
Fundamentals of Asset Management

*Step 4. Determine Life Cycle & Replacement
Costs*

A Hands-On Approach

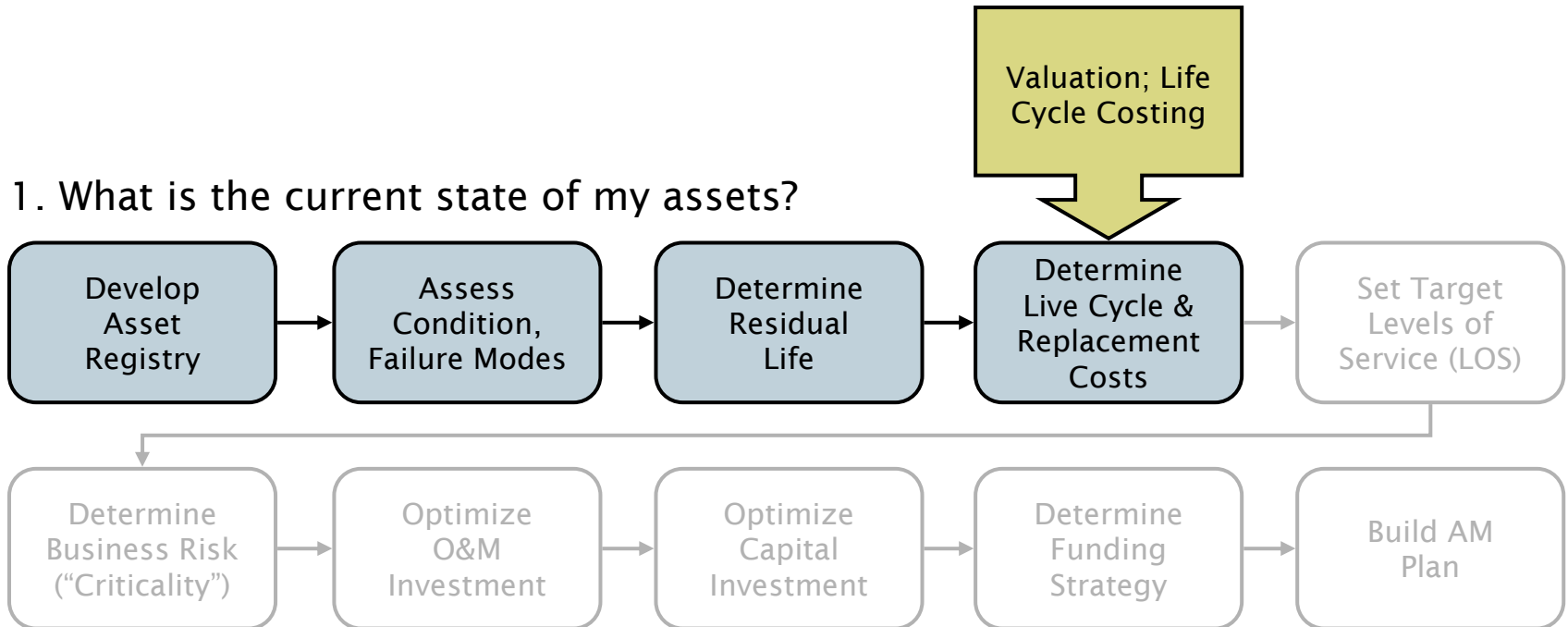
Tom's bad day...



