Core Question 1A: What Is The Current State Of My Assets?
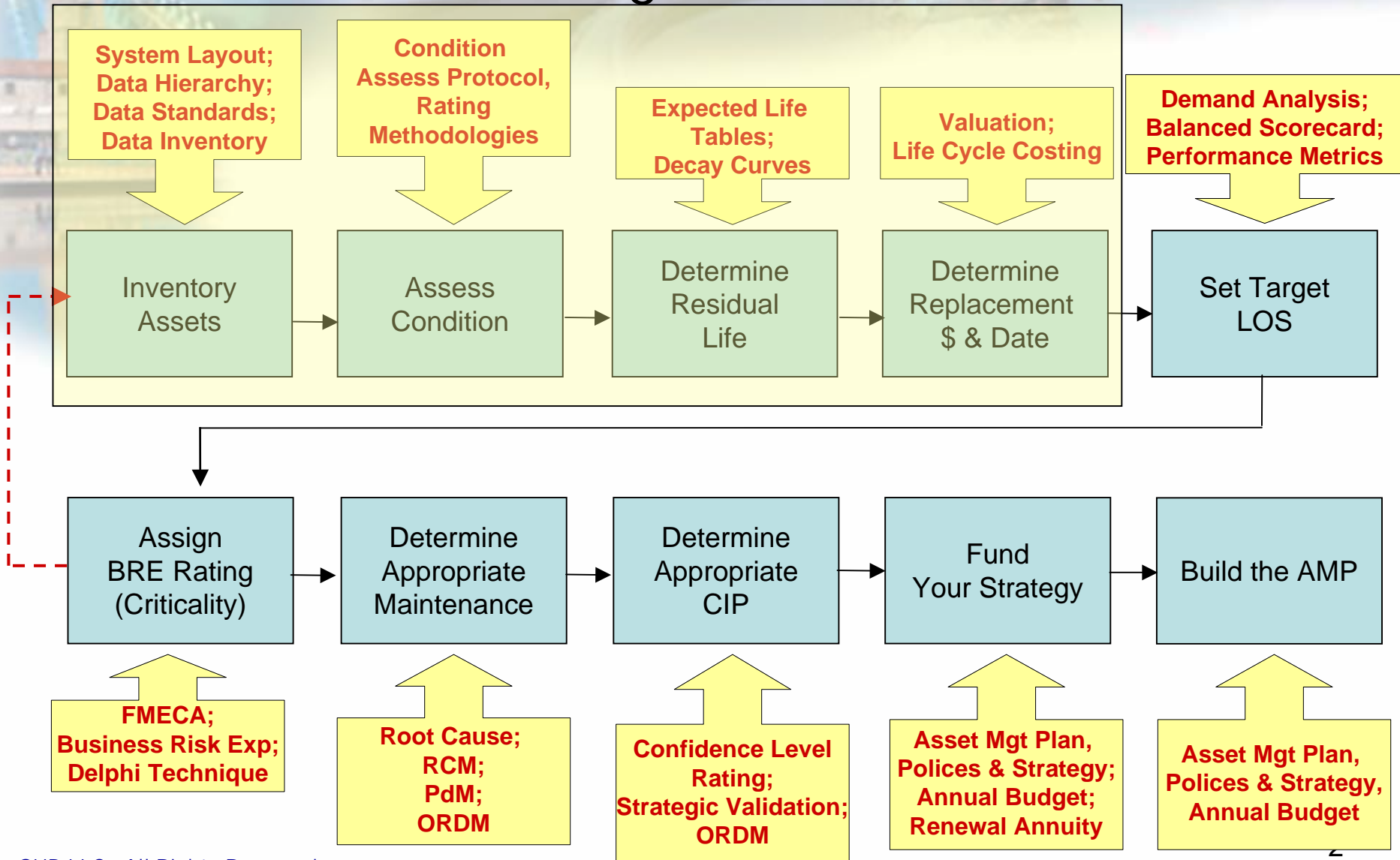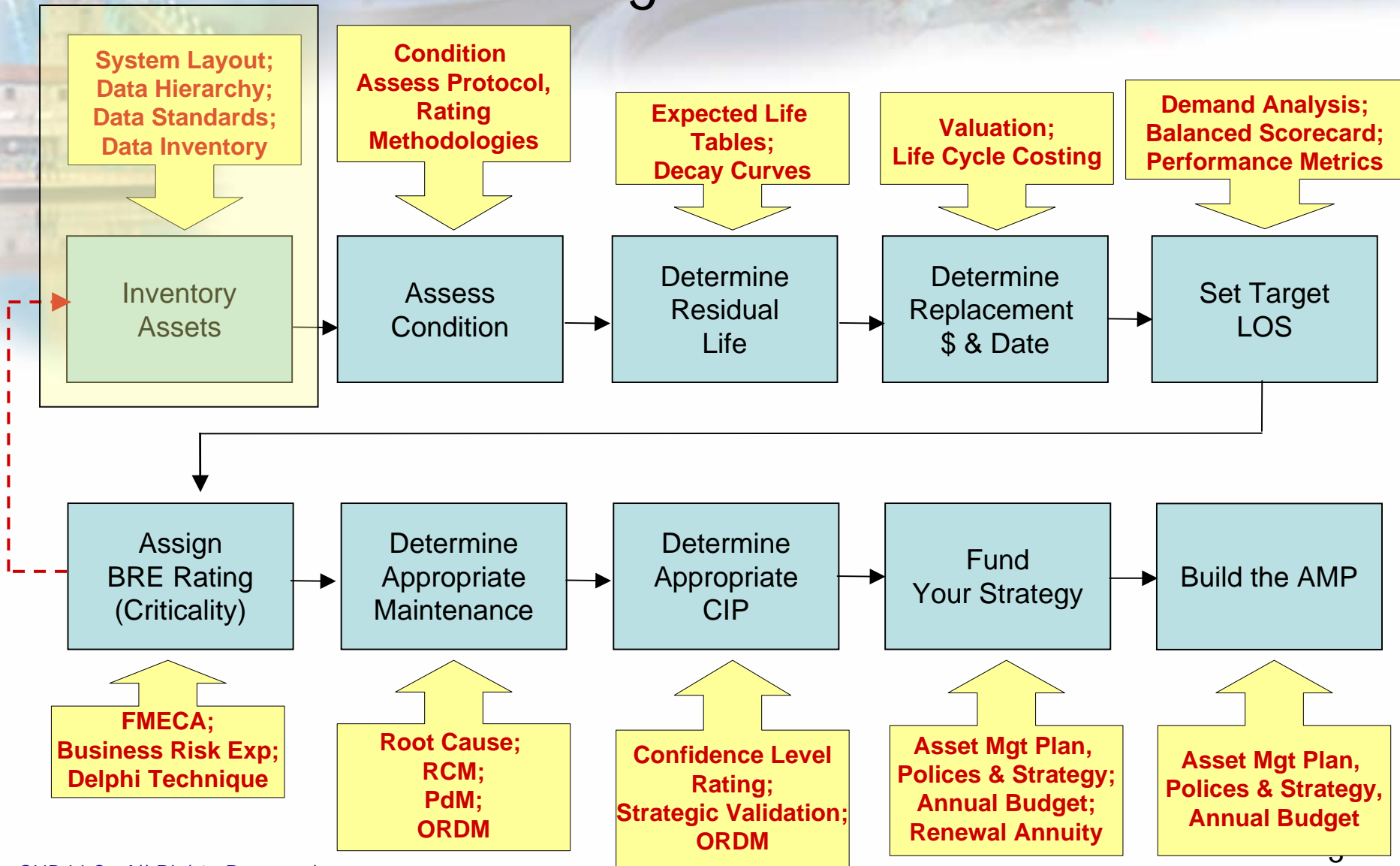
AMPLE

