

Asset Management Definitions

SACE Risk and Reliability Workshop

August 15-18, 2006



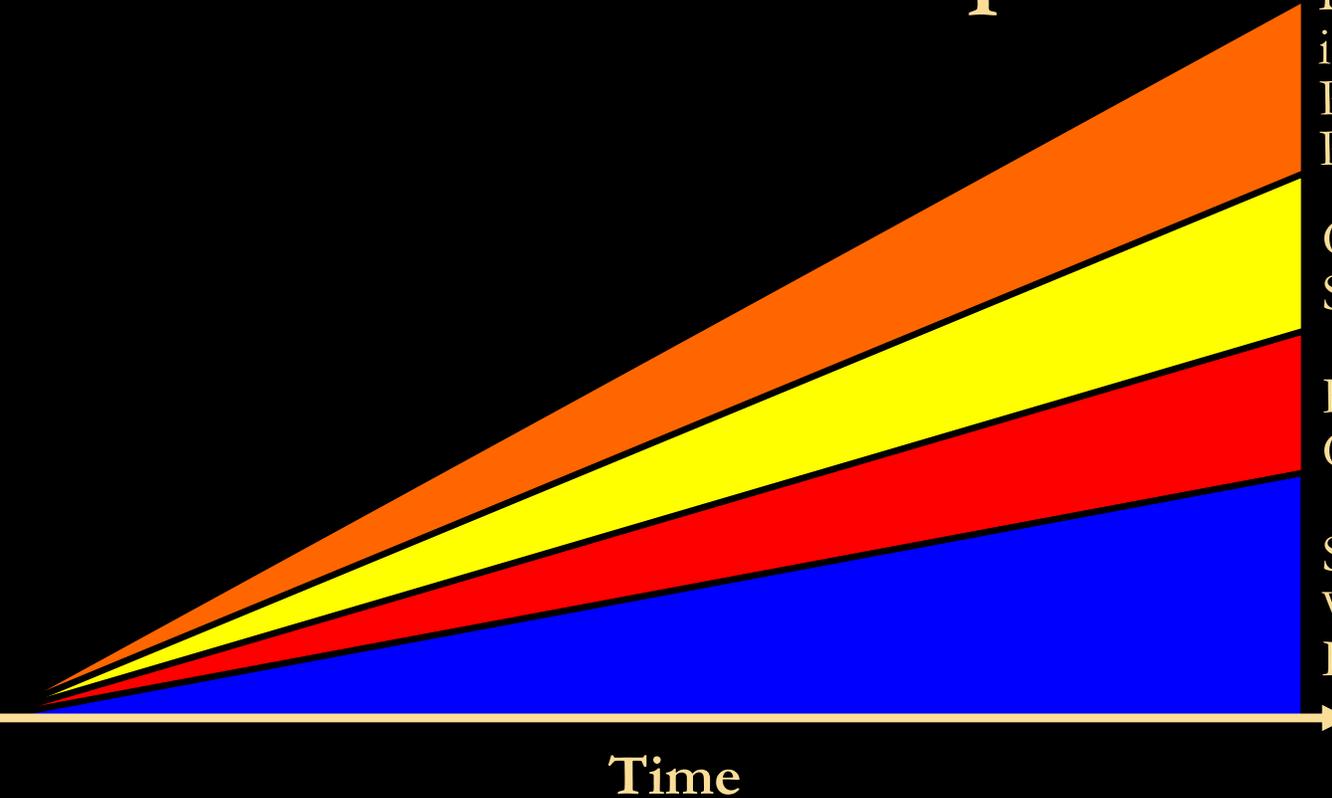
David P. Hale, PhD

Aging Infrastructure Systems Center of Excellence

The University of Alabama



What makes this complex?



Devil is in the Details —
is it about Operating
Performance, Mx Strategies,
PM and/or Budgets

Commitment — Buy-in and
Staying the Course

Functional Obsolescence —
Changing Context, Use & Sa

Structural Deficient —
What and When to collect
Data

Definitions:



Large value product or service platforms that provide capabilities for other assets and people are termed *Infrastructure Systems*

***Platforms* include Environments and Man-made Facilities**

***Performance* is affected by Structural Deterioration and Functional Obsolescence**

***Robust Infrastructure* allows us to operate in a Safe, Healthy and Economical Society**

***Maintenance Strategies* can affect Robustness and Useful Life**

***Robust Maintenance Strategies* require an investment in resources, are data, model, and tool intensive**

What are the productivity problems?



	Aero-Space	Military Weapon Systems	Transportation Infrastructure Bridges & Roadways	Mass Transport - Airlines & Trains	Utility Generation & Distribution
Diminished Productivity	✓	✓	✓	✓	✓
Increased Cost of Maintenance	✓	✓	✓	✓	✓
Increased Operating Costs	✓	✓	✓	✓	✓
Reduced Operational Safety	✓	✓	✓	✓	✓
Retiring Base of Knowledge	✓	✓	✓	✓	✓
Diminished Operational Flexibility	✓	✓	✓	✓	✓

Deterioration:

The DEMONS of Aging

The Deterioration Measures (DEMONS):

- **D**ependability (time between failures)
- **E**fficiency (cost to operate)
- **M**aintainability (time to repair, cost of repair)
- **O**ccupation (workforce and organizational costs to maintain knowledge and skills)
- **N**eglect (costs to ensure system effectiveness caused either by entropy or changing system goals)
- **S**afety (costs to minimize injury) and **S**ecurity (costs to protect)