First of 5 core questions, continued

1. What is the *value* of my assets?
 - *Why* is value important?
 - *How* is value determined?

AM plan 10-step process



Concepts of *cost* particularly useful to AM

- *Current replacement cost* - The cost of the future economic benefits expected to be derived from use of the asset, estimated as the current cost of the future economic benefits of the most appropriate replacement facility
- *Life cycle cost* - The total cost of an item throughout its life, including the costs of planning, design, acquisition, operations, maintenance, and disposal, less any residual value, or the total cost of providing, owning, and maintaining a building or component over a predetermined evaluation period

AAM two major cost perspectives

Direct life cycle costs

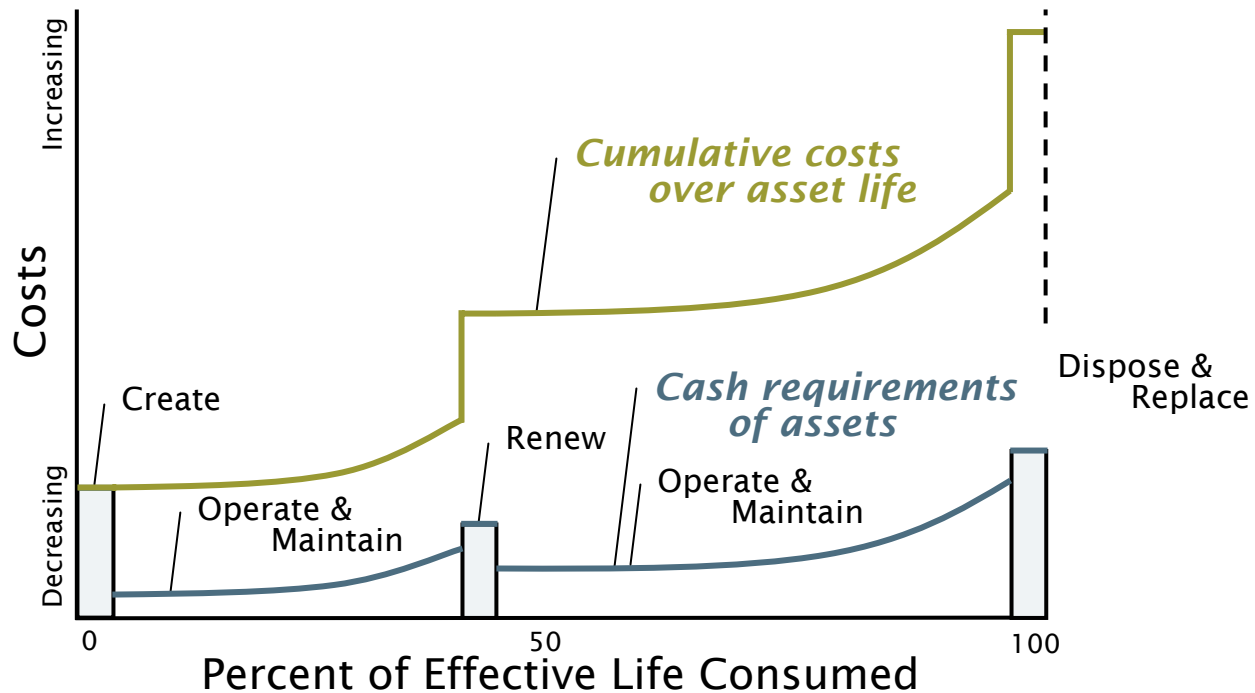
- Acquisition
- Operation
- Maintenance
- Renewal
 - Reparation
 - Rehabilitation
 - Replacement
- Disposal and decommissioning

Economic costs

- Financial costs
 - Direct costs to the governmental organization
 - Direct customer costs
 - Community costs
- Triple bottom line
 - Financial and economic
 - Social
 - Environmental

Nature of life cycle costs

Cash requirements and cumulative costs over asset life



Defining life cycle cost

$$\begin{aligned} \text{Life cycle cost} &= \text{original cost} \\ &\quad - \text{salvage value} \\ &\quad + \text{operating costs} \\ &\quad + \text{maintenance costs} \\ &\quad + \text{renewal costs} \\ &\quad + \text{decommissioning costs} \end{aligned}$$