Asset Management Program
Learning Environment

Core AAM Program Process Tools

**System Layout;
Data Hierarchy;
Data Standards;
Data Inventory**

**Condition
Assess Protocol,
Rating
Methodologies**

**Expected Life
Tables;
Decay Curves**

**Valuation;
Life Cycle Costing**

**Demand Analysis;
Balanced Scorecard;
Performance Metrics**

Inventory Assets → Assess Condition → Determine Residual Life → Determine Replacement $ & Date → Set Target LOS

Assign BRE Rating (Criticality) → Determine Appropriate Maintenance → Determine Appropriate CIP → Fund Your Strategy → Build the AMP

**FMECA;
Business Risk Exp;
Delphi Technique**

**Root Cause;
RCM;
PdM;
ORDM**

**Confidence Level
Rating;
Strategic Validation;
ORDM**

**Asset Mgt Plan,
Polices & Strategy;
Annual Budget;
Renewal Annuity**

**Asset Mgt Plan,
Polices & Strategy,
Annual Budget**

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Core AAM Program Process Tools

System Layout; Data Hierarchy; Data Standards; Data Inventory

Condition Assess Protocol, Rating Methodologies

Expected Life Tables; Decay Curves

Valuation; Life Cycle Costing

Demand Analysis; Balanced Scorecard; Performance Metrics

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FMECA; Business Risk Exp; Delphi Technique

Root Cause; RCM; PdM; ORDM

Confidence Level Rating; Strategic Validation; ORDM

Asset Mgt Plan, Polices & Strategy; Annual Budget; Renewal Annuity

Asset Mgt Plan, Polices & Strategy, Annual Budget

Q1: What is the State of My Assets?

Q1a: What do I own and where is it?

Question No. 1A

What do we own and where is it ?

- *To fully understand what we own we need an "asset register".*
- *To know where it is we need good plans.*

A Vision of "Best Appropriate Practice" Asset Registers

- We know what we own or have responsibility or legal liability for.

- We have recorded these assets in a register down to a "maintenance managed item (MMI)".

- We can roll up results in costs and levels of service (performance) .

Setting the Scene

First some background ….

- *Four major failures over the last 18 months*
- *Electrical switchboard & control panel*
- *Pump Motor*
- *Force main failure*
- *Inlet Sewer blockage*
- *Now the power pole …*
- *What does the station look like… ??*

