Metrics for Public-Private Partnerships: Case Studies

Eric Teicholz, IFMA Fellow
Graphic Systems, Inc.
Background

• Why PPP metrics
  – A transparent process that will withstand public scrutiny
  – PPPs should have shared vision, common objectives, commitment to collaborative approach to measure, monitor, document and report on progress/results
  – To articulate expectations and goals
  – What gets measured gets performed
Balanced Scorecard Methodology

- BSC refers to the Balanced Score Card performance methodology that ensures a focus on all areas of the business rather than improving one area at the expense of others.
- Therefore BSC groups metrics into four areas
  - **CUSTOMER SERVICE**
    - How well are you serving the interests of the customer – given that IFMA ranks this as the most important category for a Facilities Department – it should receive significant attention.
  - **OPERATIONS**
    - What processes accomplish the functions of the project
  - **FINANCIAL**
    - Are we providing the best possible service for the lowest possible cost?
  - **PERSONNEL**
    - Do we have the right people, enough people, do they perform to the best of their abilities

- George Washington University Certificate Program
- Developing Meaningful Performance Measures
  for Balanced Scorecards, Sept 11-13, Washington, DC
# 2007 - 2008 Balanced Scorecard

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Strategic Objectives</th>
<th>Measures</th>
<th>Targets</th>
<th>Accountability</th>
<th>Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAKEHOLDER</td>
<td>END USER/CUSTOMER</td>
<td>1. Provide scholarships/grants to meet career-development needs of practitioners potential FMs and to advance the profession</td>
<td>1.1 Number of annual scholarships and grants given</td>
<td>1.1 Award +/- 25 scholarships and +/- 10 grants annually</td>
<td>1.1, 1.2, 1.3 Develop and implement a plan to put Foundation scholarship information in the hands of every student pursuing a degree in FM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2 Total monetary value of scholarships and grants given</td>
<td>1.2 Award +/- $62,500 in scholarships and +/- $10,000 in grants annually</td>
<td>Foundation Trustees</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.3 Number of annual scholarship and grant applications</td>
<td>1.3 Receive +/- 60 scholarship applications and +/- 20 grant applications annually</td>
<td>IFMA President/CEO</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Foundation Executive Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Foundation KM Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. 1.1, 1.2 Actively seek global diversity among Foundation scholarship and grant recipients</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. 1.1, 1.2 Expand publicity for those receiving Foundation scholarships by working closer with sponsoring companies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. 1.1, 1.2 Increase dollar value of individual scholarships</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Updated August 2007
# AOC Balanced Scorecard
## Critical Success Factors for Personnel (Management)

<table>
<thead>
<tr>
<th>Financial Performance</th>
<th>Internal Process</th>
<th>Customer Service</th>
<th>Organizational Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects on Budget</td>
<td>Employee Safety</td>
<td>Client Satisfaction</td>
<td>Employee Satisfaction (pay, employment security, health/safety, advancement, ?)</td>
</tr>
<tr>
<td>Asset Preservation</td>
<td>Clean Audit</td>
<td>Recycling (stewardship)</td>
<td>Asset History &amp; Significance</td>
</tr>
<tr>
<td>Recycling (savings, volume, ?)</td>
<td>Project Approval Process</td>
<td>Project Quality (usability, appearance)</td>
<td>Value of Proactive Approaches</td>
</tr>
<tr>
<td>Project Quality (financial performance)</td>
<td>Working from Defined Workflows</td>
<td>Projects on-time</td>
<td>Value of Shared Processes and Standards (work classification, asset conditions, process status, etc.)</td>
</tr>
<tr>
<td>(Non-project) Budget Execution</td>
<td>Accurate and complete work classification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Establishing Metrics

• Prerequisites
  – What are most important indicators
  – How are they measured
  – What is base line for indicator
  – Where is data to support indicators
  – How is data collected
  – How often is data collected
  – How is data measured
  – How is progress measured
  – Do metrics change over time (trend analysis?)
  – How are metrics communicated to stakeholders
  – How is data relevant to strategic goals
  – Can feedback from metrics be used for continuous improvement
Collecting Metrics/Targets

