

# Asset Management at the Ontario Clean Water Agency

## **Abstract:**

Municipalities have been struggling for two decades to make sense of the term 'Asset Management'. The Ontario Clean Water Agency has moved to an approach centered on the application of engineering reliability principles to forecast future spending and infrastructure performance. This new approach has resulted in both a dramatic reduction in the effort required to operationalize Asset Management and increased confidence in spending forecasts.

Why do Infrastructure Asset Management?

**To forecast spending and infrastructure performance**

How were we trying to forecast?

Each individual asset was prescribed a future lifecycle spending pattern.

**Unfortunately, there is no engineering or scientific basis for this approach.**

# How did we (IAM industry) get here?



Lie – know it's false

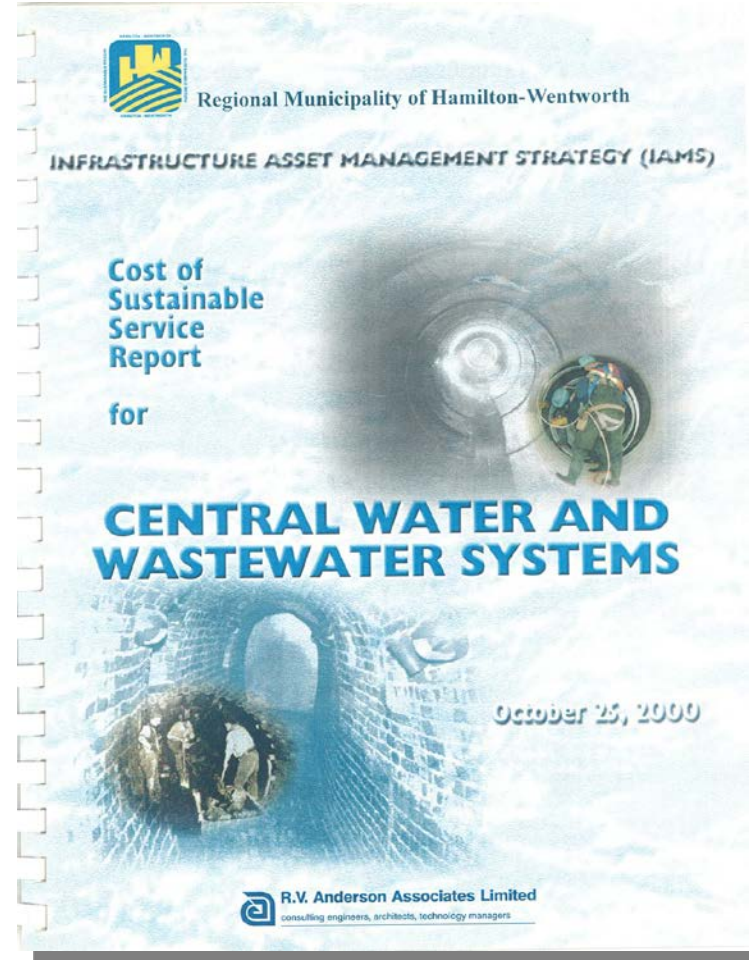
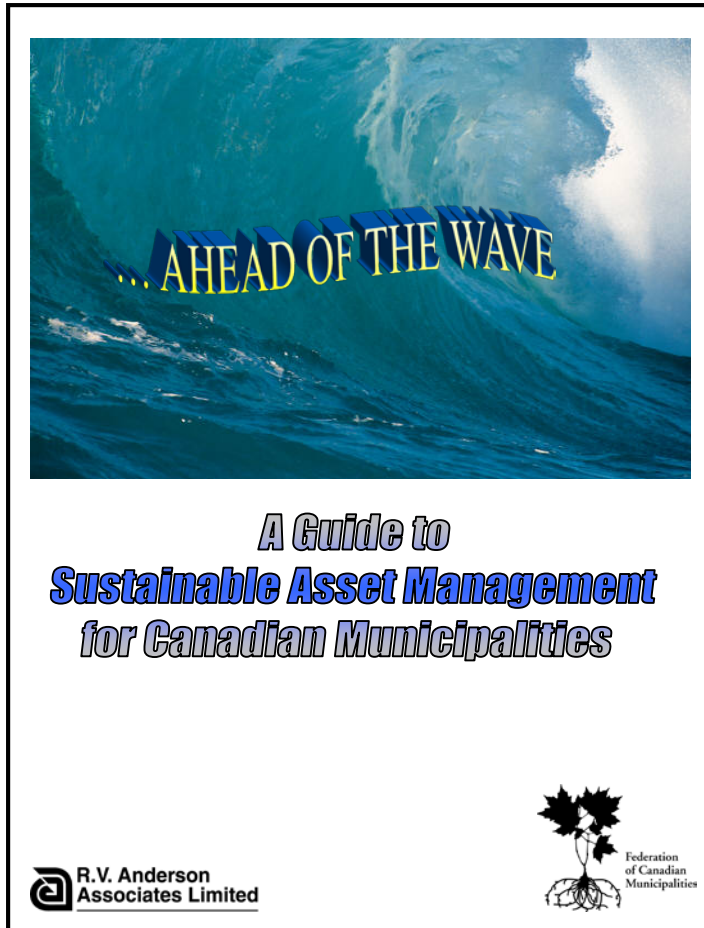
B.S. – don't care if it's true or false, just want to be believed to serve your own purposes