Tom's "System Process Layout"
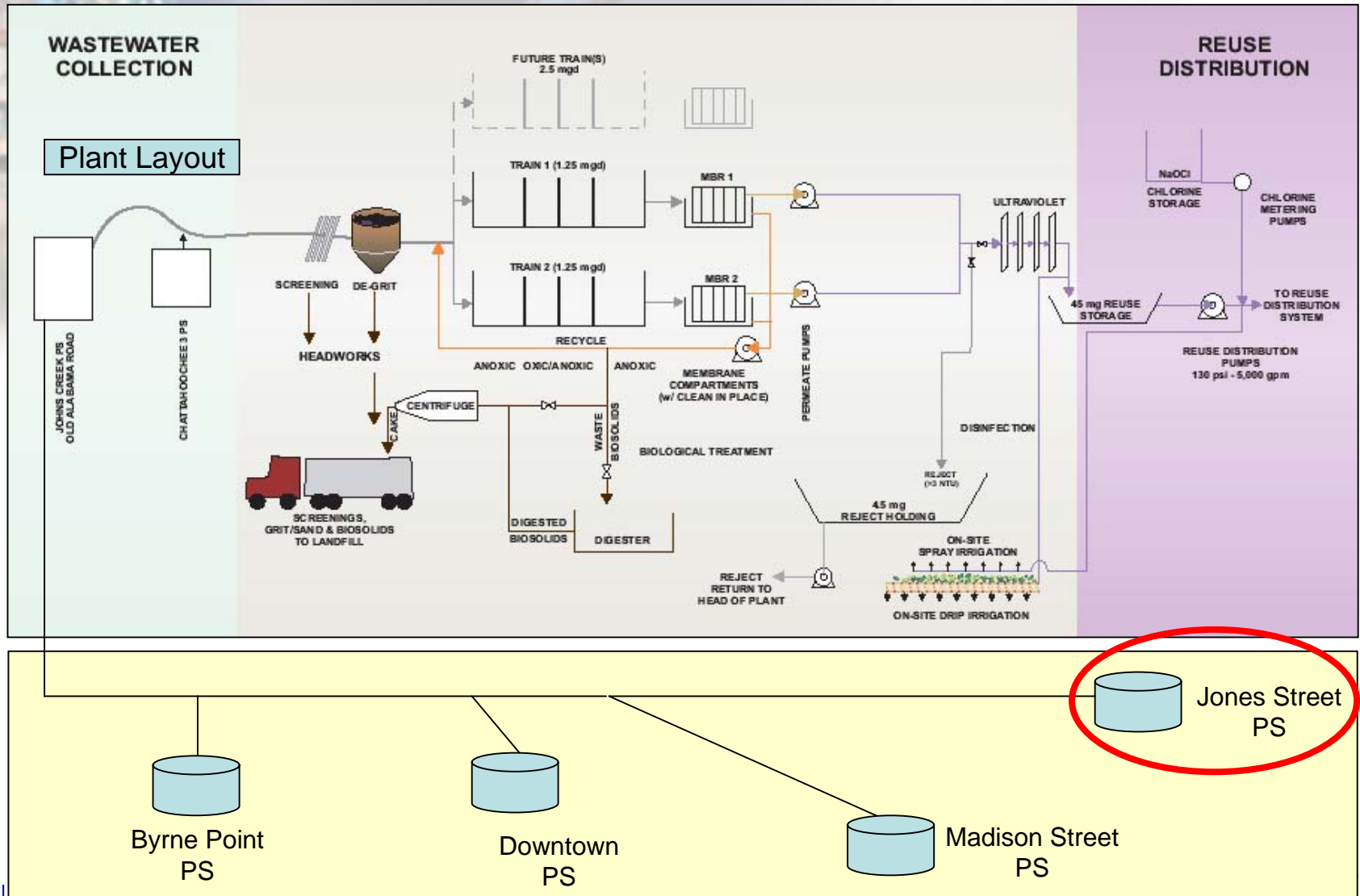
The Jones Street Pump Station
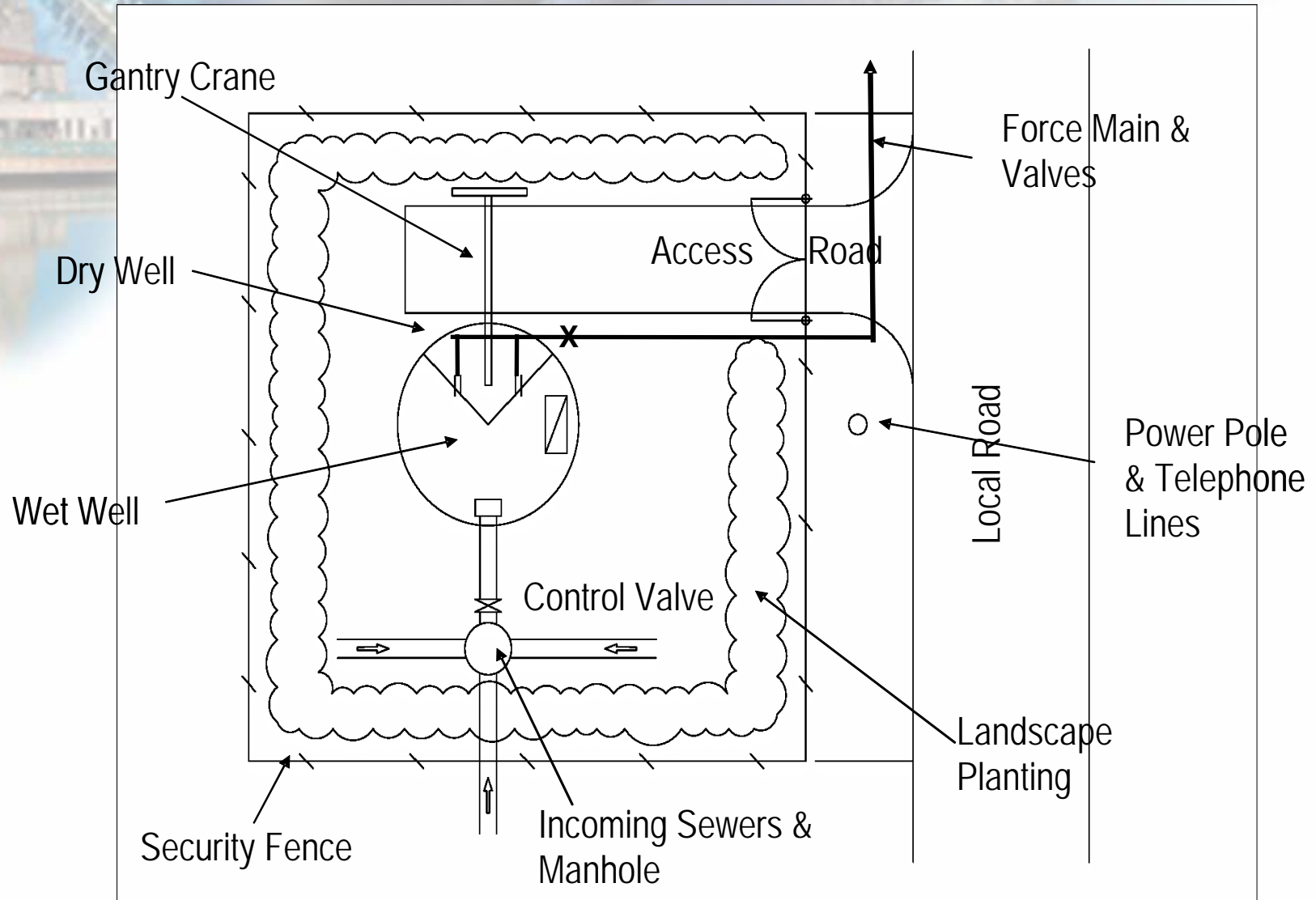
Superstructure