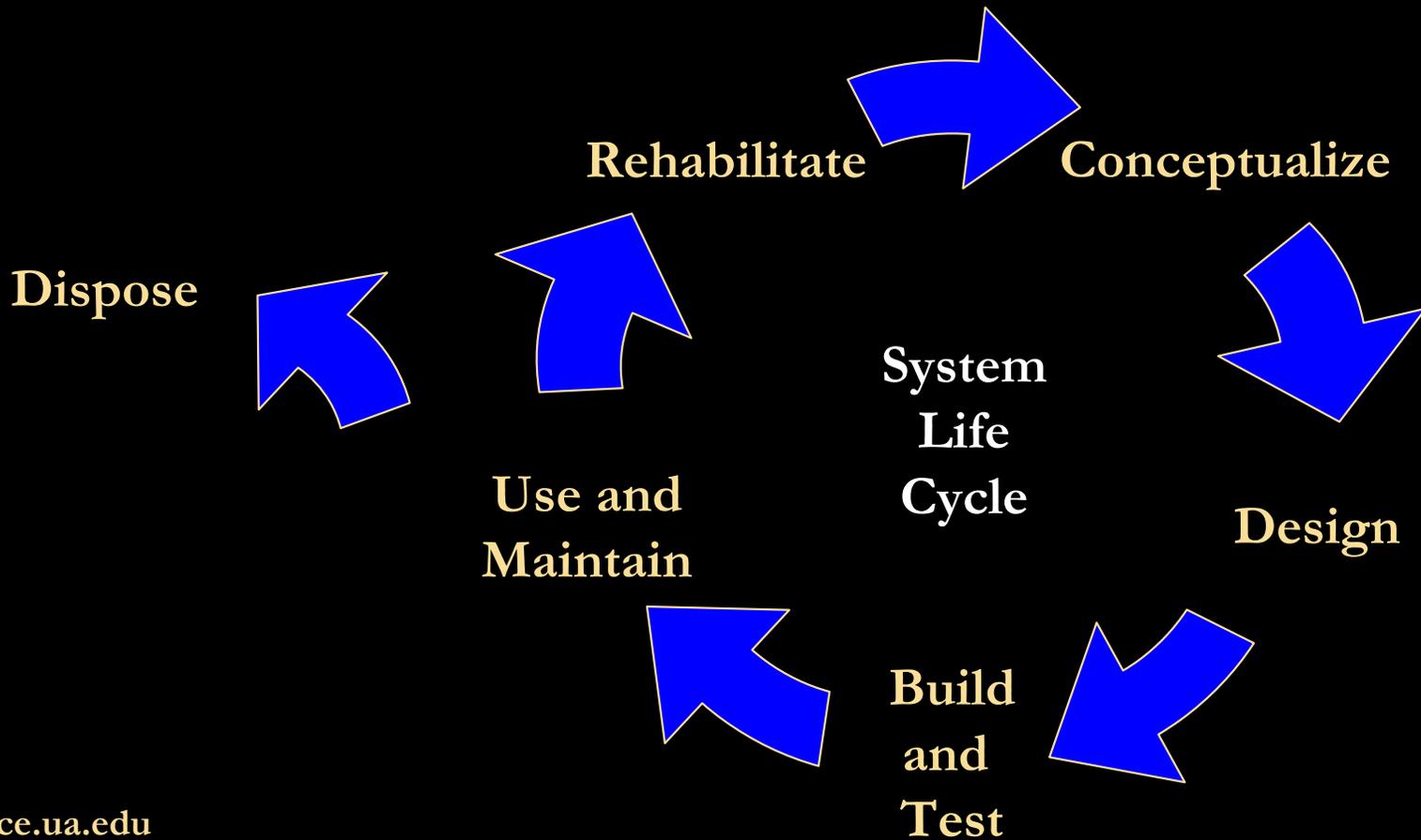
The aging infrastructure challenge...

	Navigation	Flood control	Recreation	Hydropower
Dependability	✓	✓	✓	✓
Efficiency	✓	✓	✓	✓
Maintainability	✓	✓	✓	✓
Occupation	✓	✓	✓	✓
Neglect	✓	✓	✓	✓
Safety/Security	✓	✓	✓	✓

Decision Classification



Mitigating DEMONS Effects Across Time





Asset Level: Operational Item

and Program Effectiveness through:

