



Total Cost of Ownership (TCO)

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Agenda

- ▶ What is TCO?
- ▶ Why TCO Matters
- ▶ Calculating TCO
- ▶ Components
- ▶ Benefits
- ▶ Challenges
- ▶ Best Practices

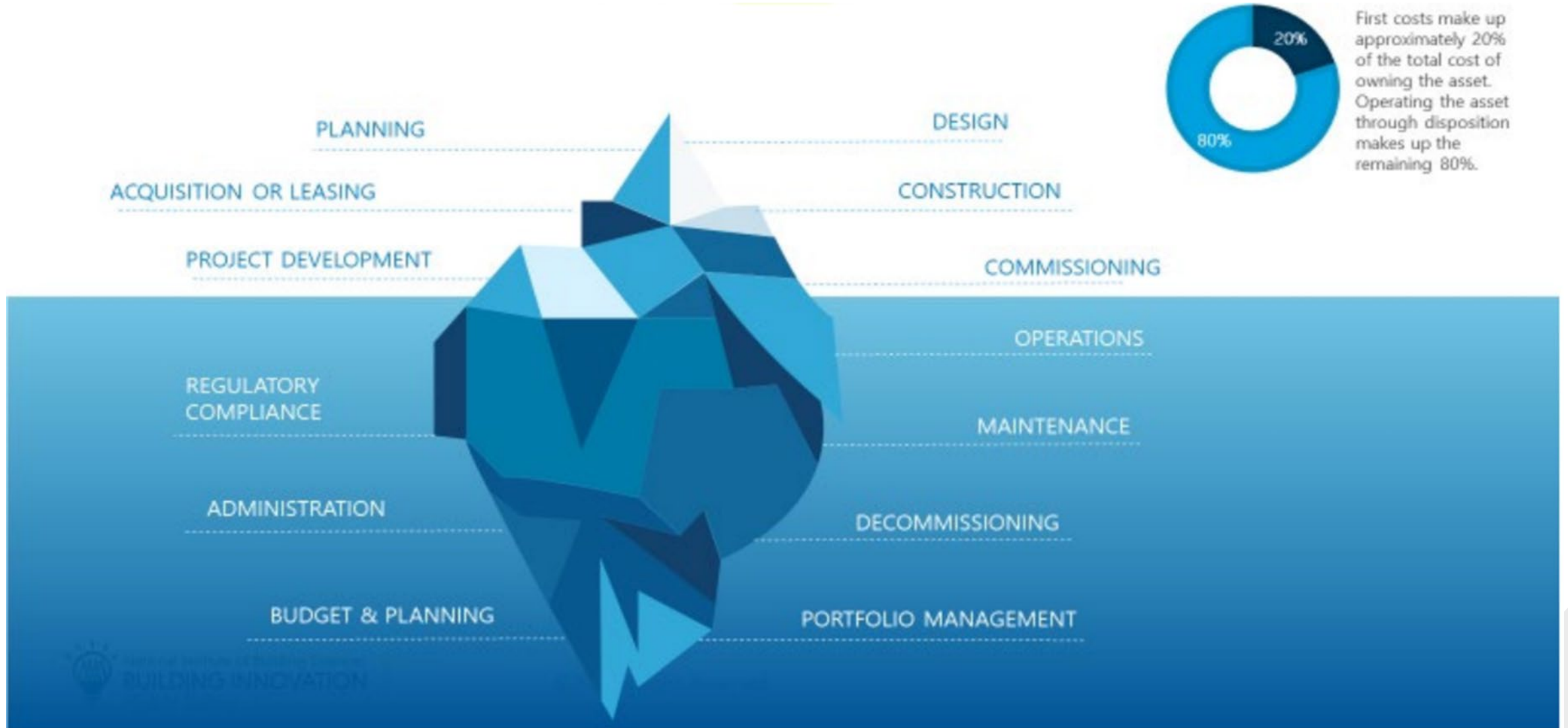


What is TCO?

- ▲ Total Cost of Ownership (TCO) - “A holistic approach to maximizing return on investment (ROI) of managed physical assets that includes the summation of all known and estimated costs to include first, recurring, renewal / replacement, and end-of-useful life costs revised at critical decision points to aid in life-cycle asset management decisions.”