“...the educated class acquires an arrogance that leads them to be negligent about truth and falsehood; they have a lot of confidence in their own opinion, and this may encourage them to produce B.S.”

Excerpt from Interview: <https://www.youtube.com/watch?v=IArA7nMIqSI>

**Dr. Harry Frankfurt,** Professor Emeritus  
Chair of Princeton Philosophy

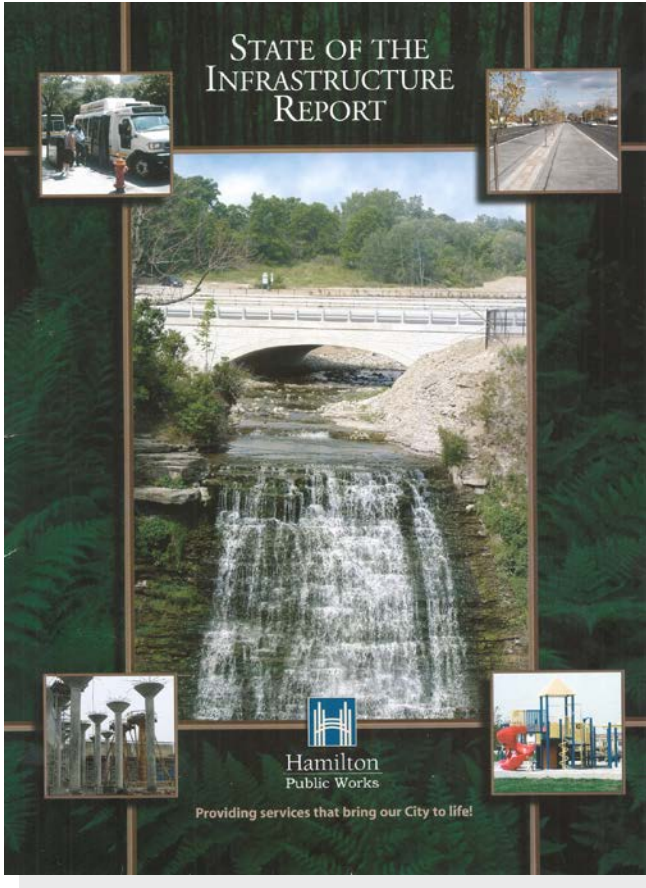
# How did we (engineers) get here?



## Circa 2000:

- Infrastructure noticeably deteriorating
- No stockpile of cash to fix it
- Taxes/user fees are insufficient to fund what we want/need

# How did we (engineers) get here?



Tangible Capital Asset accounting requires this:

Asset	Purchase Price	Purchase year	Amortization Period
1	\$	1990	10 years
2	\$\$\$\$	1950	30 years
3	\$\$\$	1970	50 years

Accountants asked Engineers for this



# How did we (engineers) get here?

Asset	Purchase Price	Purchase year	Amortization Period	Replacement Year	Cost
1	\$	1990	10 years	2000	= \$+inflation
2	\$\$\$\$	2000	30 years	2030	= \$\$\$\$+inflation
3	\$\$\$	1970	50 years	2020	= \$\$\$+inflation

**There is no scientific or engineering rationale for single asset forecasts of complex civil or environmental engineered systems!**

- But...single asset forecasting is easy to do, and we had the data in the PSAB spreadsheets



# But...what's the Problem?

Single Asset Forecasts result in incorrect spending forecasts

- A. Future spending needs derived from single asset forecasts to maintain current asset network **are 200% of actual needs**
- B. Future spending needs to achieve **societal wants/needs are not accounted for** in the modeling parameters used in single asset forecasting