Monitoring of

- Health Characteristics (*CI*)
- Performance
- Interventions

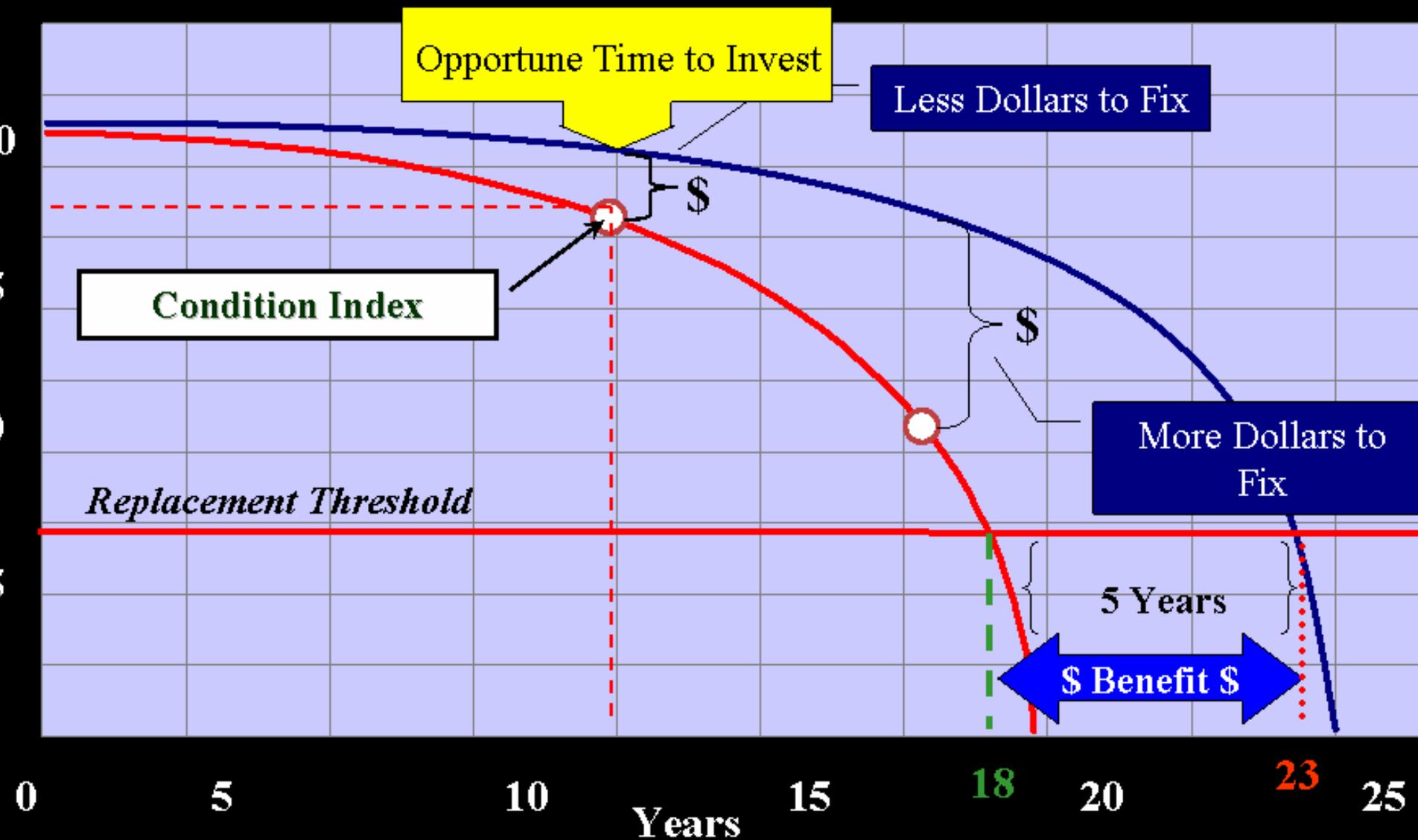
Data Collection Techniques

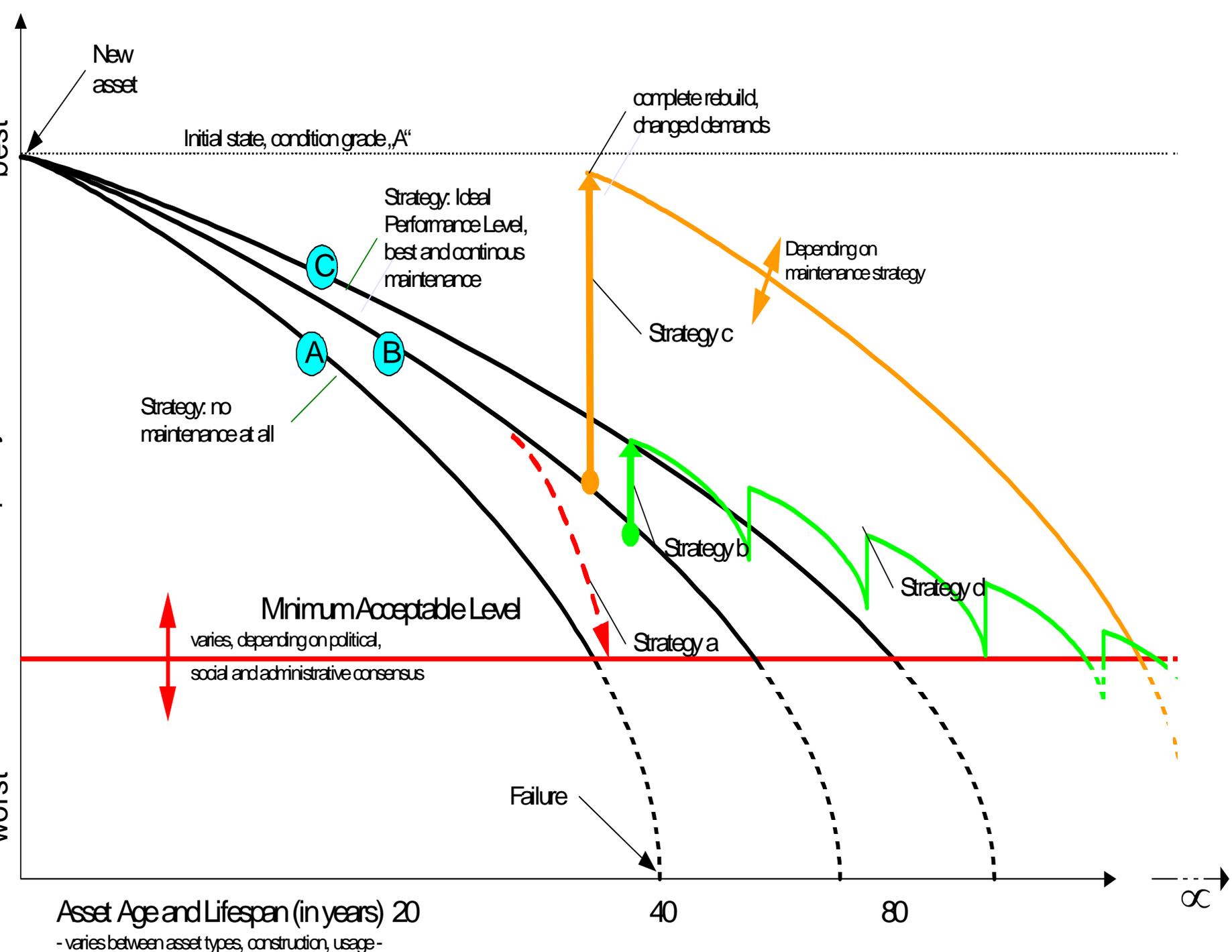
- Defined and Consistent Data Elements
- Defined and Consistent Collection Processes
- Compliance Reviews