Determining life cycle cost

Requires that an organization conduct

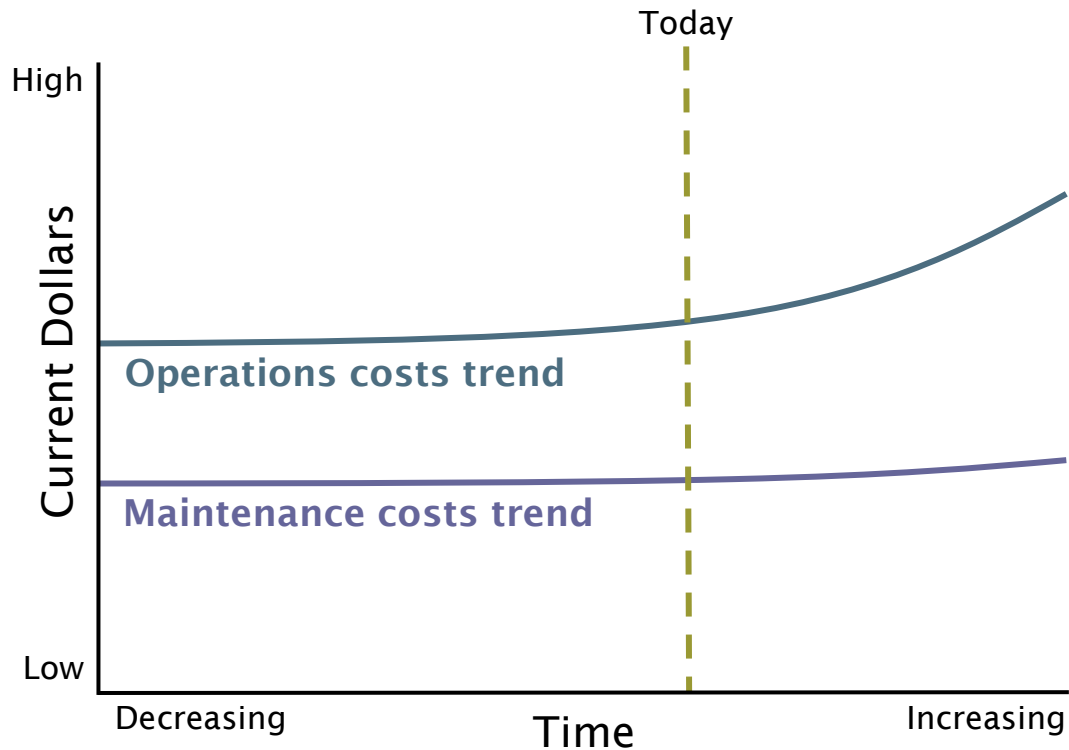
1. Either cost tracking
 - Integrating CMMS to financial system
 - Setting up activity-based accounting
 - Storing data over time
2. Or cost allocation

Primary Cost Unit	Minor code	Number of Units	\$/Unit	Allocated Cost
Direct Labor				
	Direct Pay	2.5 hours	\$42.00	\$105.00
	Overhead	.5 hours	\$6.00	\$3.00
	Benefit Burden	1	\$8.20	\$8.20
	FICA, etc	1	\$2.20	\$2.20
Materials				
	Vehicle	1.5 hours	\$47.15	\$70.73
	Pipe	160 feet 8" PVC	\$1.20/foot	\$ 192.00

CMMS means computerized maintenance management system

Life cycle costing

It's about understanding trends and drivers



Three elements of full economic costs

1. *Direct costs to the local government*

- Repair and return to service costs
- Service outage mitigation costs
- Utility emergency response costs
- Public safety costs
- Administrative and legal costs of damage settlements
- Lost product costs

Three elements of full economic costs, cont.

2. *Direct customer costs*

- Property damage costs, including restoration of business
- Service outage costs
- Service outage mitigation and substitution costs
- Access impairment and travel delay costs
- Health damages

Three elements of full economic costs, cont.

