INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS OF KENYA

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What is the Current State of my Assets

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Session outline

- Building a “Process Layout” Schematic
- Creating The “Asset Hierarchy”
- Defining The “Data Standard”
- Initial Condition Analysis, Determining Remaining Physical Life
- The Four Primary Failure Modes
- Determining Replacement Value
- Practical Challenges

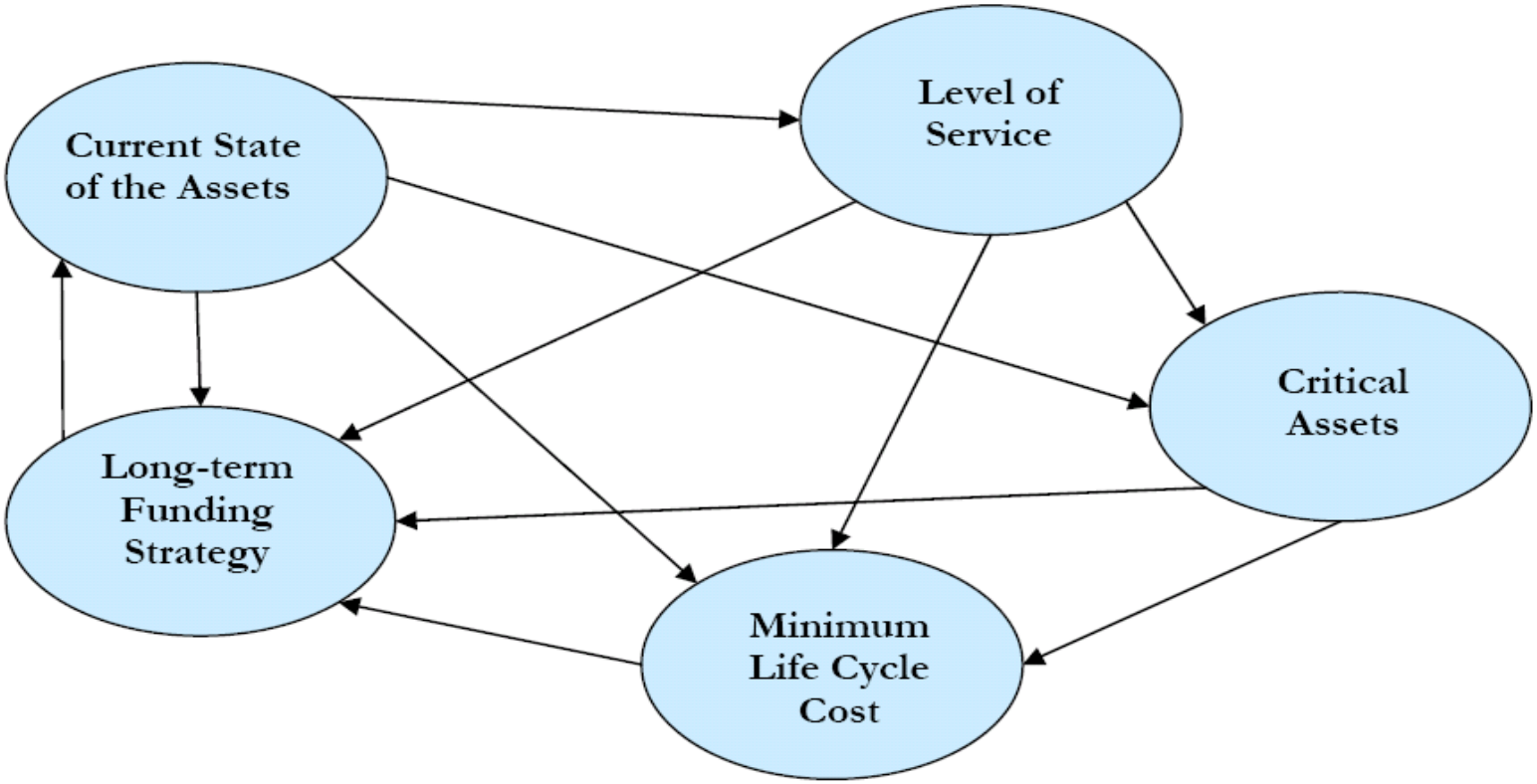
What is the Current State of my Assets

What do I own?