TCO Iceberg



Why TCO Matters

- ▲ Improve financial planning, budget analysis, and reporting
- ▲ Identify gap between annual funding requirements and actual funding levels
- ▲ Identify opportunities to reduce TCO
- ▲ Align with OMB M-20-03 and the National Academies' report *Strategies to Renew Federal Facilities*

“...over 75 percent of the TCO occurs after construction, with that number rising for laboratory space to 78 percent.”

from 'Technical Assessment of the Capital Facility Needs of the National Institute of Standards and Technology (2023)'



National Academies' Report on NIST

Recommendation 6-1: NIST should develop and maintain facility and infrastructure **total cost of ownership standards for each unique facility and infrastructure type** that identifies (a) first cost, (b) annual operations costs (utility, security, custodial and janitorial), (c) sustainment costs, and (d) renewal (restoration and modernization) costs on a per unit basis as a baseline for identifying and forecasting the total cost of ownership for each new and existing facility, and supporting infrastructure with the resulting funding requirement identified as part of the overall research program needs.

Recommendation 6-2: NIST should expand its current real property asset management system and strategy beyond condition assessment and deferred maintenance reporting and **provide a proactive, life-cycle approach** to real property ownership for the NIST real property portfolio that aligns with the Federal Real Property Reform Act of 2016 and the associated framework by GAO and the 2023 National Academies' report *Strategies to Renew Federal Facilities*.



Life Cycle Cost vs. TCO

Life Cycle Cost Analysis (LCCA)

- ▲ all costs of acquiring, owning, and disposing of a building or building system. Especially useful when comparing project alternatives that differ with respect to initial costs and operating costs.

Total Cost of Ownership (TCO)

- ▲ aligns an organization's mission with its investment strategy for an asset's life-cycle including all related infrastructure and business process costs.



Calculating TCO

$$TCO = \sum C_a + \sum C_b + \sum C_c + \sum C_d + \sum C_e$$

Where:

C_a = **Initial Asset Costs** / First Cost (one Time)

C_b = Cost of **Operations and Maintenance** (Annual Recurring)

C_c = Cost of **Utilities** (Annual Recurring)

C_d = Cost of **Renewal** (Periodic Recurring)

C_e = Cost at **End of Useful / Functional Life** (One Time)



Initial Asset Costs/First Costs (One Time)



Planning and Programming

Acquisition

Design

Construction/Site Development

Commissioning/Startup



Operations and Maintenance (Recurring)



Lease or Rental

Maintenance

Operations

Overhead and Administration



Utilities (Recurring)



Electrical

Water

Sewer

Gas

Steam

Chilled Water/Hot Water



Renewal (Recurring)



Replacement

Programmatic Upgrades

Improvements/Enhancements



End of Useful/Functional Life (One Time)



Sale/Adaptive Reuse

Re-sale Value/Salvage Value

Removal

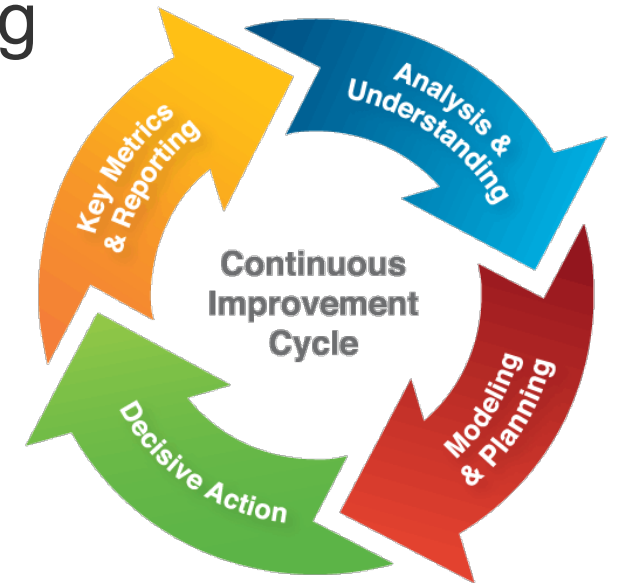
Site Restoration/Remediation

Deconstruction/Recycling



Benefits of TCO Analysis

- ▲ Identify gap between current and required funding
- ▲ Identify risks to mission requirements
- ▲ Identify areas to reduce TCO
 - Prioritize facilities and equipment (e.g., Level of Performance or Tiered Maintenance approach)
 - Perform maintenance task analysis (streamlined RCM)
 - Identify energy conservation measures (ECMs)
 - Identify where new buildings may lower TCO
 - Disposition underutilized facilities