Analyze trends across individual asset components

- Work Order Management

Life Cycle Analysis





Asset Age and Lifespan (in years) 20

- varies between asset types, construction, usage -

40

80

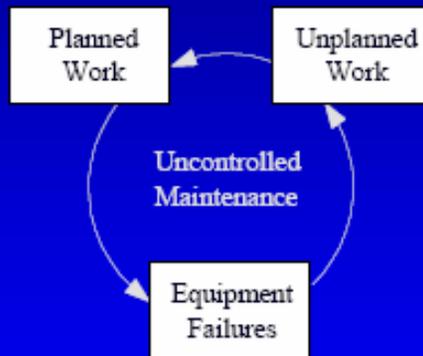
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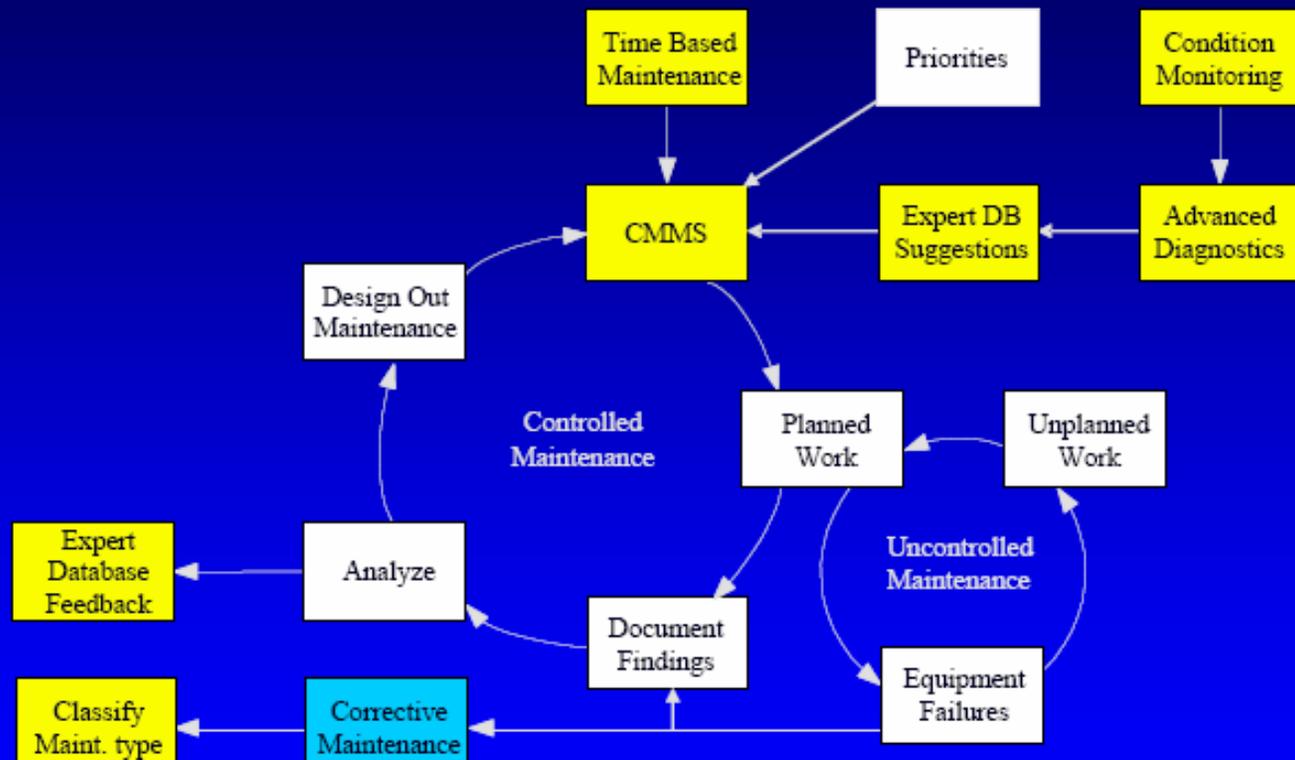
System Level: Optimize Tactical Maintenance