3. *Community costs*

- Emotional strain and welfare
- Environmental pollution, erosion, sedimentation
- Destruction of habitat or damage to it
- Attractiveness (economic, tourists)

Concepts of *value* particularly useful to AM

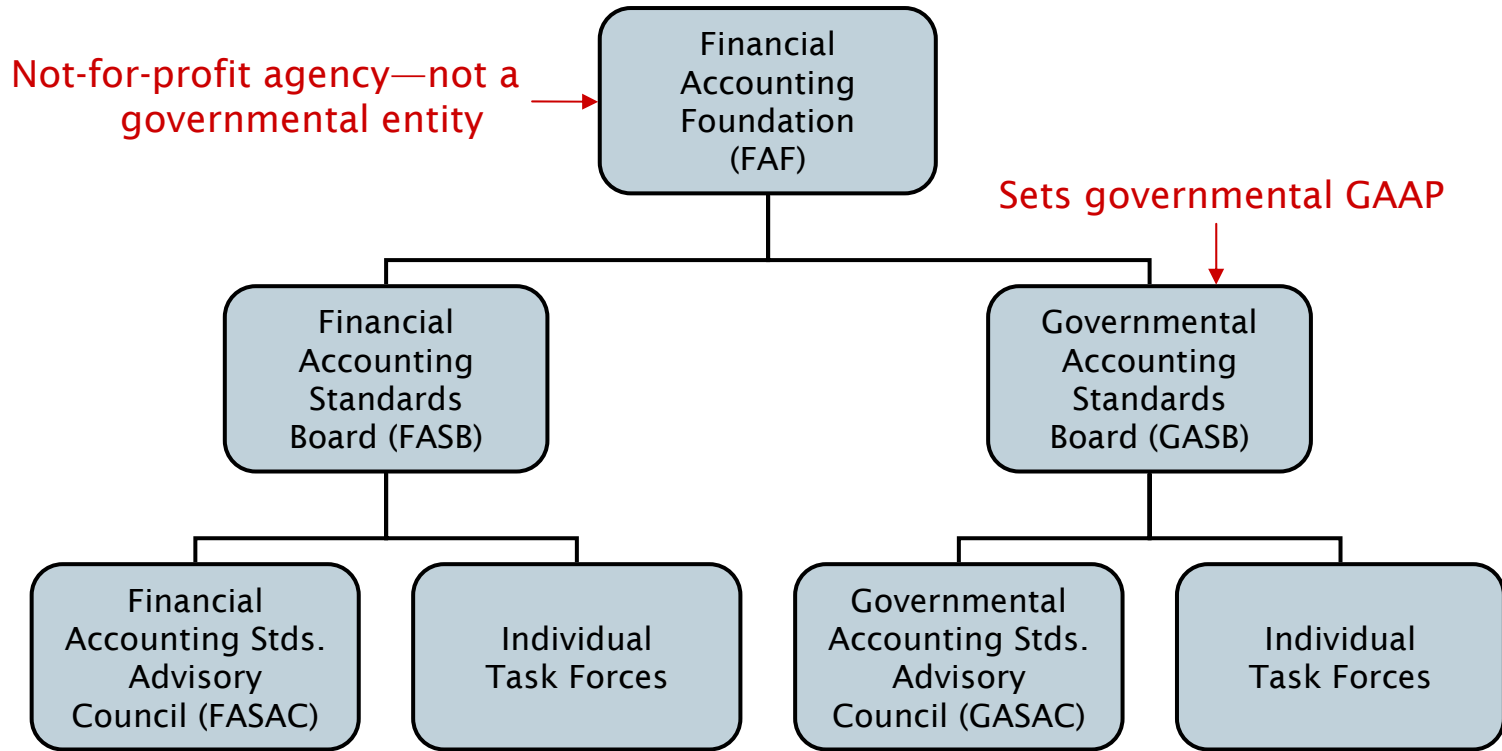
- *Depreciated value (book value)*—Value of an asset as determined using generally accepted accounting principles and as reflected on the balance sheet
- *Replacement value*—The current cost to substitute an entire asset with a new or equivalent asset without enhancement of capabilities

Two valuation perspectives

- Macro view—aggregation of assets
 - Financials
 - GASB
- Micro view—the individual asset
 - Life cycle cost
 - Economic life
 - Optimal renewal decision making

