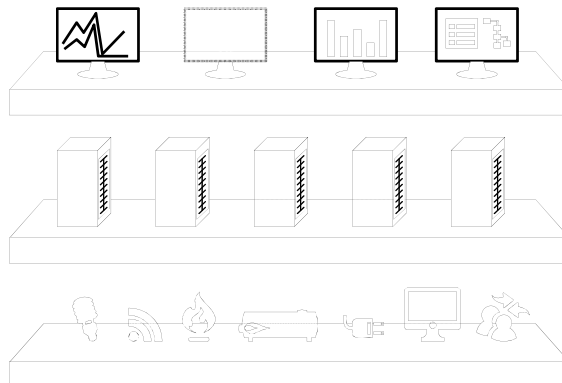




Too Much Data, Not Enough Answers



Gaps In The Information Mean Few Clear Answers





Turn Weakness to Strength



*Facility assessments document, analyze, and benchmark the **current condition** of an organization's facility assets, and **make data actionable** by combining condition data with financial analysis to identify **capital planning priorities**.*



Status Quo is Not an Option

Typical
O&M Manual
Storage



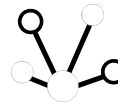
Process Overview



Learn



Audit



Analyze



Report

Learn



Campus Needs	Assessment Type		
	Condition	Operational	Organizational
-Existing problems need planning & long term solutions in lieu of band-aids.	X	X	
-Recent capital projects have failed to meet expectations of efficiency and instead have created more headaches and disruptions.		X	
-Over/Understaffed with an aging workforce, non-technical capabilities and resistance to change/improvement.			X
-Pain points- aging facilities & shrinking dollars	X		
-Existing or Potential violations, grievances and liabilities are generating additional expense and poor customer interaction.			X
-Lack of process, procedure and protocol is creating a trunk full of one off's.			X
-Technology has become a burden instead of a blessing.		X	
-Customers are not expecting but demanding better service and support.	X	X	X
-Corrective work is increasing despite more equipment & system PM's.	X		
-Decision makers and stakeholders are not listening, believing or buying anything without an independent opinion or analysis- VALIDATION	X		X
-Transparency has created gaps in compliance that have now become serious issues	X		X
-Stakeholders want data, NOT emotion, to support decision making	X	X	
-Systems, equipment and technology have surpassed the current staff's skills	X	X	X

Pre-Assessment Sample Interview Form



Facility Operational Assessments Stakeholder Interview Short Form	
Stakeholder _____	Date _____
Interviewer _____	Company _____
ROLE:	
What is your role in the organization?	How long?
Prior relevant experience?	
What are your overall responsibilities?	
What are your top commitments to the organization? Timing? Deliverables? Priority?	
1.	
2.	
Is there a Facility Mission & Vision? How does it relate to the Mission of the Organization?	
CHALLENGES:	
What are the current problems/challenges you face with your role?	
1.	
2.	
What do you need to be successful?	
Is this achievable and can it be accomplished within schedule, scope and budget?	
What are your expectations for delivery of services?	
Who are you dependent on for completion of your responsibilities?	
SUCCESS:	
How do you measure success?	
What is the biggest obstacle to success?	
GENERAL ROLES:	
Who or whom do you want to emulate?	
Is there an expectation to get there? Is there a scope, schedule, and budget to get there?	
VISION OF FACILITY OPERATIONS:	
Day One	
5 Year	
15 Year	
SHORT AND LONG TERM PRIORITIES:	
Short: 6-12 Months	
Long: 2-5 Years	
BIGGEST FEAR	
PERCEPTIONS- HOW DO YOU WANT TO BE PERCEIVED?	
MEASURES OF SUCCESS- Ranking: Top 3	
Financial-	
Operational-	
Customer-	
Community- Local, Global	
Public-	
Private-	
Sustainability-	
WHAT WILL BE YOUR LEGACY?	

Audit



Then, we **head onsite**. We review architectural, structural, mechanical, and electrical elements of the building. We can also look at **energy conservation** or **safety** opportunities.

Audit



Asset Management



Item

Equipment Inventory

Equipment Tagging



Existing

- Some equipment is inventoried
- Institutional knowledge is not documented
- Few assets have barcodes, none have QR codes

Proposed

- Mechanical assets are accurately inventoried, properly documented, and updated
- Staff will have the ability to scan equipment tags at the unit to pull up relevant information, maintenance plans, SOPs

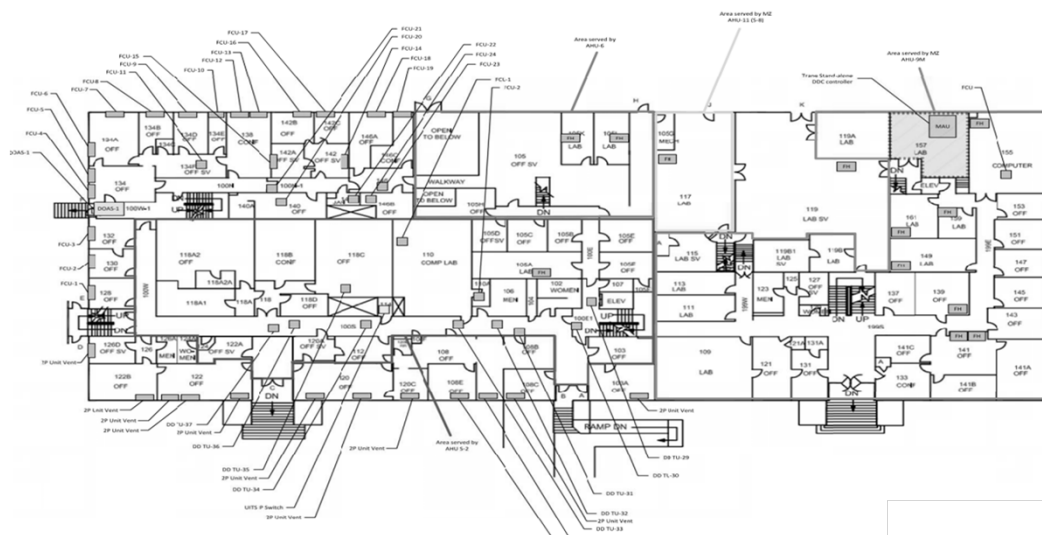
Benefits: All equipment information stored and easily accessible; standards set in place moving forward

Analyze



Back at the office, we start to **crunch the data**. We build **construction-grade** repair and replacement cost estimates, and **score each asset** based on the criteria we set together.

Analyze



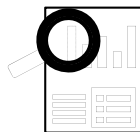
Report



Must use **quantitative and qualitative** information about your facility to develop our FCA Visualization Tool and prepare a **detailed report** with information on each asset. You need the right tools to **budget for your facilities** based not only on equipment condition but also on how it affects **your business needs**.

Turn Data Into Answers

A best-in-class approach is:



A single source of facility data.



Filtered by criteria most important to you.



Accessible via a powerful and flexible tool.



Built to help you make decisions.





FCA Viz Tool

Facility condition assessment visualization tools empowers you to make data-driven investments in your facility

Visual tools to drive needs-based decision making with consideration to equipment life, replacement costs, occupancy impact, and energy usage.