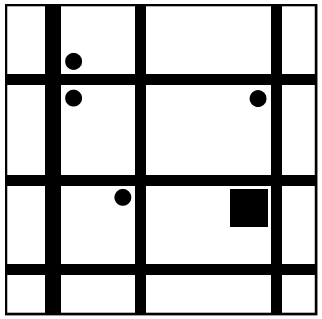
You can’t manage what you don’t know you own

Five Core Components of Asset Management

Flow Chart: The Five Core Questions of Asset Management Framework



Core Component 1: Current State of the Assets



Where is it?

What do I own?

What is its remaining useful life?

What condition is it in?

What is its remaining economic value?

Core Component 2: What is the required Level of Service?

- What is the demand for my services by my stakeholders
- What do regulators require
- What are the physical capabilities of the assets?

Good Items

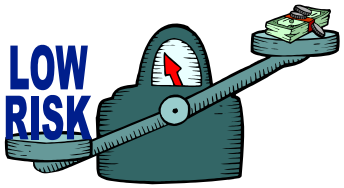
Items that are Measurable

Track Progress: Measure how well you're doing

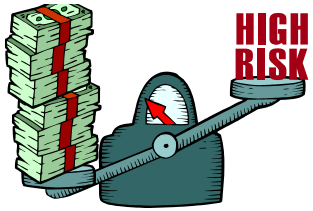
Customer Involvement/Customer Communication

Core Component 3: Which Assets Are Critical to Sustained Performance?

How do my assets fail?



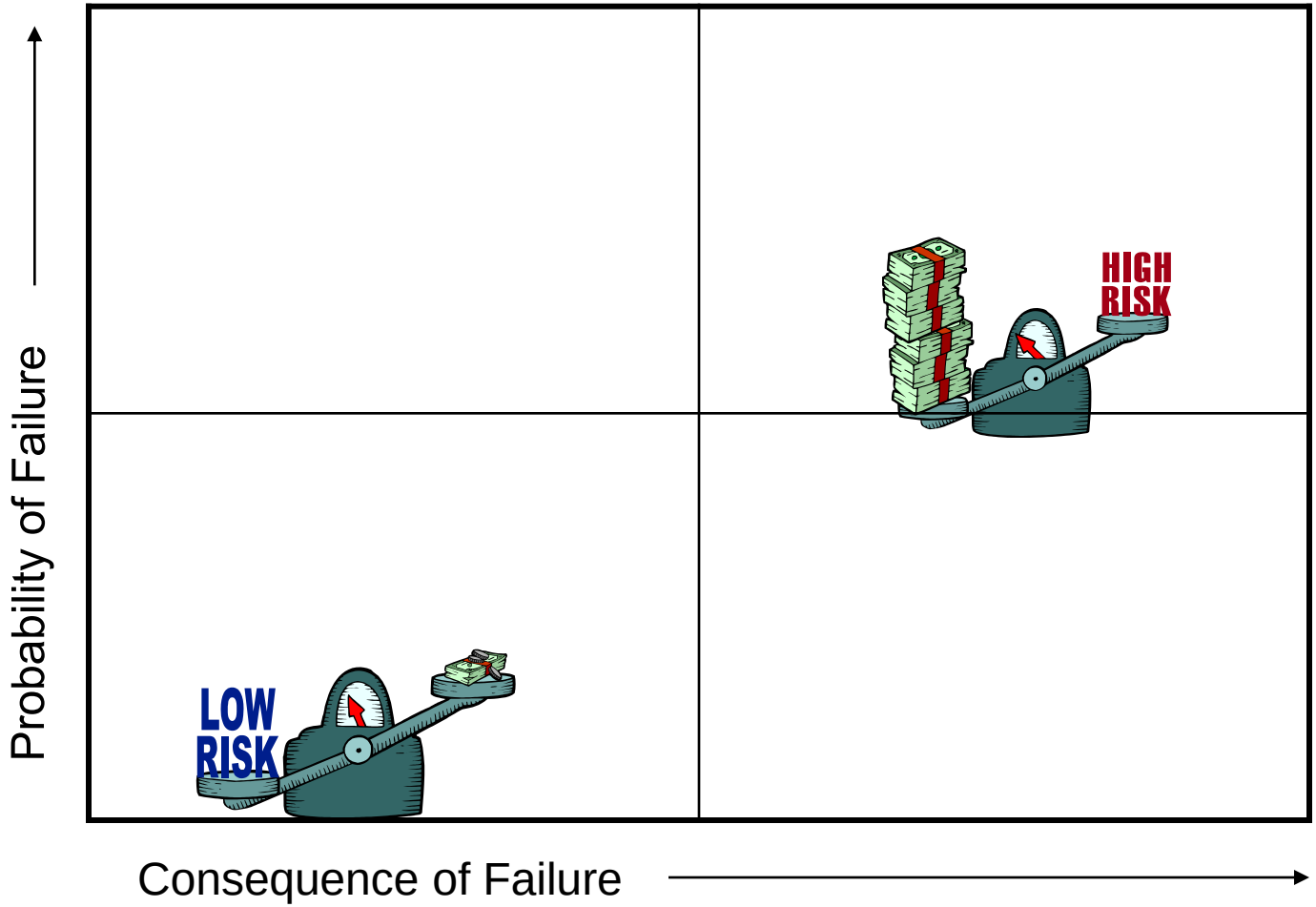
What is the likelihood of failure?