GASB is Governmental Accounting Standards Board

GASB—how GAAP is set



GAAP is generally accepted accounting principles

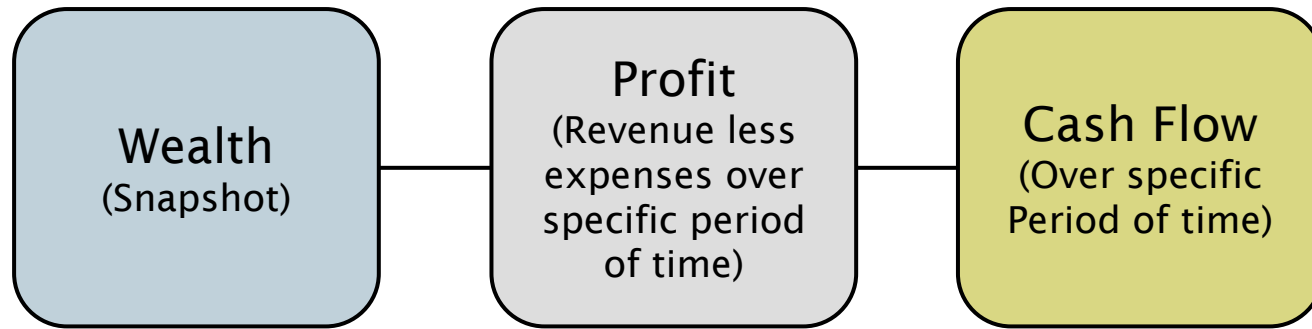
What GASB is all about

Practices and procedures by which governments...

- Using *source documents for such transactions as*
 - Tax receipts
 - Paychecks
 - Invoice payments
 - Debt payments
- *Record* financial transactions
 - In an accounts journal
 - And general ledger
- And *report* financial transactions
 - In consolidated annual financial reports

Focus of GASB's Statement 34

What it's all about—financial prospective



What is the story to be told?

Financial condition—a government's ability to provide as committed and to meet obligations as they fall due

- Liquidity
- Solvency
 - Cash solvency—capacity for the utility to cover its cash obligations of the next 30-60 days
 - Budgetary solvency—capacity for the utility to cover budgetary appropriations within the current budget cycle
 - Structural (long-term) solvency—relationship of assets to long-term liabilities over time
 - *Service level solvency—capacity for the utility to maintain a target level of service (LOS) over multiple budget cycles*
- Fiscal capacity