Control
Switchboard

Power Pole
&Transformer

Motors

Access Stairs

Caisson

Inlet Sewer

Drive
Shafts

Pumps

Inlet Screen

Wet Well

Dry Well

Sump Pump

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The Planimetric View

Labels: Gantry Crane, Dry Well, Wet Well, Security Fence, Control Valve, Incoming Sewers & Manhole, Access Road, Force Main & Valves, Local Road, Power Pole & Telephone Lines, Landscape Planting

Sources of Data

⇨ As-built plans

⇨ Design plans

⇨ Manufacturers Manuals

⇨ Bid documents

⇨ Schedules of quantities

⇨ Staff   - current

           - previous

Types of Asset Registers

⇨ Hierarchical – Parent child

⇨ Category based

⇨ Process loops

⇨ Spatial Relationships – GPS generated

⇨ Business unit responsibilities

⇨ Service Provision

The Asset Hierarchy
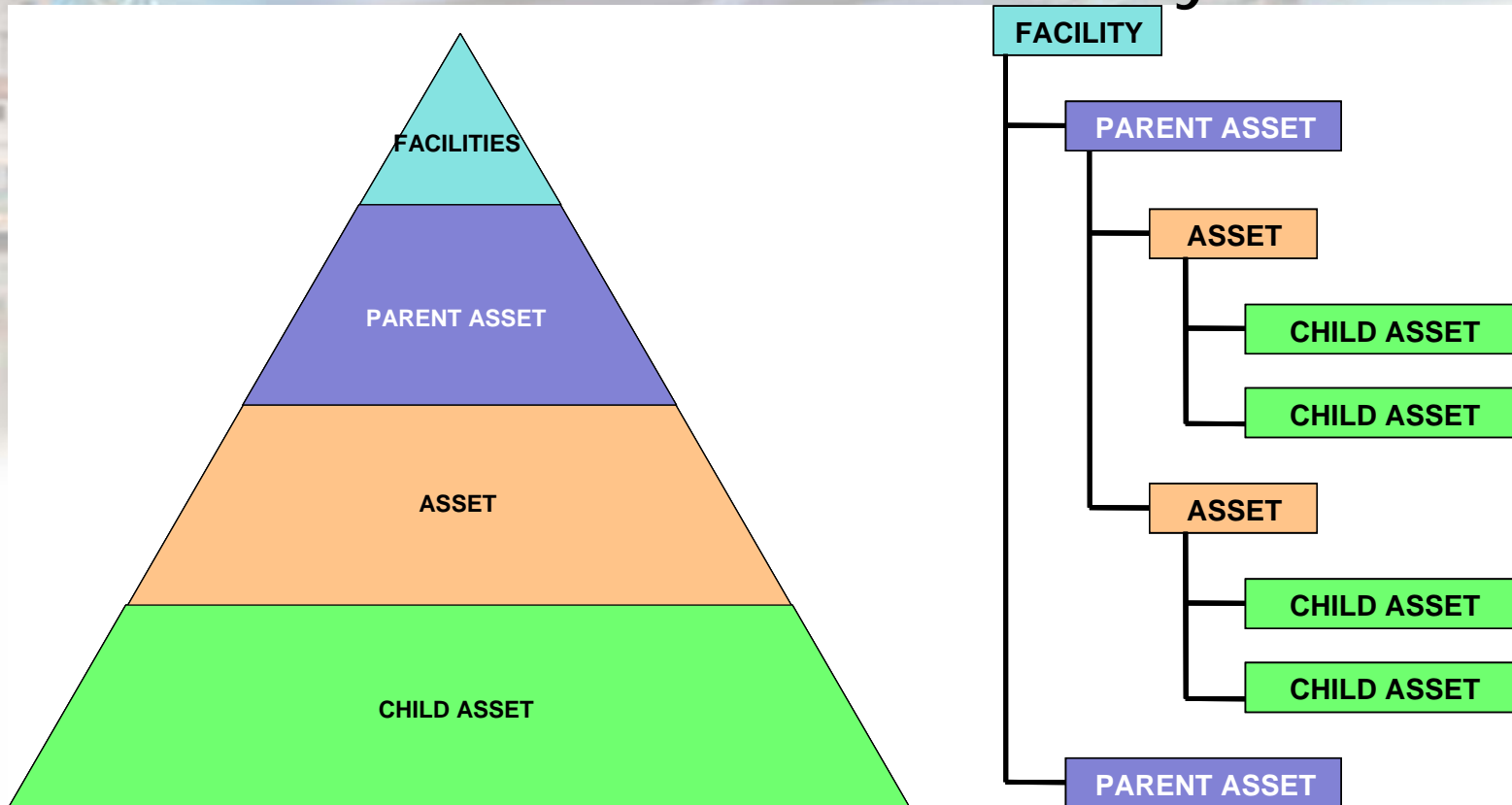
An agency's data standards are the backbone of its management capabilities

Hierarchical Structures

Level 1

Level 2

Sanitation Program

Collection Systems

Treatment Systems

Disposal Systems

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Hierarchical Structures

Level 1

Level 2

Sanitation Program

Eastern Systems

Northwest Systems

Southern Systems

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Hierarchical Structures

Level 2

Level 3

Collection System

Gravity Sewers

Siphon Structures

Pump Stations

Force Mains

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Hierarchical Structures

Level 3   **Level 4**

Gravity Sewers

Manholes

Pipelines

House Connections

Drop Structures

Sewer Ventilation

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Hierarchical Structures

Level 4

Level 5

Pump Stations

- Inlet Sewer & Screen
- Wet Well / Dry Well
- Superstructure
- Pumps & Motors
- Force Main
- Electrics
- Controls
- Land & Surrounds