What does it cost to repair?

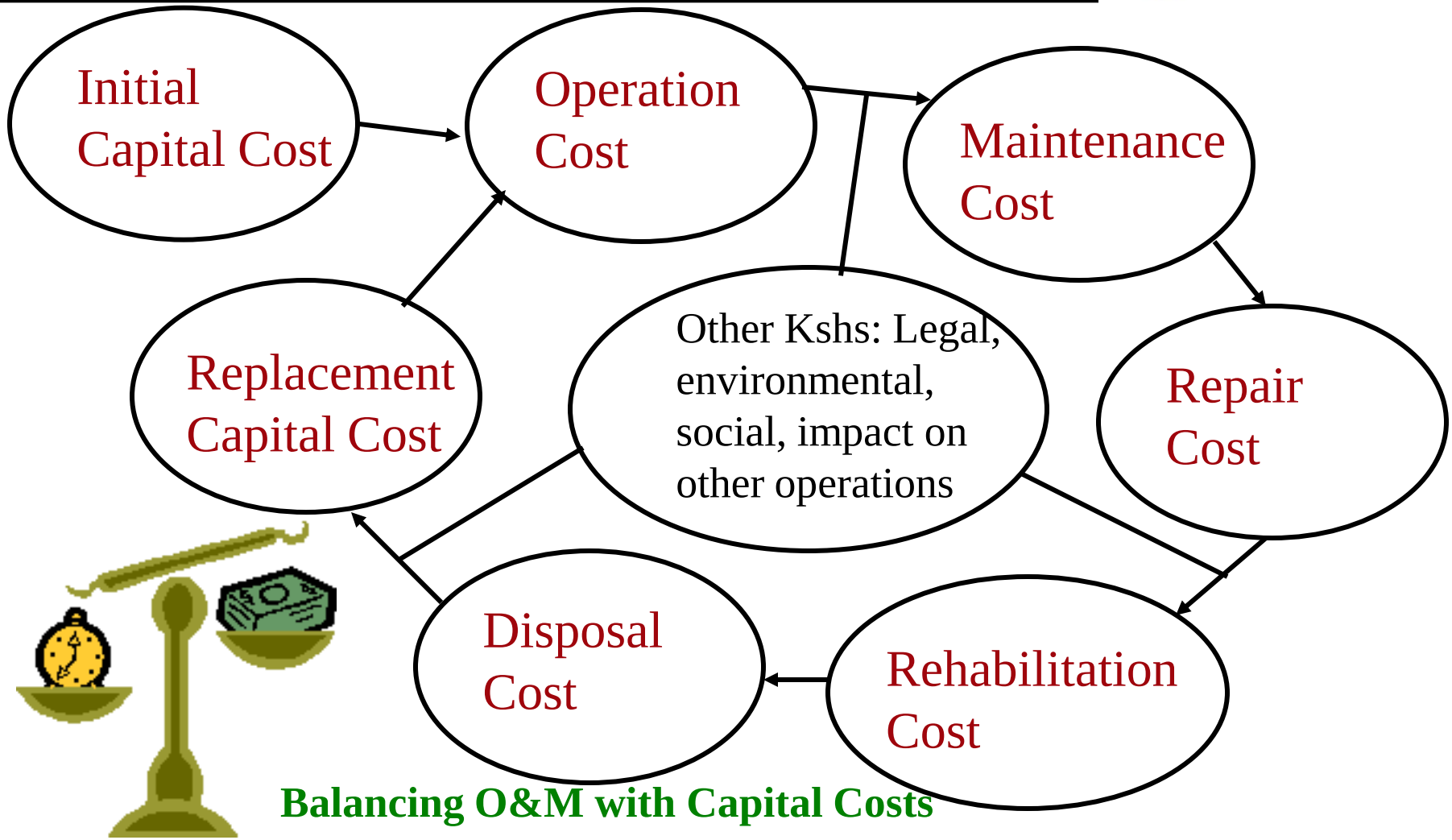
What are the consequences of failure?