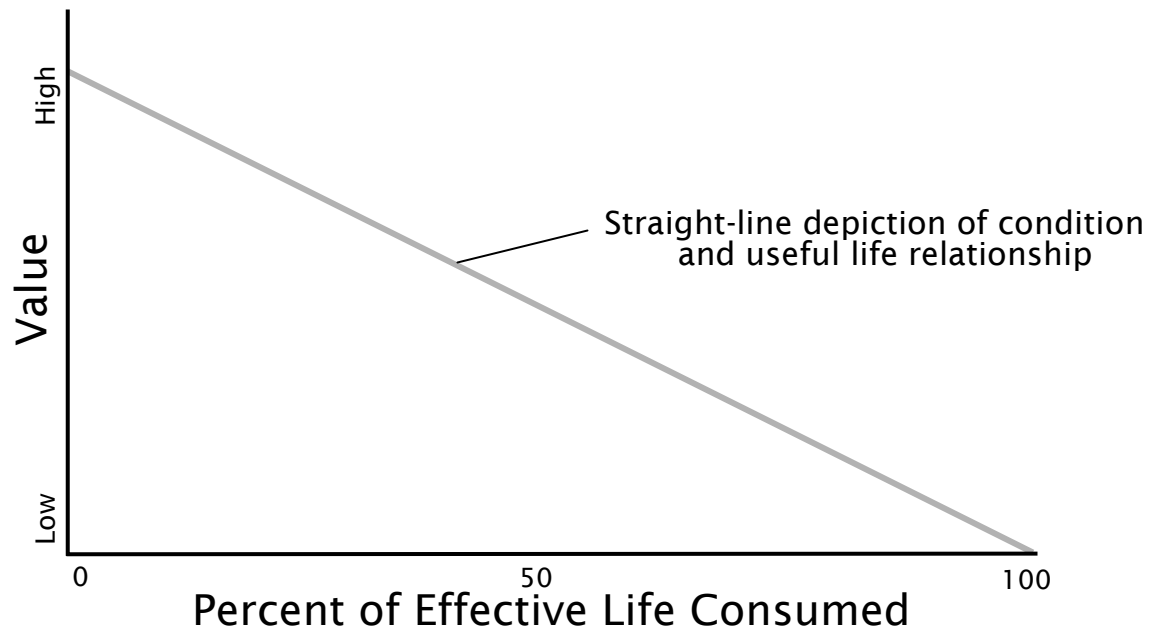
Reporting of capital assets

- One of the main goals of the new reporting model is to provide information about the *full cost* of providing government services
- Cost of services must include the *consumption of capital* resources used to provide those services
- Two techniques for estimating those consumption of capital costs are available
 - Depreciation
 - Modified (preservation) method

Basic depreciation method

Straight-line depreciation

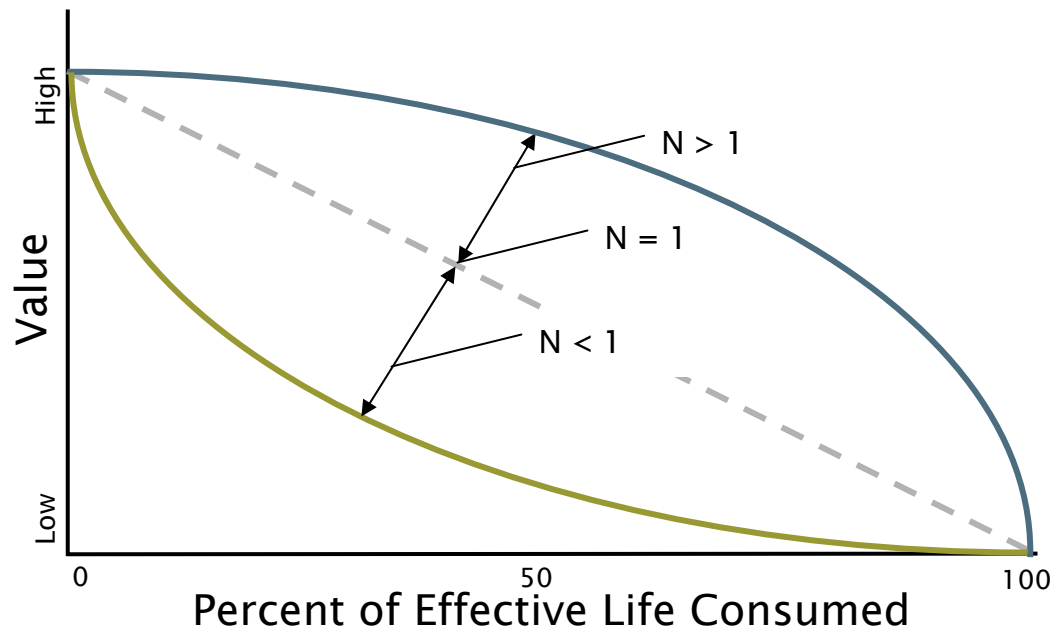
- Easy to apply, but rarely a true reflection of asset decay and useful life
- Book value = Original cost/Useful life



Condition-based depreciation

Calculate condition-based (CB) *depreciated* and *renewal* cost

- CD *depreciated* cost = $(\text{Life to date}/\text{Estimated useful life})^N \times \text{Original cost}$
- CB *renewal* cost = $(\text{Percent effective life consumed})^N \times \text{Replacement cost}$