Approaches through:

- Definition of Asset Families
- Forecast Performance over Time and Usage,
 - Requires quality data over long periods of time
 - Substantial quantity of data
- Affects of Alternative Rehab/PM Intervention Actions
 - Predictive Maintenance (Operating Expense)
 - Rehabilitation (Capitalized Maintenance)
- Extreme Events Analysis
 - Probability
 - Uncertainty



Implemented Operational Asset Management System

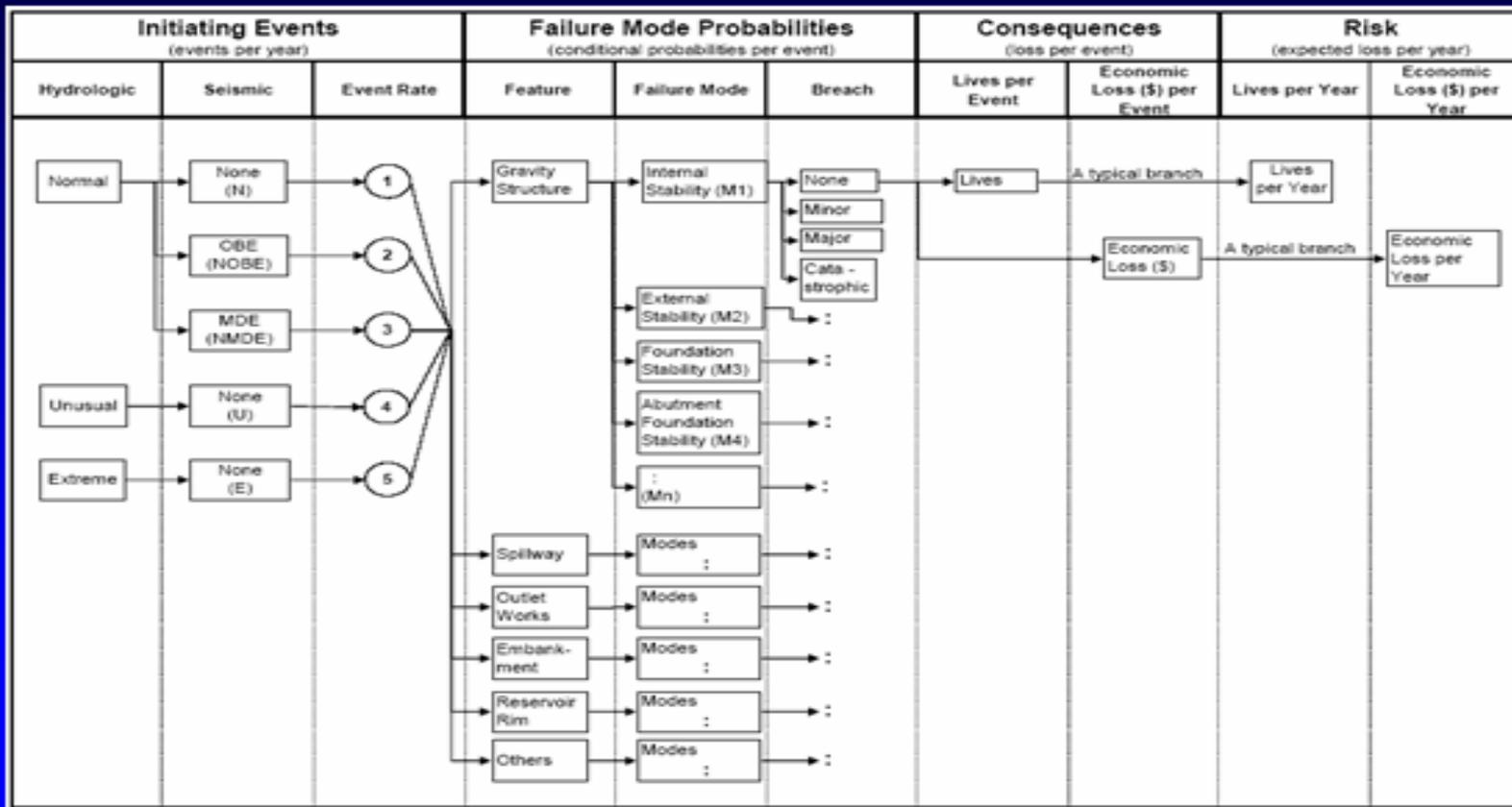




US Army Corps
of Engineers

One Corps Serving the Army and the Nation

SPRA Methodology