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The "Roll-up" Concept

Sanitation System

Major Facilities

Child Assets

Components

Spare parts
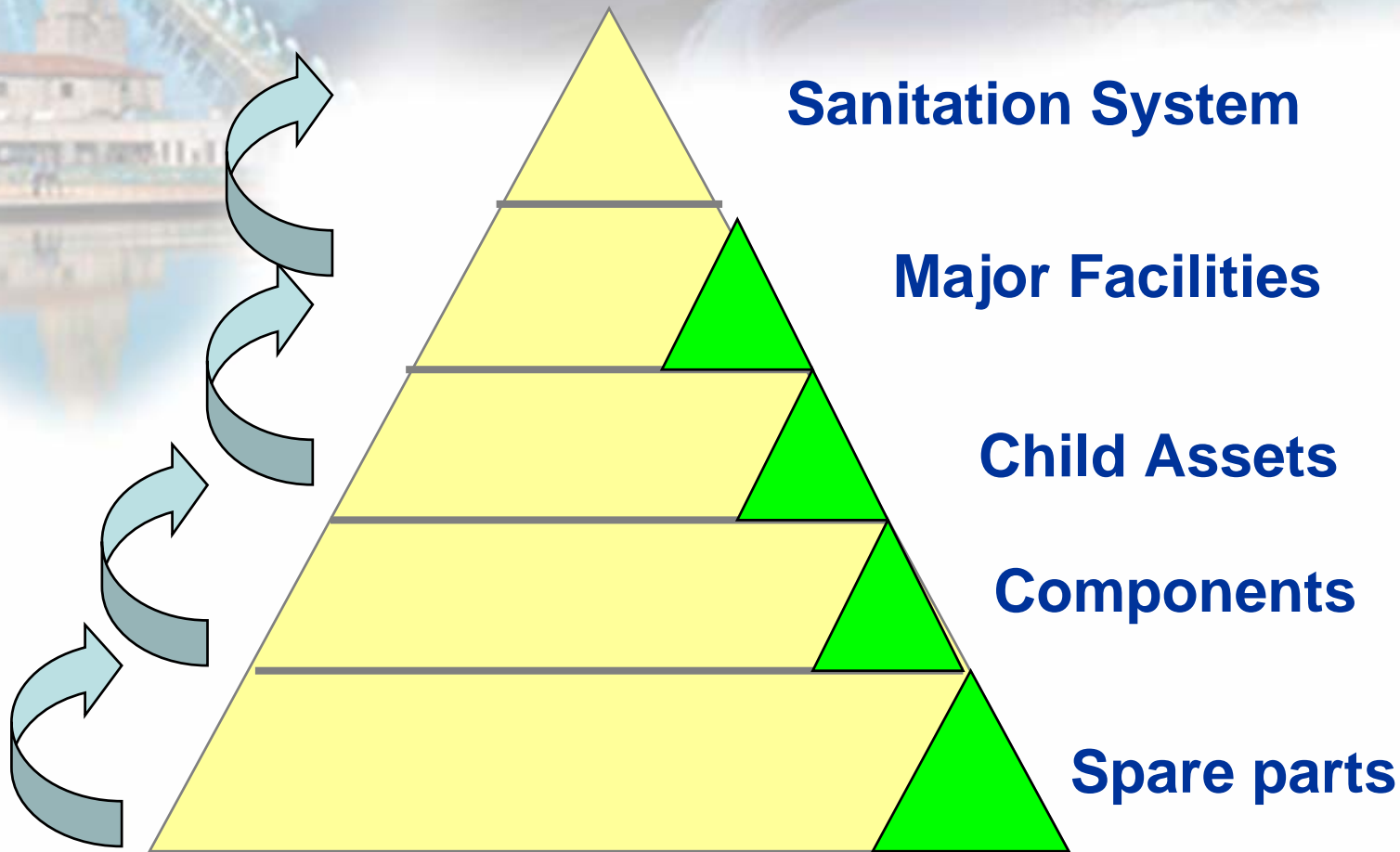
Confidence at the asset level is required
to roll it up with confidence.

The "Maintenance Managed Item" (MMI)

- "Maintenance Managed Item" or "MMI" refers to the lowest level of an asset's physical structure that is to be recognized within an asset register where the registry is structured as a nested hierarchy of physical assets.

- Typically, an MMI is set at that level of the hierarchy at which an asset is individually maintained or at which management decisions to repair, renew or replace are made.

Or?

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Maintenance Managed Items

ASSET TYPE	SUGGESTED REGISTER BREAK UP
PIPE ELEMENTS - Manholes - Pipelines - House Connections	Individual manholes Pipelines between manholes House connections per pipeline
PUMP STATIONS	Split into pump well structure, inlet screens and valves, pumps, controls, electrics, rising main, valves, superstructure, ladders and landings
MAJOR FACILITIES	Split into individual assets Then split into individual components • Civil elements • Mechanical elements • Electrical elements • Other items

Tying Data to the Hierarchy

AGAINST "Maintenance Managed Item" (M.M.I.) LEVEL

M.M.I.

M.M.I.

M.M.I.