Critical Assets



Which category of assets do I care the most about, the least?

Core Component 4: what is my Best O&M and CIP investment strategies



Balancing O&M with Capital Costs

Core Component 5: What is my Best Long-term Funding Strategy

O&M

Fleet

CIP

What funding do we need to properly operate the Utility?

Personnel

Equipment

IT

Where will the funding come from?

Impact Fees

Customer Rates

Grants

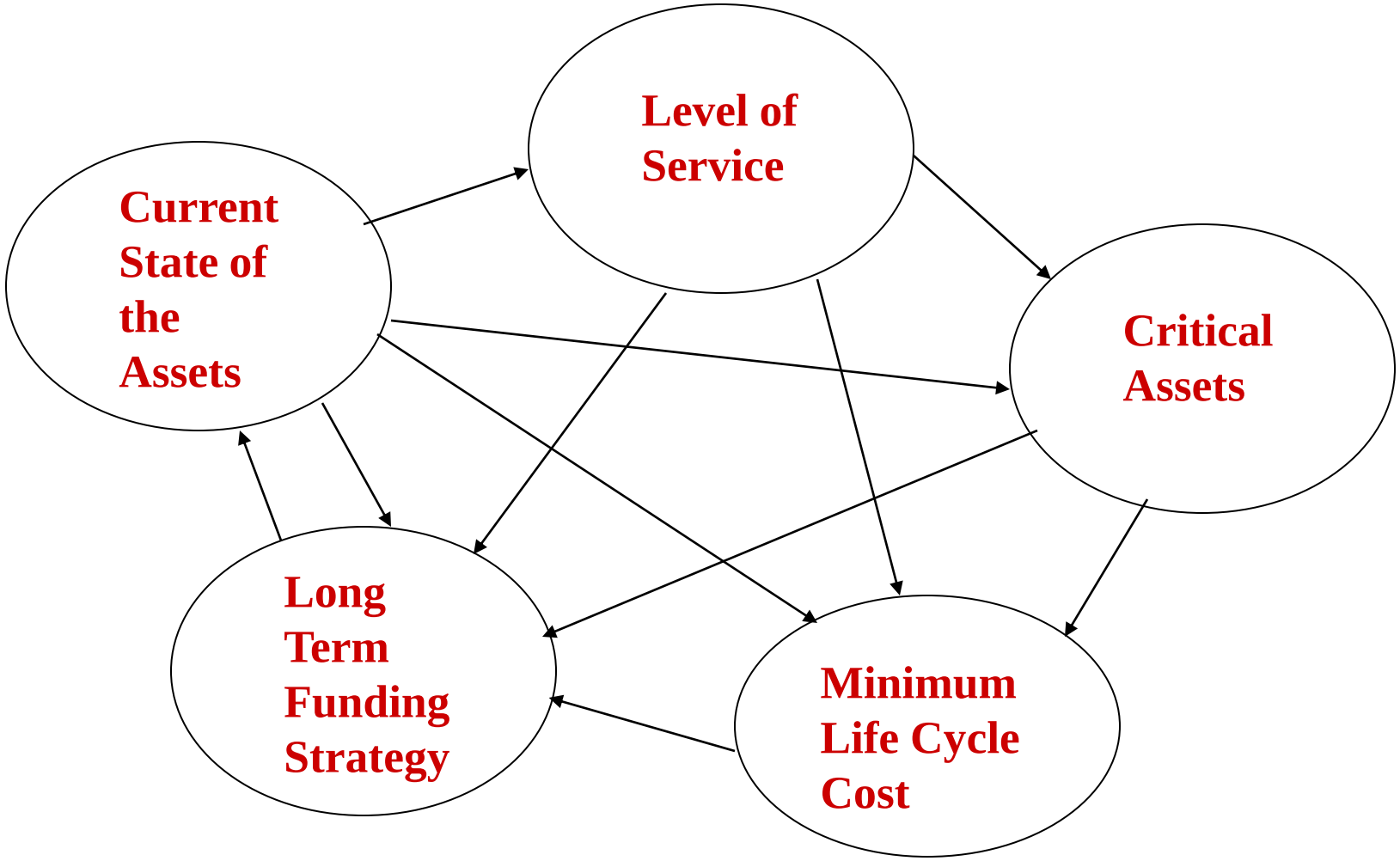
Customer Fees

Loans

Bonds

Special Funds

Components are Interrelated; Process Can Start Anywhere



Five Core Components of Asset Management