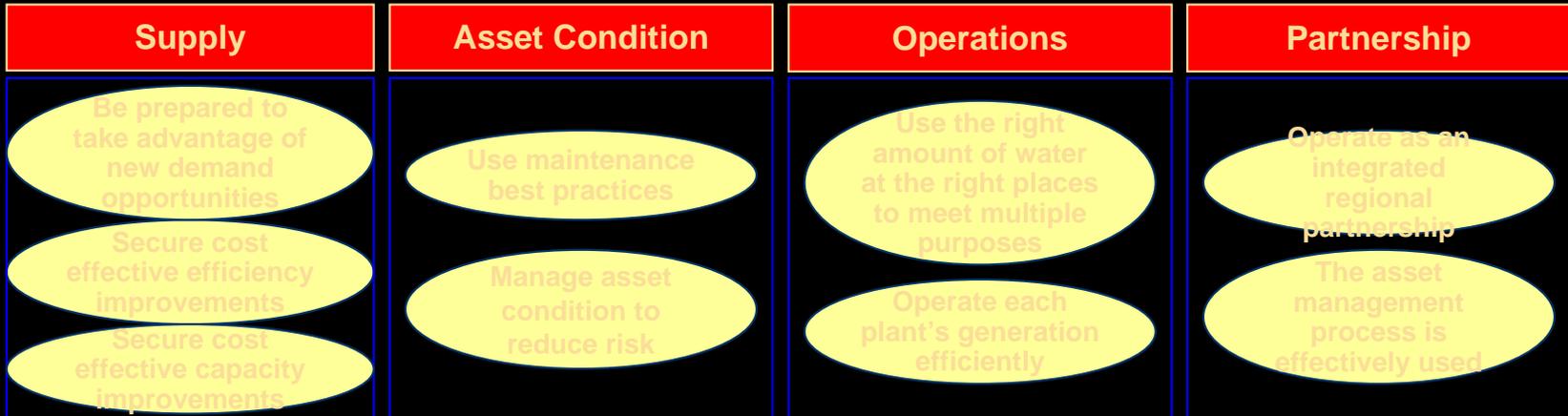
Portfolio Risk Assessment

Maximize Value to the Region

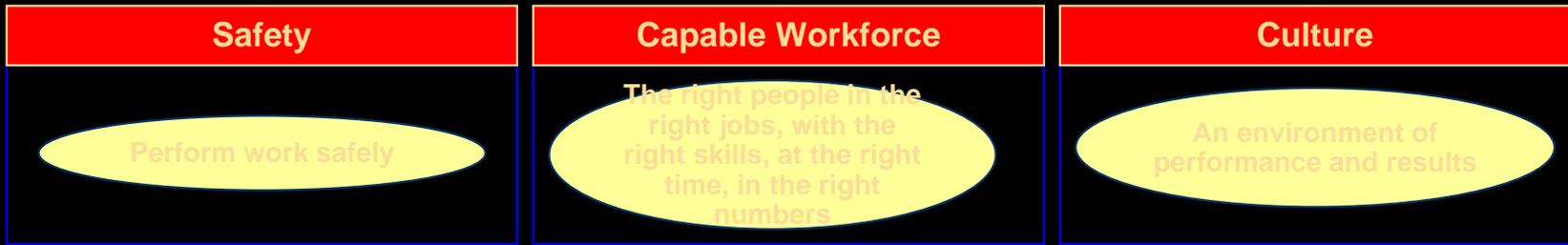
Stakeholder perspective



Operational perspective



People and Culture perspective



Decision Classification

Macro Level: Strategic Public Policy

Decision Support through:

Support for Policy and Regulates

(alternatives, trade-offs, and consequences)

Emphasis on:

- Multi-Criteria Decision Analysis
- Goal Programming

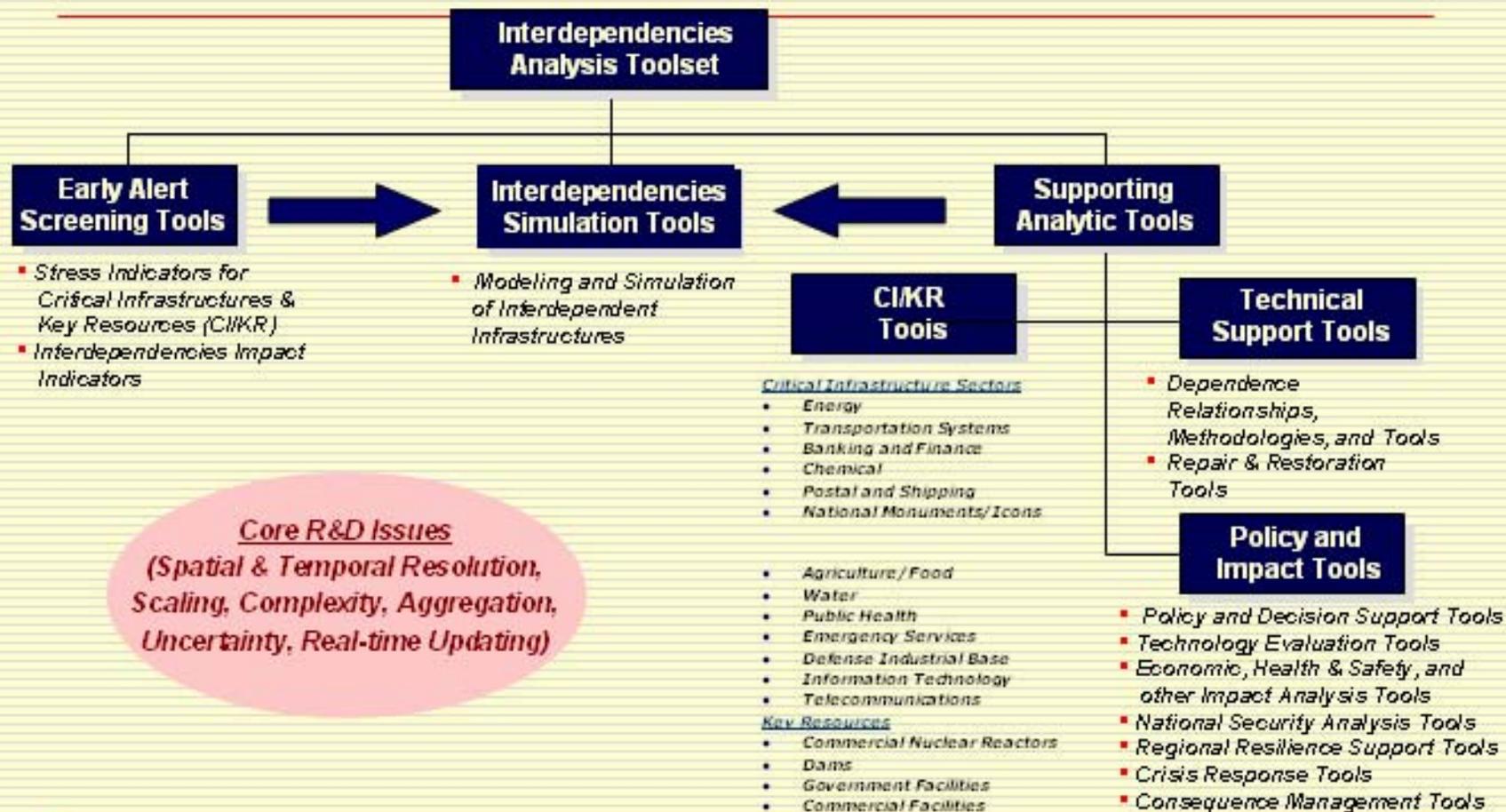
Developing and Refining Financial Recapitalization