HIERARCHY

WHAT LEVEL IS WARRANTED?
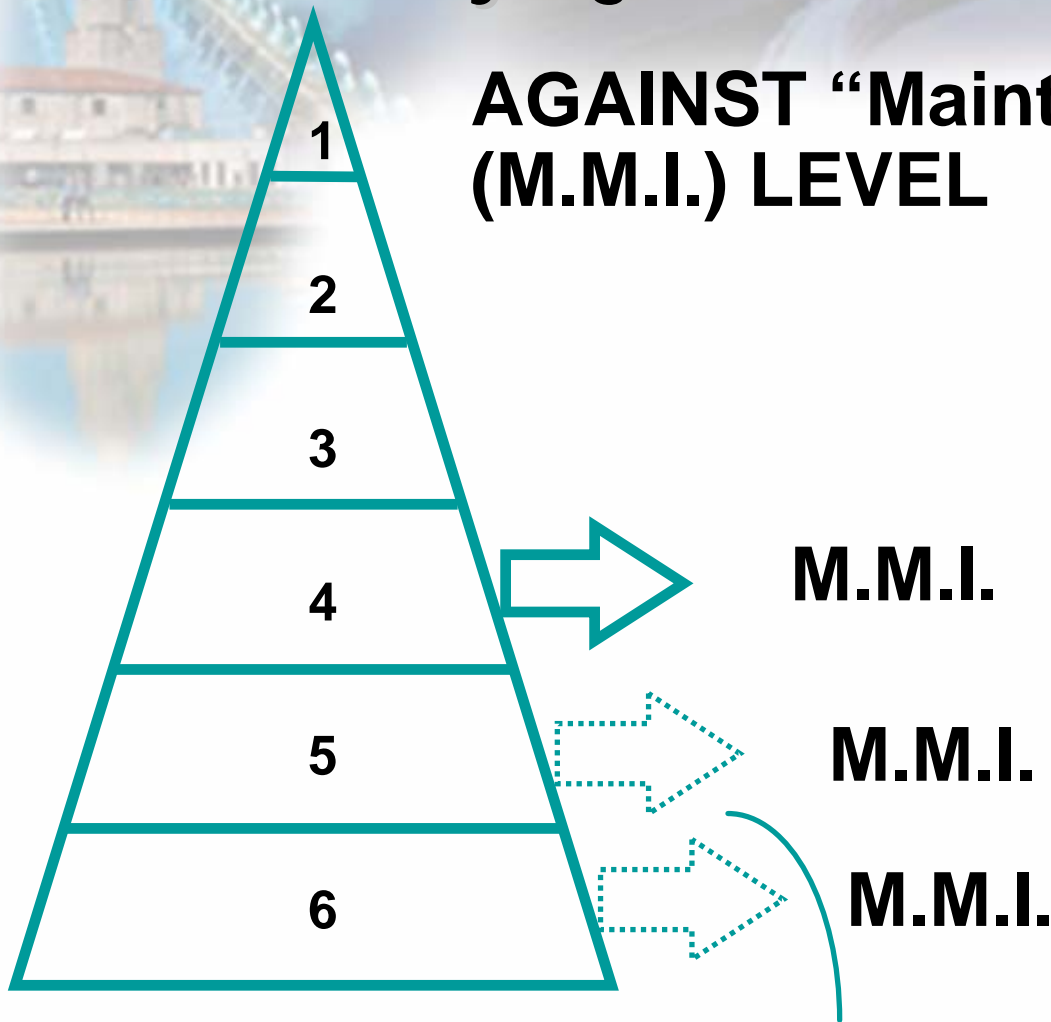
MAINTENANCE DATA

- **Planned or unplanned**
  - **+ labor**
  - **+ materials / spares**
  - **+ plant**

- **Indirect impact on customers**

- **Failure codes**

- **Activity codes**

Data – "Confidence Levels"

Level	Confidence
1	40%
2	55%
3	70%
4	85%
5	95%
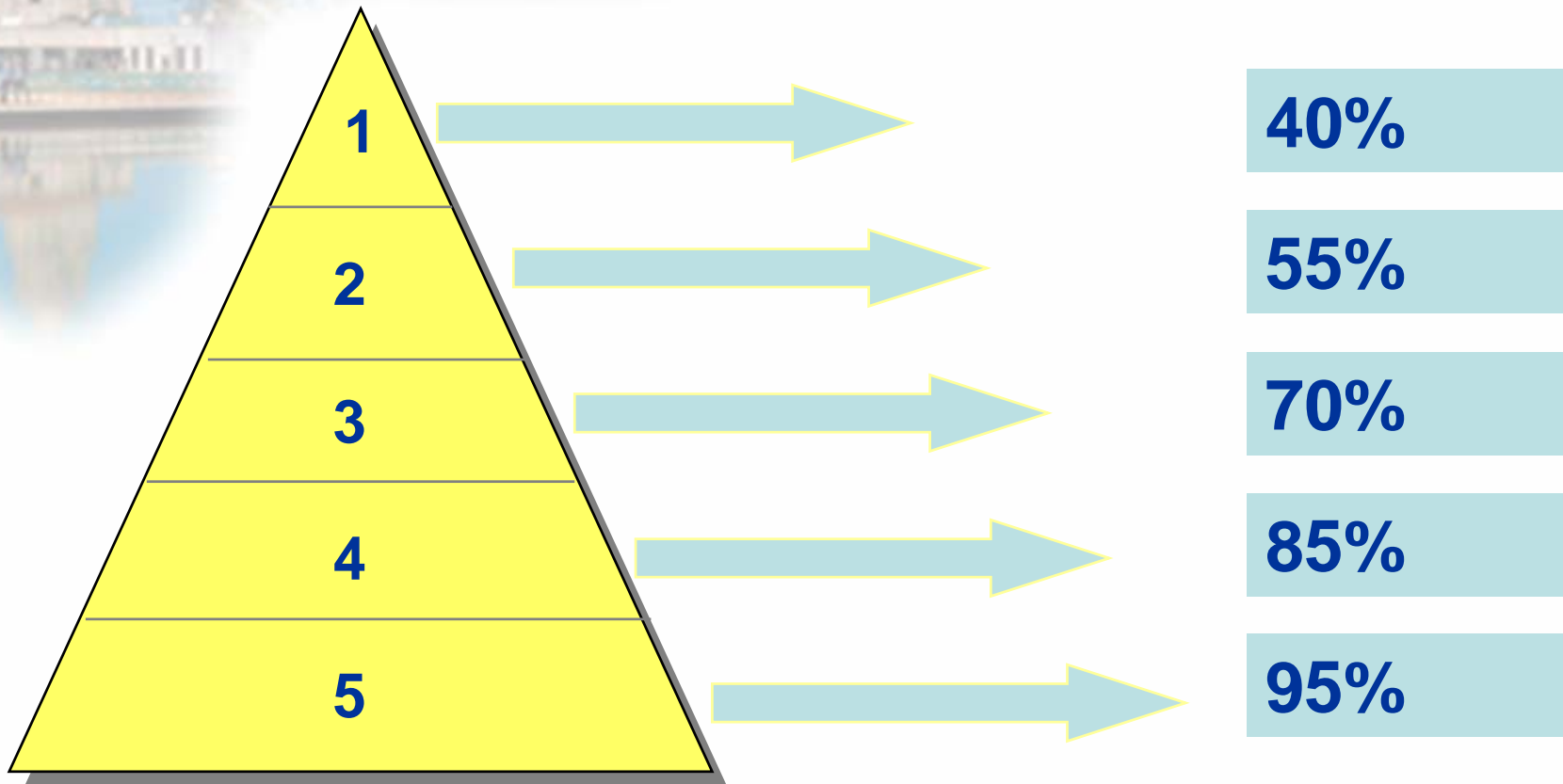
Data Hierarchy

AM Data levels – Costs .