AM is cyclical but each time through the cycle there is improvement

Creating the Asset Hierarchy

- An asset hierarchy is a systematic and comprehensive listing of all assets in a logical, nested order that facilitates quick location of asset records and the rolling up of data from lower levels to higher or the drilling down from higher levels to lower.

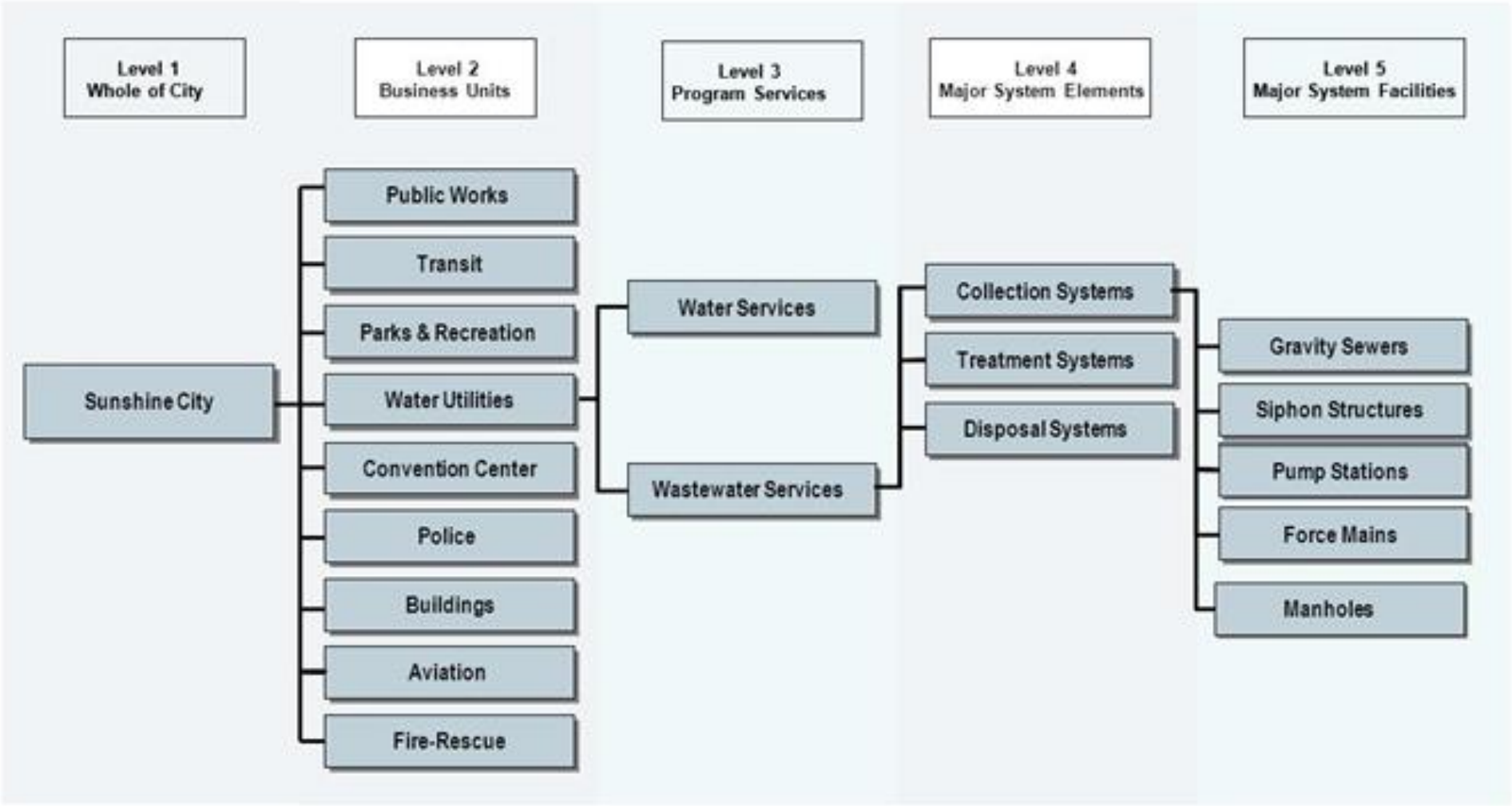
- The hierarchy, when combined with unique identification numbers and relevant attribute data for each asset comprises an asset registry, which is one of the most fundamental building blocks of an asset management program and system