Major passive assets, $N = 4$; architectural passive assets, $N = 3$; mechanical, electrical, and other dynamic assets, $N = 2$

Alternative GAAP valuation method

Modified preservation method

- Based on *historic* cost
- Historic cost is not reduced if the condition of the asset is preserved, hence, *preserved historic cost*
- Requires setting a *measurable condition* or performance standard (level of service)
- Requires condition to be measured and disclosed at least *every three years*
- Expenses *renewal costs* each year

Two accounting views

1. Financial accounting

Based on historic cost

- GAAP-driven
- Financial statement reporting—external
- Meets criterion of fairly presenting the result of operations on financial condition
- Audit trail paradigm

2. Managerial accounting

Based on replacement cost

- Not GAAP-driven
- Instead, *business case*-driven—*decision*-focused
- *Cost*-focused

GAAP is generally accepted accounting principles

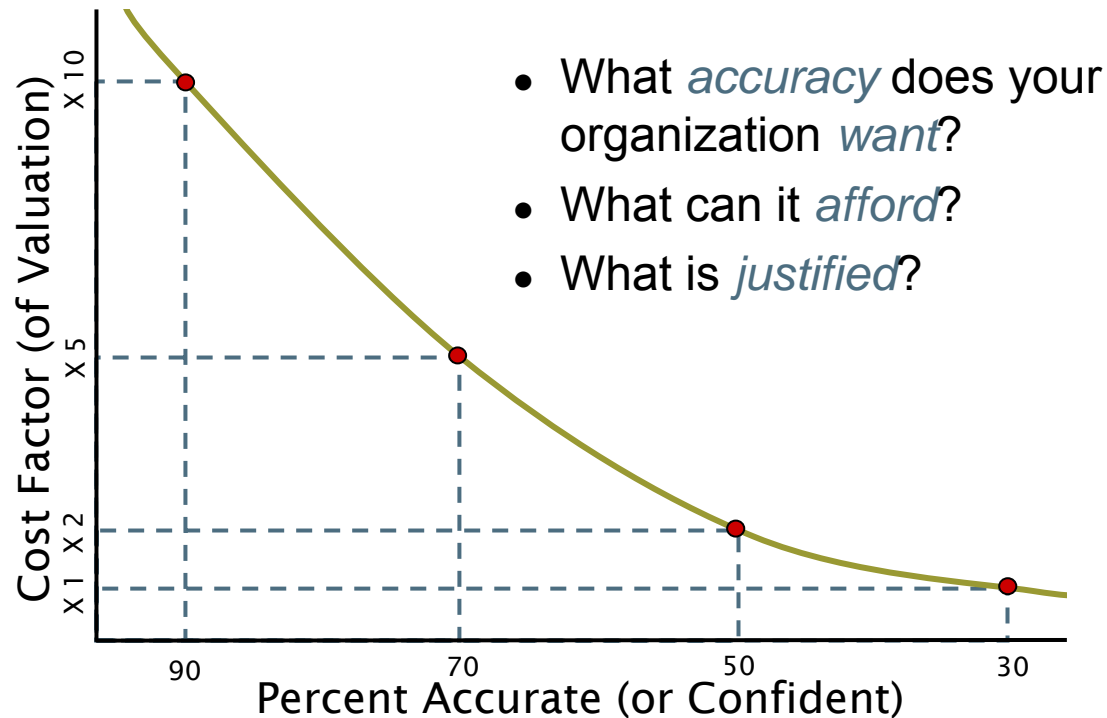
Determining replacement cost

- Level 1
 - Original cost x general cost index (e.g., CPI)
- Level 2
 - Original cost x sector-based cost index (e.g., ENR, Means, CCI)
 - Brownfields-to-Greenfields conversion costs
- Level 3
 - Modern Equivalent Engineered Replacement Asset (MEERA)
 - Detailed site-based cost analysis

CPI is Cost Performance Index, ENR is Engineering News-Record, Means is Means Building Construction Cost Data, CCI is Consumer Confidence Index

Cost vs. accuracy or confidence

Estimated *trade-off* in cost for accuracy or confidence



Which valuation technique?