# Only 2 Types of Municipal Infrastructure Systems

## Non-repairable systems:

- Typically mechanical engineered assets
- Approximately 5 % of municipal portfolio
- Fleet, equipment, HVAC

## Repairable systems:

- Typically civil and environmental engineered assets
- Approximately 95 % of municipal portfolio
- roads, sidewalks, trails, bridges, culverts, sanitary pipes, water pipes, storm pipes, storm water management ponds, creeks, parks, parking, facilities

# How are they analyzed?

## Non-repairable systems:

- Estimate Service Life (ESL) testing at full scale
- Typical full cost replacement at end of ESL
- Design, manufacturing, full-scale testing independent of municipality sold to

## Repairable systems:

- Average treatment (repair) cost at end of ESL
- ESL = mean time to treatment (repair) not replacement
- Design and construction changes based on municipality specific characteristics
- Reliable forecasting is only possible for aggregate system

# Diverting our Attention and Resources

Application of non-repairable system logic to repairable system forecasting has resulted in:

- Excessive focus on collecting current asset condition to forecast better
- Excessive focus on populating dozens of data fields to make a more 'unique' prescribed lifecycle spending plan
- Not enough focus on forecasting approach
- Not enough effort spent analyzing currently available information

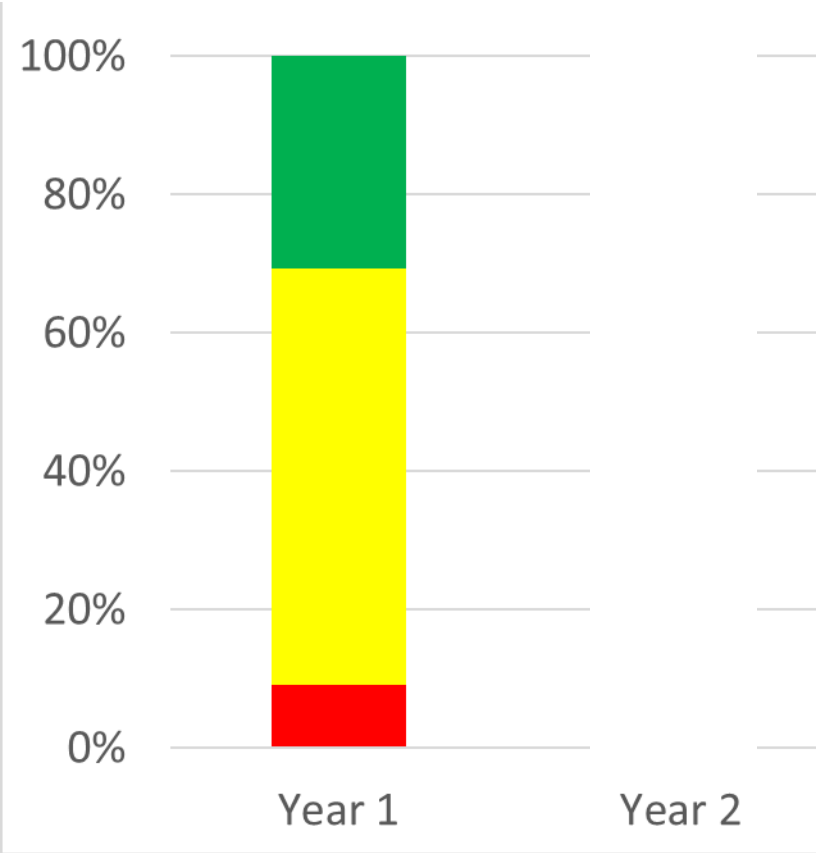
So how do we Forecast?

# Performance (not 'Condition') as Fundamental Term

Asset Performance = ability to fulfill objectives/requirements

<b>PERFORMANCE CATEGORY</b>	<b>STATE OF INFRASTRUCTURE ASSET</b>
<b>Good</b>	No Deficiencies, Fit for Purpose
<b>Fair</b>	Has Deficiencies, Fit for Purpose
<b>Poor</b>	Requires Treatment/Spending

# System Performance Distribution



PERFORMANCE CATEGORY	STATE OF INFRASTRUCTURE ASSET
Good	No Deficiencies, Fit for Purpose
Fair	Has Deficiencies, Fit for Purpose
Poor	Requires Treatment/Spending