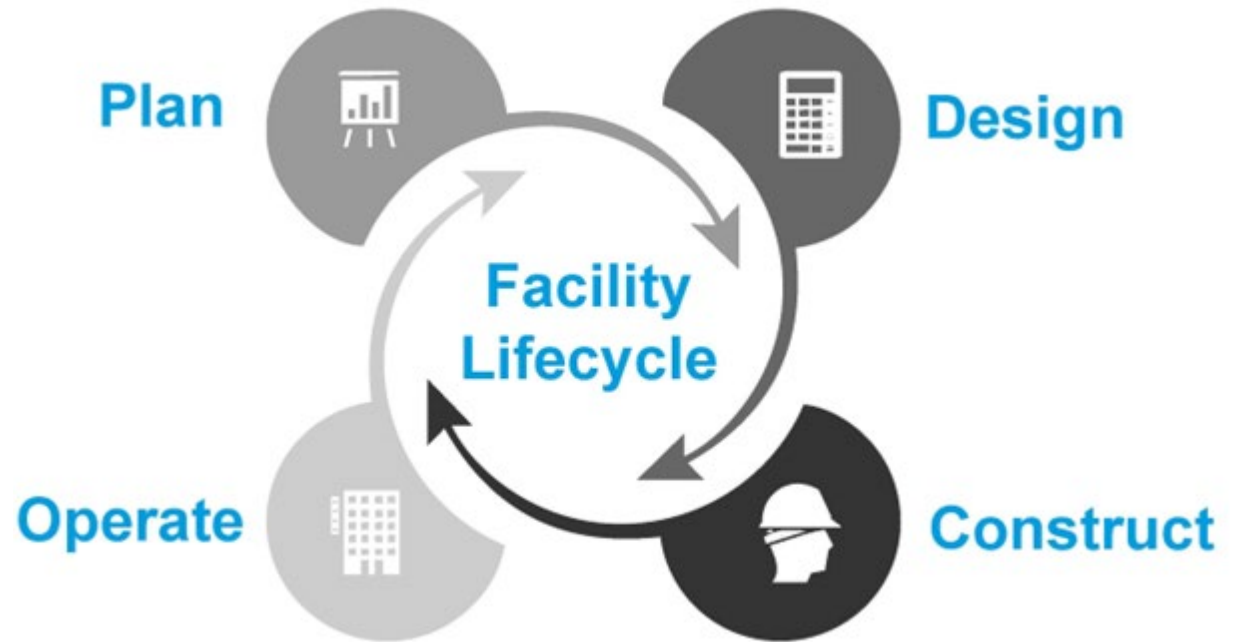
Challenges in TCO Analysis

- ▲ Lack of time
- ▲ Lack of resources to perform
- ▲ Lack of training
- ▲ Estimating costs accurately
- ▲ Estimating useful life of equipment
- ▲ Predicting end-of-life costs



Best Practices for TCO Analysis

- ▲ Use TCO to make data-driven decisions
- ▲ Regularly review and update
- ▲ Collect data once
- ▲ Leverage CMMS data
- ▲ Track historical costs
 - Utility bills
 - Contract values
 - Maintenance



Additional Resources

- ▲ [APPA 1000™ – Total Cost of Ownership Standards](#)
 - Part 1 – Principles
 - Part 2 – Implementation and Data Elements
- ▲ [UFC 3-701-01 – DoD Facilities Pricing Guide](#)
- ▲ Gordian – RS Means Facilities Maintenance & Repair Costs
- ▲ CBRE CostLab (formerly Whitestone)
- ▲ IFMA Benchmarking Reports
- ▲ [Technical Assessment of the Capital Facility Needs of the National Institute of Standards and Technology \(2023\)](#)
- ▲ [Strategies to Renew Federal Facilities \(2023\)](#)



Questions?

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