- Financial accounting
 - Used for GASB reporting purposes
 - With choice of
 - *Historic* depreciation
 - Or *modified or preservation* approach
- Managerial accounting
 - Used for *renewal or replacement* analysis
 - And *long-term* funding strategies, including rate setting
 - With choice of
 - *Condition-based* renewal
 - Or *depreciated* replacement

GASB is Governmental Accounting Standards Board

Key points from this session

What is the value of my assets?

Key Points:

- Asset valuation is the “common benchmark” against which the decision to repair, refurbish or replace is made.
- Historic depreciation has little relevance to long lived assets where the management intent is to preserve the asset
- Far more relevant are the replacement value-based techniques

Associated Techniques:

- Valuation and costing
- Straight-line depreciation
- Condition-based depreciation
- Renewal/Replacement costing
- Depreciated replacement cost
- Deprival cost

Tom's spreadsheet

Microsoft Excel - EPA Seminar Master.xls

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Asset Register and Hierarchy					What is the State of My Assets?			Required LOS?		Which Are Most "Critical"?		
Installed Date	Asset Class	Original Cost	Estimated Effective Life	Condition Rating	Annual Dep	Accum Dep	Current LOS?	Minimum Condition	Backup Reduction (Redundancy)	Probability of Failure	Consequence of Failure	
Year		\$	Years	1 to 10	\$	\$			%	Rating	1 to 10	
Act or Est	Tab A	Act or Est	Calculated	Tab A	Calculated	Calculated		Tab A	Tab D	Calculated	Tab C	
10	Sanitation System											
11	Disposal System											
12	Treatment Plants											
13	Collection Systems											
14	Sewer Mains											
15	Pump Station											
16	Incoming Sewer											
17	Pipes	1963	3	\$ 1,725	100	6	\$ 17	\$ 742				
18	Manhole	1963	3	\$ 340	100	5	\$ 3	\$ 146				
19	Influent Gate Valve	1986	5	\$ 442	30	8	\$ 15	\$ 235				
20	Incoming Power											
21	Pole & Transformer	2006	4	\$ -	40	1	\$ -	\$ -				
22	Connection	2006	7	\$ -	35	1	\$ -	\$ -				
23	Control system											
24	Incoming Telephone	1985	8	\$ 85	25	7	\$ 3	\$ 71				
25	PLC	1983	8	\$ 8,600	25	8	\$ 344	\$ 7,912				
26	Manual controls	1978	8	\$ 425	25	7	\$ 17	\$ 476				
27	Land & Improvements											
28	Land	1950	10	\$ 630	300	1	\$ 2	\$ 118				
29	Access Road	1963	1	\$ 12,500	75	5	\$ 167	\$ 7,167				
30	Landscaping	2000	1	\$ 595	75	6	\$ 8	\$ 48				
31	Security fence	1963	1	\$ 1,360	75	7	\$ 18	\$ 780				
32	Sub Structure											
33	Cassion Outer	1963	1	\$ 30,600	75	6	\$ 408	\$ 17,544				
34	Upper Floor	1963	1	\$ 4,250	75	6	\$ 57	\$ 2,437				
35	Dry well	1963	1	\$ 6,800	75	6	\$ 91	\$ 3,899				
36	Landings and Stairs	1963	9	\$ 4,250	60	7	\$ 71	\$ 3,046				
37	Wet Well	1963	1	\$ 5,100	75	6	\$ 68	\$ 2,924				
38	Shaped floor	1963	1	\$ 850	75	6	\$ 11	\$ 487				
39	Sump pump	1963	4	\$ 895	40	6	\$ 15	\$ 640				
40	Pumps											
41	Drive shafts	2006	6	\$ 12,660	35	1	\$ 359	\$ -				
42	Pumps	2006	4	\$ 29,750	40	1	\$ 744	\$ -				

Ready

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