# Forecasting Performance and Spending

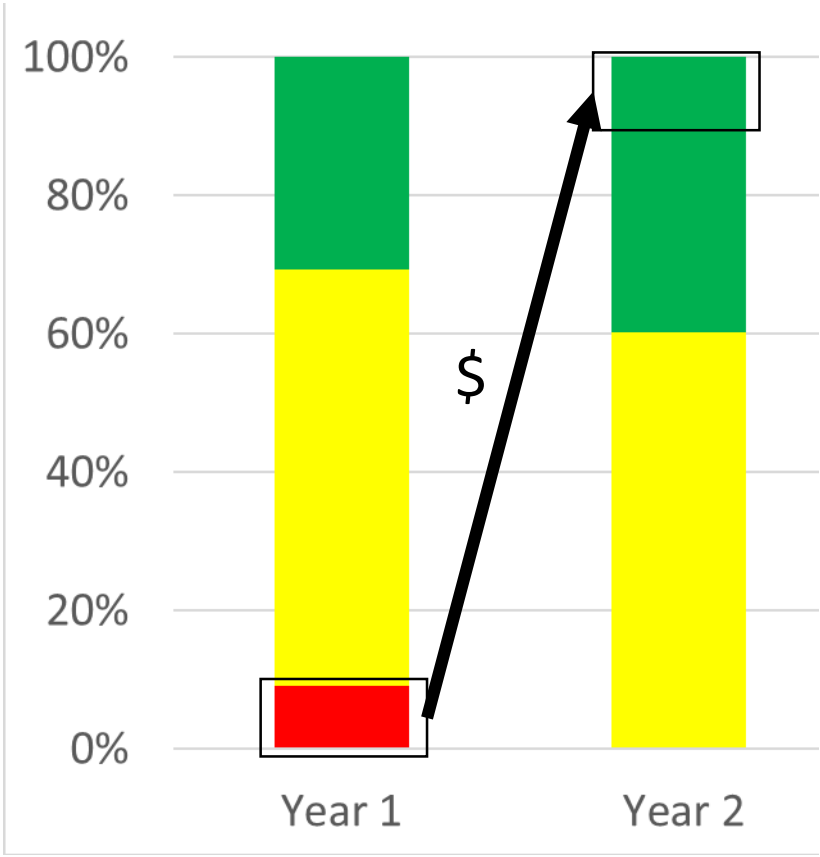
2 competing forces:

1. Performance deterioration (i.e. how quickly asset performance is consumed by the community)
2. Performance improvement resulting from spending