• **R+D** (relevant metrics from other organizations)?
• Best Practices/KPIs
• Legal or regulatory requirements
• Diverse multi-stakeholder representation (management, line staff, end user)
• Brainstorming/problem solving
• Expert advice
• Publications
**Case Study #1: Wiltshire Police Authority (1999 to 2005, $40M, Vinci PLC)**

**Project Background: United Kingdom PPP Example -**

**Gablecross Police Station, Swindon**

The new building is 10,114m² at South Marston by Swindon. The building comprises a three-story main administration and operations block, a single storey 40 cell custody suite, garages and vehicle workshops and a two storey dedicated Vulnerable Persons Unit, together with a 200 plus space car park.

Consultants offered advice and project management services at the procurement stages including the PPP Public Sector Comparator Case, identifying and setting the brief, preparation of Employers Requirements, Technical Adviser for the Police Authority, and as Independent Certifiers, checking for compliance with specifications and reviewing design data.

http://www.wiltshire.police.uk
United Kingdom Treasury Department has developed a spreadsheet tool to assist Procuring Authorities undertake a quantitative analysis to support the Value for Money (VfM) decision as to whether to use PPP or conventional procurement. One key aspect of this is lifecycle costing.

“...Lifecycle Costs should be invested at a rate and frequency that enables an asset to be maintained to the same standard as that achieved on its construction, refurbishment and/or procurement...”

HM Treasury - Quantitative Assessment User Guide

In the calculation, Lifecycle Costs are incurred with effect from the first year following the end of the construction period.
## Information for Determining Lifecycle Assumptions

<table>
<thead>
<tr>
<th>Similar Projects</th>
<th>Expert Advice</th>
<th>Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full “PFI-Type” Lifecycle Costs</strong></td>
<td><strong>Data Collection</strong></td>
<td><strong>Periodic Lifecycle Costs</strong></td>
</tr>
<tr>
<td>Analysis of cost experience from bodily similar PFI projects, completed either by the Procuring Authority or by the sponsoring Department or its associated Estates Agency.</td>
<td>Interrogation of databases maintained either by sponsoring Departments or by professional advisers.</td>
<td>Traditional level and timing of investment in assets in the sector on the basis of records maintained by, for example, Departmental Estates Agencies (such as NHS Estates and Defence Estates Agency)</td>
</tr>
<tr>
<td>Advice provided by external experts relating to the optimum lifecycles and associated costs for particular classes of assets.</td>
<td>Dissemination by sponsoring Departments of lifecycle cost norms achieved in PFI projects.</td>
<td>Traditional level and timing of investment in assets by the Procuring Authority on the basis of records maintained by it.</td>
</tr>
<tr>
<td>Particularly for equipment, guidelines published either by manufacturers of by relevant professional or trade associations</td>
<td></td>
<td>Traditional level and timing of investment in assets in the sector on the basis of past experience</td>
</tr>
</tbody>
</table>

[www.hm-treasury.gov.uk](http://www.hm-treasury.gov.uk)
## UK Public Sector Comparator Input Data

### General

<table>
<thead>
<tr>
<th>Thriller</th>
<th>%</th>
<th>Rates - Escalators &amp; Discount</th>
<th>Rates (%)</th>
<th>Base Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract period</td>
<td>20</td>
<td>CapEx esc.</td>
<td>5.0%</td>
<td>1</td>
</tr>
<tr>
<td>Initial CapEx period</td>
<td>3</td>
<td>OpEx (non employment) esc.</td>
<td>2.6%</td>
<td>1</td>
</tr>
<tr>
<td>Year when OpEx is first incurred</td>
<td>4</td>
<td>OpEx (employment) esc.</td>
<td>3.6%</td>
<td>1</td>
</tr>
</tbody>
</table>