- A registry organized in hierarchical order is the vehicle by which the information system most effectively enables the assessment of the assets as individual components, composite assets, or groups of assets.

Creating the Asset Hierarchy Cont…

- A good registry is built around two main concepts:
  - the asset hierarchy and
  - the data standard.
- The structural organization of the entity's set of asset records is the focus of the asset hierarchy concept.
- The classic rule when organizing data recognizes that data can always be aggregated or "rolled-up" to higher levels from lower, but can never be disaggregated lower than the lowest level collected.
- A rolled-up data structure is organized much like a family tree. At the lowest level is a child, followed by parent, grandparent, great-grandparent, etc. with each level encompassing more and more asset records, until reaching the top or most overarching entity or system, such as an entire department or organization.

Creating the Asset Hierarchy Cont…



Creating the Asset Hierarchy Cont…

- While it is not absolutely necessary to organize asset records in a hierarchical structure (they could simply be listed in date of creation order for example), doing so greatly simplifies the search for the proper record when entering data and greatly facilitates the roll up/drill down concept.

- Like any system development challenge, careful thought must be given to how the registry will be used, and who will be using it. Care should be given to anticipate how the hierarchy/registry supports all aspects of the life cycle (planning, acquisition /construction, maintenance, operations, renewal, decommissioning).