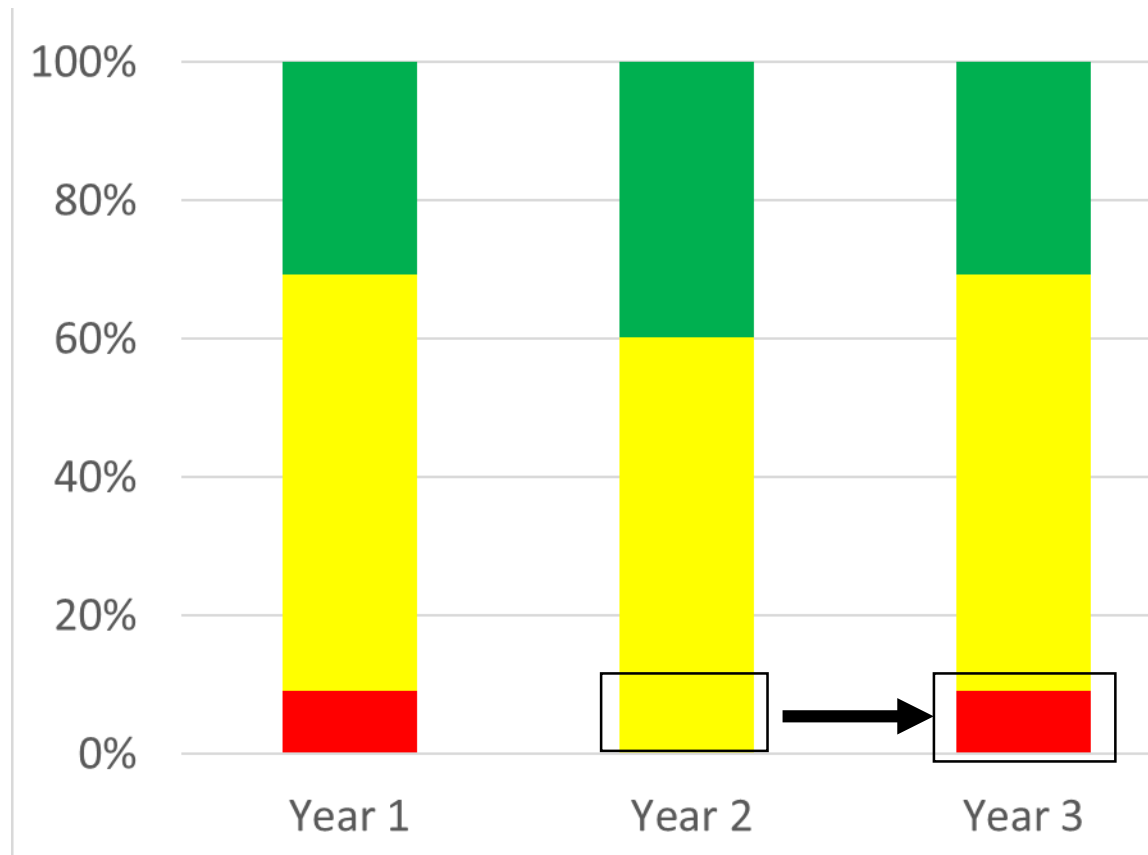


# Forecasting Performance and Spending



Spending Improves  
Asset Performance

# Forecasting Performance and Spending

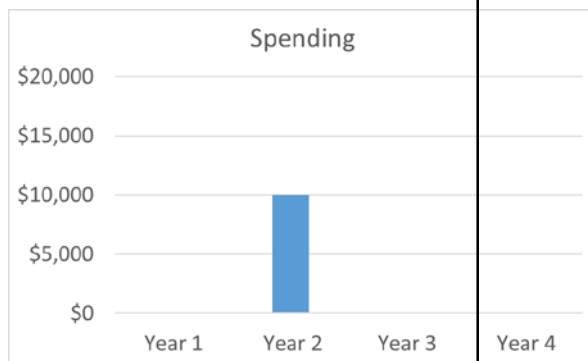
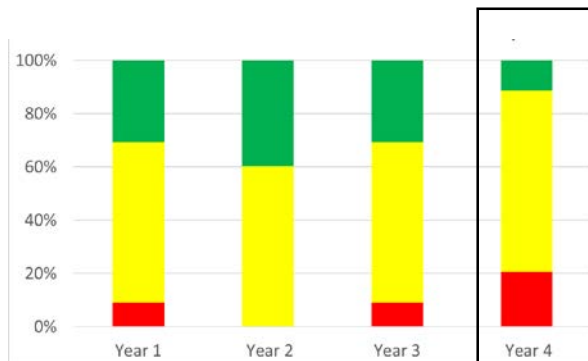


Asset Performance  
Deteriorates without  
Spending

# Forecasting Performance and Spending

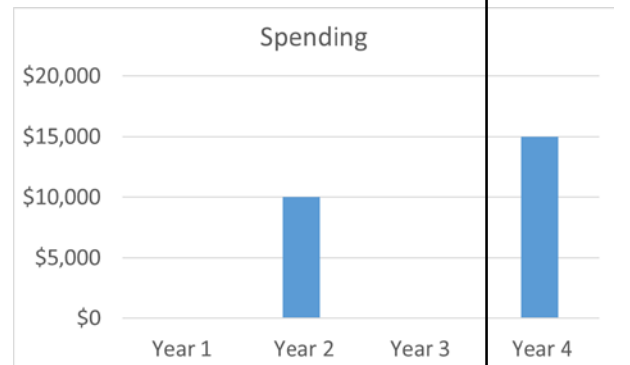
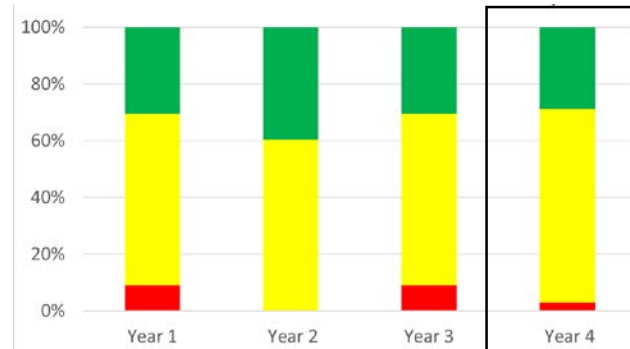
Plan A