Levels of Hierarchy - Staging

SERVICE TYPE		STAGES	COSTS
Facility	1		
Parent Assets	2	1	x1
Assets	3		
Components	4	2	x1.7
Sub Components	5	3	x2.5
Spares	6	4	x4.5
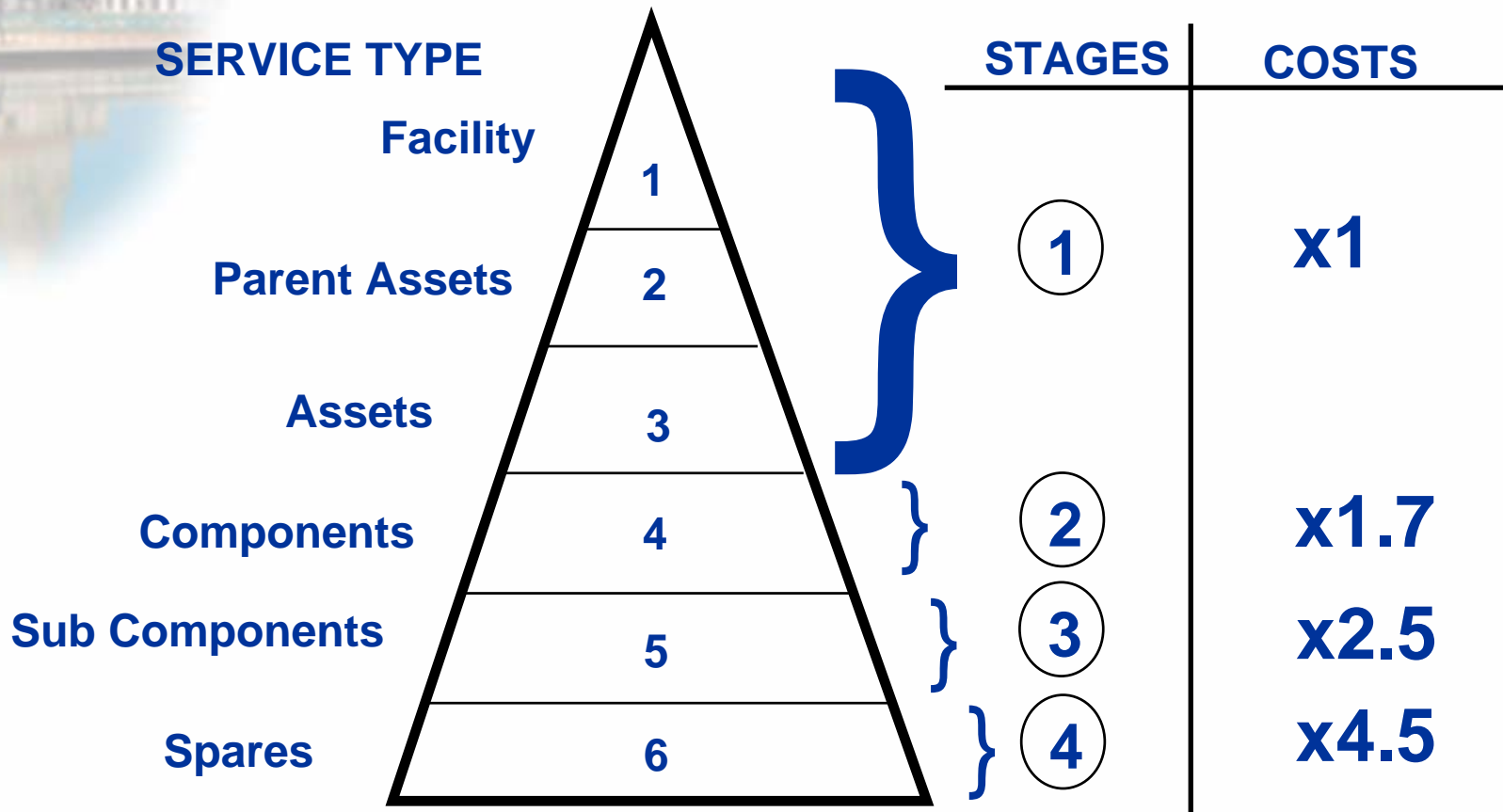
"Tree-style" Asset Hierarchy

Types of Asset Data

⇨ Basic attributes

⇨ Location / spatial (plans)

⇨ Feature details / attribute

⇨ Manufacture type data

⇨ Maintenance & operations

⇨ Resource allocation / spares

⇨ Risk assessments

⇨ Life cycle cost / ORDM

Primary Data

Secondary Data

Tertiary Data

The "Data Standard"

- **Attributes**
- **Record layout**
- **Database architecture & protocol**
- **Data collection protocols**

Generating Registry Data – Two Different Tasks

- **Retrospective ("What we already have")**
  - "Critical first"
  - Use existing crews as they respond to Work Orders
  - Engineering students

- **Prospective ("What we are about to acquire")**
  - Tie to "commissioning/ handover process
  - Use contract retainage to control

Data Responsibilities – Pump Station?

Who has responsibilities in your Agency?