### Costs

#### Whole Life

<table>
<thead>
<tr>
<th>Initial CapEx (£'000)</th>
<th>PSC Pre (%)</th>
<th>OpEx (non employment) (£'000)</th>
<th>PSC Pre (%)</th>
<th>OpEx (employment per person) (£'000)</th>
<th>PSC Pre (%)</th>
<th>OpEx (employee number)</th>
<th>PSC Pre (%)</th>
<th>Public sector (£'000)</th>
<th>PSC Pre (%)</th>
<th>Private sector (£'000)</th>
<th>PSC Pre (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>15%</td>
<td>235</td>
<td>15%</td>
<td>11,100</td>
<td>15%</td>
<td>1100</td>
<td>15%</td>
<td>1,200</td>
<td>15%</td>
<td>750</td>
<td>0%</td>
</tr>
</tbody>
</table>

#### Lifecycle Costs at each LC date (£'000)

<table>
<thead>
<tr>
<th>Lifecycle costs</th>
<th>PSC Pre (%)</th>
<th>OpEx Pre (%)</th>
<th>Business Post (%)</th>
<th>Base Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,100</td>
<td>15%</td>
<td>13%</td>
<td>14%</td>
<td>19%</td>
</tr>
</tbody>
</table>

### Flexibility

<table>
<thead>
<tr>
<th>Flexibility</th>
<th>PSC</th>
<th>PFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope change year</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Probability factor (%)</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Level of scope change (%)</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Premium flexibility factor (%)</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Indirect VFM Factors

<table>
<thead>
<tr>
<th>Indirect VFM Factors</th>
<th>PSC</th>
<th>PFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount (Npv) (£'000)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Tax

<table>
<thead>
<tr>
<th>Tax</th>
<th>PSC</th>
<th>PFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC adjustment factor (%)</td>
<td>3%</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Lifecycle Related Adjustments

<table>
<thead>
<tr>
<th>Lifecycle Related Adjustments</th>
<th>PSC</th>
<th>PFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC lifecycle VFM adjustment</td>
<td>40%</td>
<td>-</td>
</tr>
<tr>
<td>Residual cost benchmark (%)</td>
<td>50%</td>
<td>-</td>
</tr>
<tr>
<td>PSC residual cost factor if lower than benchmark (%)</td>
<td>70%</td>
<td>-</td>
</tr>
<tr>
<td>PSC residual cost factor if higher than benchmark (%)</td>
<td>35%</td>
<td>-</td>
</tr>
</tbody>
</table>

### PFI Funding

<table>
<thead>
<tr>
<th>PFI Funding</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearing (%)</td>
<td>50%</td>
</tr>
<tr>
<td>Sterling swap rate (%)</td>
<td>5.00%</td>
</tr>
<tr>
<td>Credit spread (bps)</td>
<td>12</td>
</tr>
<tr>
<td>Bank margin (bps)</td>
<td>93</td>
</tr>
<tr>
<td>Tail for bank cost (bps)</td>
<td>2</td>
</tr>
<tr>
<td>Commitment fees (bps)</td>
<td>50</td>
</tr>
<tr>
<td>Upfront fee (bps)</td>
<td>90</td>
</tr>
<tr>
<td>Grace period (yrs)</td>
<td>1</td>
</tr>
</tbody>
</table>

### Pre Tax IRR Targets

<table>
<thead>
<tr>
<th>Pre Tax IRR Targets</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>18%</td>
</tr>
<tr>
<td>Medium</td>
<td>15%</td>
</tr>
<tr>
<td>Low</td>
<td>13%</td>
</tr>
</tbody>
</table>

---

[http://www.hm-treasury.gov.uk](http://www.hm-treasury.gov.uk)
UK Public Sector Comparator Output Data

Positive Value = Go With PPP/PFI

Switches

IRR

10% Pre Tax Target IRR
15% Pre Tax Target IRR
18% Pre Tax Target IRR

IRR Stabiliser

Indifference

CapEx IP
UpEx Non Empl IP
UpEx Empl IP
Transaction IP

Unitary Charge IP

IP Stabiliser

Picking the indifference switch gives the percentage increase/decrease in the variable required to give the point of indifference