Extending Risk-Based Outcome Analysis

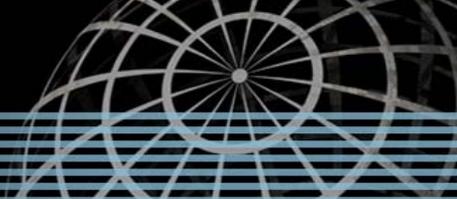
Cross Asset Family Portfolio Management

May Use Alternative Data Sources due to Granulari

Interdependencies Analysis Tool Set



Granular Asset Management



Public Private Partnership Act of 2003 – H.R. 2573

**Federal Real Property Disposal Pilot Program and
Management Improvement Act of 2005 – H.R. 3134**

Executive Order 13327 (2004)

GASB 34

Intelligent Asset Management Phases



Detail the decisions that are going to be made through the Use of the Asset Management System

Define needed Metrics

Define Requirements to Produce the Metrics--Iterate among

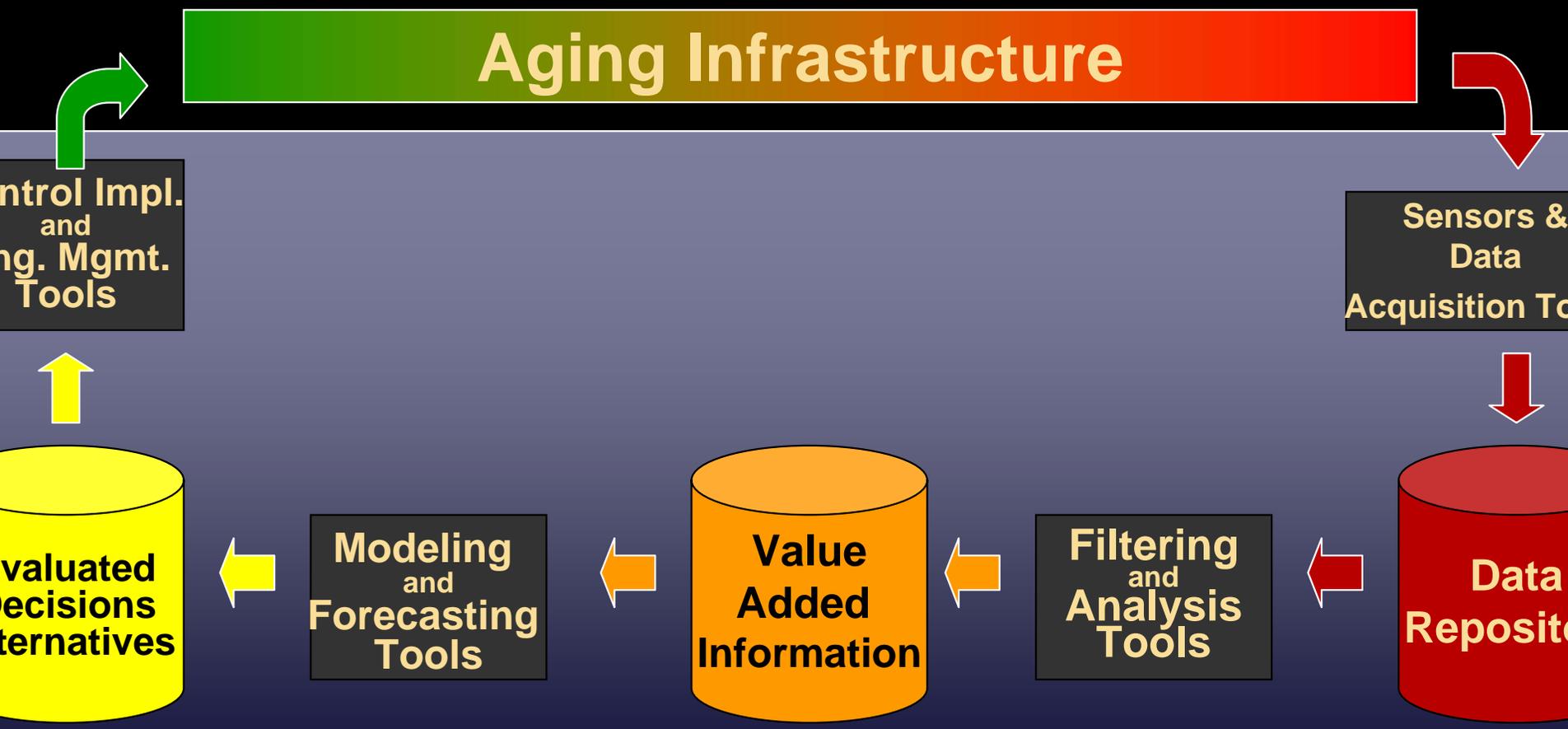
Algorithms

Data Availability/Quality/Cost

Obtain and Sustain Organizational Commitment

Develop Intelligent Command and Control Process

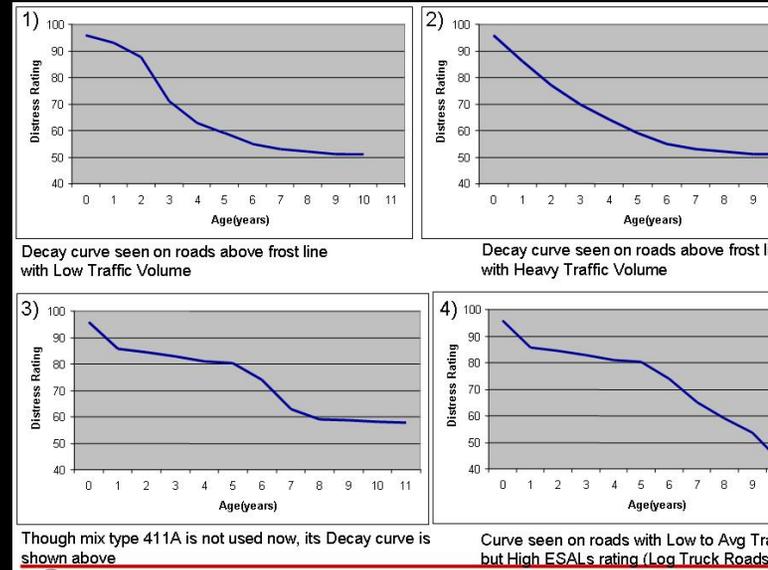
Intelligent Command and Control Process At ALL Levels



Data Collection

The screenshot displays the ASSET software interface. The 'Sufficiency Rating Calculator' window shows a list of bridge components and their respective ratings. The 'Sufficiency Rating' window shows the overall rating calculation, with a maximum value of 50% and a proposed rating of 73.2. The 'S1: Structural Adequacy and Safety' window shows the calculation of S1 = 41.2 based on input items and reduction factors.

Data Analysis



Though mix type 41A is not used now, its Decay curve is shown above