⇨ Asset Details	Operations
⇨ Condition Assessment	Maintenance
⇨ Asset Values	Engineering
⇨ Residual Physical Lives	Engineering
⇨ Probability of Failure	Maintenance
⇨ Consequence of Failure	Engineering
⇨ Business Risk Exposure	Engineering
⇨ Optimal Renewal Strategy	Maint/Engineering

Ensuring Business Uniformity

```
                    ┌─────────────────┐
                    │   Sanitation    │
                    │     Agency      │   71%
                    └────────┬────────┘
                             │
   ┌──────────┬──────────┬───┴────┬──────────┬──────────┐
┌──────────┐┌──────────┐┌──────────┐┌──────────┐┌──────────┐┌──────────┐
│Collection││  Trunk   ││  Pump    ││Treatment ││ Disposal ││  Reuse   │
│  Sewers  ││ Sewers   ││ Stations ││  Plant   ││ system   ││ system   │
└──────────┘└──────────┘└──────────┘└──────────┘└──────────┘└──────────┘
   73%         85%         55%         70%         75%         74%
```

Sanitation Agency — 71%

Collection Sewers — 73%

Trunk Sewers — 85%

Pump Stations — 55%

Treatment Plant — 70%

Disposal system — 75%

Reuse system — 74%

Land & Surround — 60%
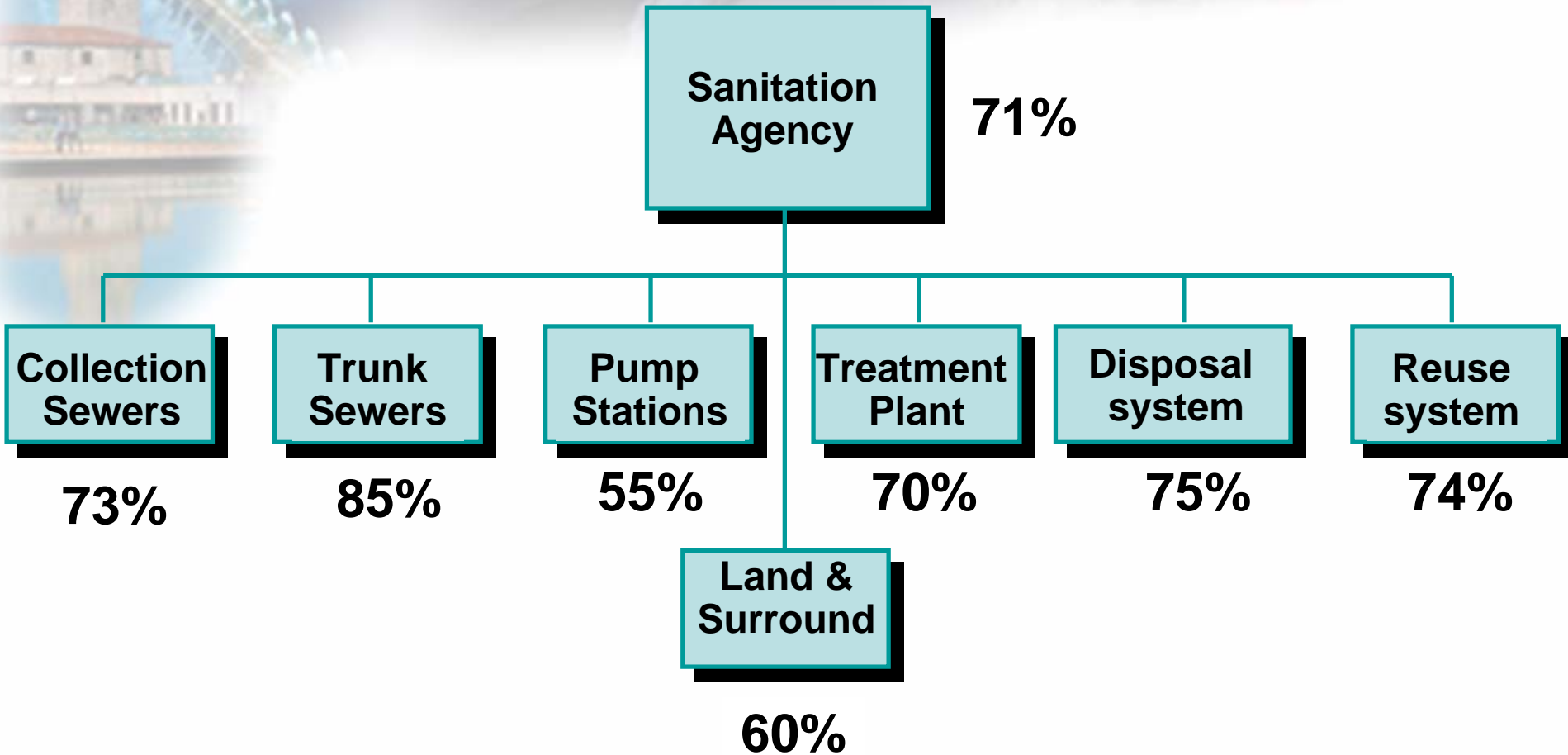
RATING THE INDIVIDUAL DEMANDS FOR RESOURCES BY USING CONFIDENCE LEVEL SCORES

Exercise Number 1a

Help Tom develop his first asset register for the pump station using the data provided:

- Prologue
- Layout plans
- The Excel worksheets in your packet
- Your own knowledge and experience

Exercise Number 1a Cont.

Using a "Delphi" approach:

- Develop a "system process layout" for Tom
- Develop a register that you think is needed to manage the pump station
- Set the level of the maintenance managed item ("MMI") to the level of hierarchy that you think is needed.

Key Lessons Learned

⇨ How the Delphi technique serves to get started

⇨ Importance of a system process layout

⇨ How to construct your asset register

  ⇨ Always include all assets

  ⇨ Consolidate to one and only one register

  ⇨ Decide on a data standard

  ⇨ Choose an initial MMI

  ⇨ Roll-up the assets according to logical "nesting"