No spending, no performance increase



Plan B

Spending results in performance increase



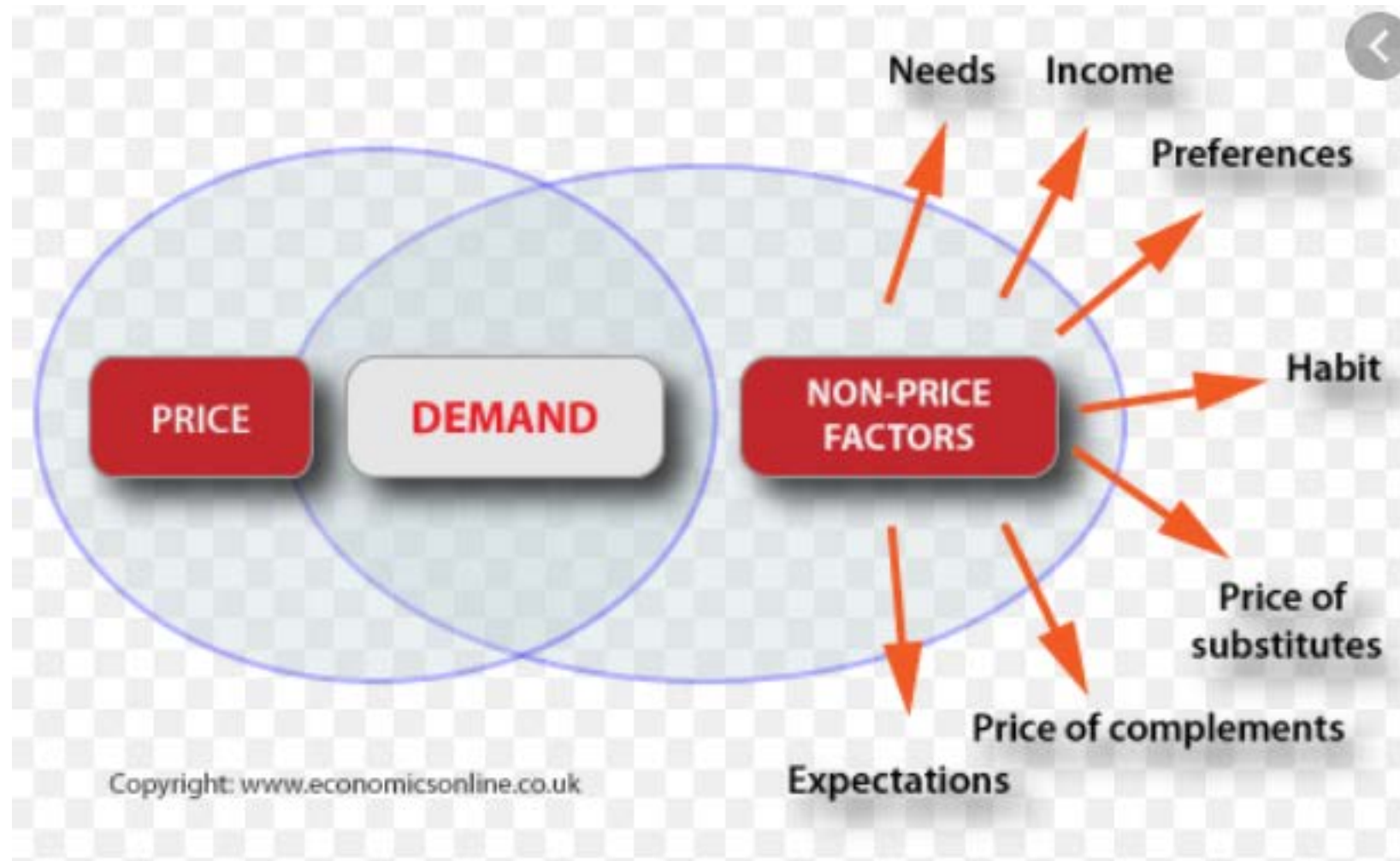
Forecasting Future  
Performance vs  
Spending

# A Municipality is a Consumer of Infrastructure

## Consumer-based asset management:

- Analysis of past and current engineering, financial, and administrative information
- Forecasting future performance and corresponding infrastructure according to all decision factors (other than age/condition)
- Equivalent of forecasting methods used in private sector (e.g. banking, insurance, and retail)

# A Municipality is a Consumer of Infrastructure



# Resetting the Asset Management Paradigm

## Key Concepts:

- Non-repairable vs repairable systems
- Forecasting aggregate repairable systems done using consumer-based methodology rather than prescriptive single-asset lifecycle models
- Can produce reliable forecasts with the data you have now

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# Thank You for Participating!