 Curve seen on roads with Low to Avg Traffic but High ESALs rating (Log Truck Roads)

Development of Alternatives

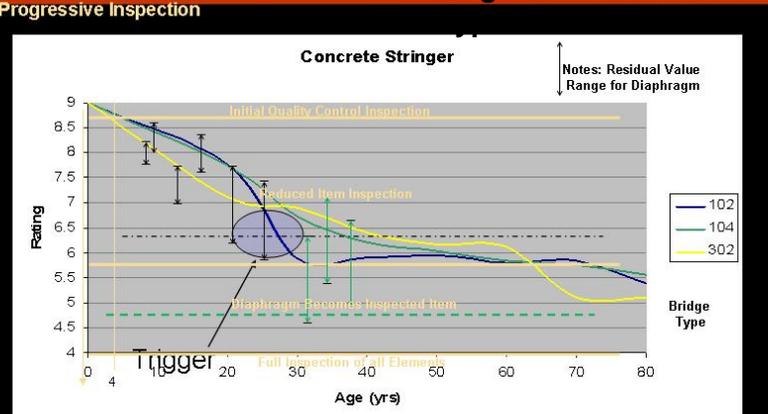
Summary of 2004-2008 Interstate Need Analysis Results:

Category	2004-2008 Need by Program	Program Budget Cost
Equity	\$1.4B (20%)	\$214M (20% of Interstate Needs)
Safety	\$800M (20%)	\$214M (20% of Interstate Needs)
Bridge	\$100M (20%)	\$214M (20% of Interstate Needs)
Performance	\$1.1B (20%)	\$214M (20% of Interstate Needs)
Total	\$3.4B (20%)	\$842M (20% of Interstate Needs)

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Forecasting to Develop Alternative Inspection Bands



Cross Project Lessons Learned:



The Difference between System Outcome and Asset Characteristic
Using More than 1 Metric for Risk

Customizing DEMONS as Risk Goal/Decisions Based Metrics

Move Toward Defining Outcome-Based Risk

Interaction Effects among DEMONS

Financial Interrelationship among New Construction, Ops, & Mx

Disciplined Committed Process Requiring Multiple Cycles

Change of Use (Func'l Obsolescence) & Increased Capacity Demand

Measurement – Massive Quantities of Data does not create precision

Measurement – Collect based on current goal and future decisions

Inter-Disciplinary Problem, Requiring Cross-Discipline Solutions



Aging Infrastructure Systems Center of Excellence

David P. Hale, Ph.D
Director, AISCE and MIS Programs
The University of Alabama
aisce@ua.edu
205.348.5525