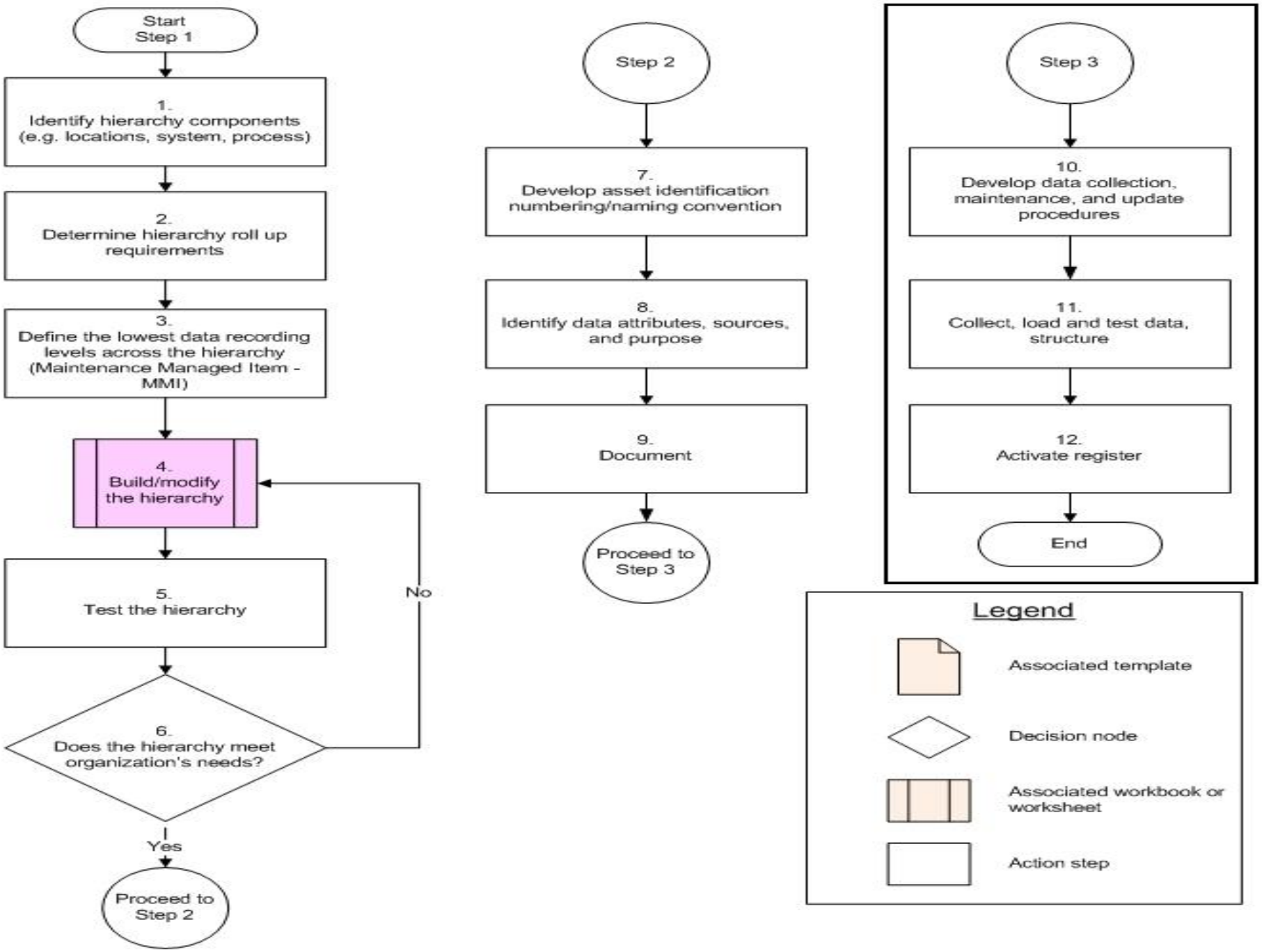
- The Data Standard is a document which consists of written rules and procedures that govern which attributes of each asset are to be recorded in the registry and how they are to be recorded.

Creating the Asset Hierarchy Cont…

Step 1: Organize hierarchy layout

Step 2; Develop “data standard “to support hierarchy

Step 3: Load Data, Test, Activate


Start
Step 1
1.
Identify hierarchy components (e.g. locations, system, process)
2.
Determine hierarchy roll up requirements
3.
Define the lowest data recording levels across the hierarchy (Maintenance Managed Item - MMI)
4.
Build/modify the hierarchy
5.
Test the hierarchy
6.
Does the hierarchy meet organization's needs?
No
Yes
Proceed to Step 2
Step 2
7.
Develop asset identification numbering/naming convention
8.
Identify data attributes, sources, and purpose
9.
Document
Proceed to Step 3
Step 3
10.
Develop data collection, maintenance, and update procedures
11.
Collect, load and test data, structure
12.
Activate register
End
Legend
Associated template
Decision node
Associated workbook or worksheet
Action step

Creating the Asset Hierarchy Cont…

Illustration

Asset Management\COMAPANY XX.xlsx

The Primary Failure Modes

- The performance of an asset relates to its current ability to meet current and future demands.
- Assets can fail in four major ways, known as primary failure modes, which can be used to determine the most appropriate investment strategies relevant to the asset.
- The four Primary Failure Modes are;
  - ✓ Physical Mortality,
  - ✓ Level of Service,
  - ✓ Capacity, and
  - ✓ Financial Efficiency.

Failure Mode	Description and Drivers	Assessment Technique	Management Strategy
Physical Mortality	Asset deterioration ("wear & tear") reduces performance below an acceptable level Age, Usage, Operational Stresses, Acts of Nature	Condition Level 1 – Staff Knowledge – 'Delphi*' Level 2 – Visual / Touch Inspection Level 3 – Physical Testing	Renewal, O&M Optimization
Capacity	Demand exceeds design capacity Growth and System Expansion	Capacity Level 1 – Staff Knowledge – 'Delphi' Level 2 – Desktop Capacity Modeling Level 3 – Capacity Modeling with Field Data	Redesign
Level of Service	Functional and reliability requirements exceed design capability Regulations, Quality, Safety, Client Service, Noise, Odor	Function Level 1 – Staff Knowledge – 'Delphi' Level 2 – Process Assessment Level 3 – Strategic Planning Reliability Level 1 – Staff Knowledge – 'Delphi' Level 2 – Desktop Analysis Level 3 – Work Order History (Mean Time Between Failure – MTBF)	Redesign, O&M Optimization
Financial Efficiency	Cost of Operation exceeds feasible alternatives New Technology, Wear, Spare Parts	Efficiency Level 1 – Staff Knowledge – 'Delphi' Level 2 – Desktop Life Cycle Cost Analysis (LCCA) from Estimated Data Level 3 – LCCA with Field Data	Replace

**A decision-making process that uses the opinions of experts, gathered on a dispersed or face-to-face basis, and the guidance and direction of a facilitator to reach either group consensus or a clear definition of alternatives*

The Primary Failure Modes cont…

- While all assets are subject to each failure mode throughout their lives, not all failure modes are imminent for every asset and therefore each asset needs to be identified in accordance with the failure mode that is applicable.
- It is therefore important to identify the most imminent of the four Primary Failure Modes confronting a given asset to assess the relevance of likelihood of failure estimation for that asset.
- For example, substantial investment in condition assessment data is generally only cost effective where physical mortality is the most pressing or imminent failure mode

The Primary Failure Modes cont…

- The concept of “Primary Failure Mode” links directly to the concept of “remaining effective life”.
- Remaining effective life is that life that remains in an asset before the most imminent failure mode leads to failure.
- Effective remaining life is not determined solely by the time to physical collapse, but by which of the four primary modes is most imminent for that asset in its operating environment.
- The timing of the imminent failure mode directly impacts determination of the remaining effective life; remaining effective life, in turn, affects the determination of the Likelihood of Failure, a key step in developing a Business Risk Exposure score.

The Replacement Analysis

- Should the existing equipment be retained or replaced?
- The Replacement Problem
  - **Obsolescence** occurs when an asset's technology is surpassed by newer and/or different technologies (PC)
  - **Depletion** is the gradual loss of market value of an asset as it is being consumed or exhausted (Oil well, Timber)
  - **Deterioration** is the general loss in value of an asset due to aging process (Production machinery)

The Replacement Analysis cont..

- Planned replacements can be scheduled to minimize the time and cost of disruptions.
- Variations of replacement problems, such as abandonment, retirement, improvements of existing or keeping existing as spare, can be considered as potential new.
- Since replacement problems usually are considered with “fixed output”, only costs of existing and new are analyzed.
- Due to the lives of the existing and new usually different, most calculations focus on annual marginal costs

The Replacement Analysis cont..

- Maintain the existing asset as long as the marginal cost of ownership for one more year is less than the new asset's minimum marginal cost.

- When the existing asset marginal cost becomes greater than the new asset's minimum cost, then replace the existing with the new.

AM is the Future….

If it hasn’t come to you yet, it will!