Switches

IRS

Output Box

Scenario No
Scenario name
Pre Tax Equity IRR
Pre Tax Project IRR
"Crude" PFI VM

Indifference Points

PSC
1. Initial CapEx
2. OpEx (Non Employment)
3. OpEx (Employment)
4. Transaction Costs
PFI
5. Unitary Charge

Other Values

PSC Costs (NPV)
PFI Costs (NPV)
Unadjusted Annual Unitary Charge

Check

Senior Debt Fully Repaid?
Pre Tax IRR = Target?
Total Cashflows = Zero?

PSC Sensitivity Multipliers

CapEx(%) 0%
Lifecyle(%) 0%
OpEx (non employment) (%) 0%
OpEx (employment) (%) 0%
Transaction (%) 0%
Residual cost (%) 0%
Third party income (%) 0%

Unitary Charge Balance(£m) 31.03
Default UCF (30%)

Note: The "Default UCF Factor" value may be changed from the default value of 30% ONLY in the event that PFI or other severe value changes and those are not shared by the PFI and PPP/PFI switches, bearing in mind that all inputs in the input sheet are correct. See section 4.2 of the User Guide for further details.

Sensitivities (Positive Multipliers)

"Crude" PFI VM Values at which positive the relevant technical PSC cost variable and the Discount Change by different multipliers and, varying from 100

http://www.hm-treasury.gov.uk
Case Study #2:
Partnerships Victoria - Spencer Street Station

Public Sector Comparator (PSC)
D8B4D8742CA2570D900188615

<table>
<thead>
<tr>
<th>Project Information</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programme</td>
<td>Spencer Street Station PSC Benchmark</td>
</tr>
<tr>
<td>Value</td>
<td>AUD million, description of the station development</td>
</tr>
<tr>
<td>Status</td>
<td>Open for Commercial Use</td>
</tr>
<tr>
<td>Department</td>
<td>Department for Spencer Street Station</td>
</tr>
<tr>
<td>Description</td>
<td>Spencer Street Station PSC Benchmark, description of the station development and its impact on the community</td>
</tr>
</tbody>
</table>

PSC Benchmark
1. Paw PSC
2. Competitive Neutrality Adjustment
3. Transferable Risk
4. Retained Risk
Case Study #3:

Project Background: Highways Agency, London

http://www.highways.gov.uk

UK Roads Project
http://www.highways.gov.uk

- Road Privatization
- Contracts
  - Managing agent
  - Term maintenance
  - Private Financing
- KPIs
- Communication of Metrics
  - Local press
  - Leaflets
  - Call center
  - Signage
  - Stakeholder meetings
## Metrics Used

<table>
<thead>
<tr>
<th>Key Performance Indicator</th>
<th>Description</th>
<th>Target Type</th>
<th>Target Value</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ministerial Indicators</strong></td>
<td>In order to deliver best value for money, maintain the network so that the proportion requiring maintenance within the next year is held between 7% and 8%.</td>
<td>Network Target (max)</td>
<td>8%</td>
<td>State of Network (SON)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network Target (min)</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td><strong>Whitehall Standards</strong></td>
<td>Aim to provide the Information Line service with a satisfaction rating of 75%, as measured by the 1998 Road Users Satisfaction Survey. This figure will combine the percentage of callers satisfied and percentage of callers partially satisfied with the service they receive.</td>
<td>Network Target (min)</td>
<td>75%</td>
<td>HAIL database</td>
</tr>
</tbody>
</table>

*Related links for indicators are provided.*
<table>
<thead>
<tr>
<th>4. Winter Maintenance</th>
<th>MAC</th>
<th>Time to carry out precautionary treatment</th>
<th>Area Target (max)</th>
<th>minutes</th>
<th>RMMS database</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number of confirmed adverse personal injury accidents reported where ice is a factor</td>
<td>Area Target (max)</td>
<td></td>
<td>STAT5 19</td>
</tr>
</tbody>
</table>

**PERFORMANCE SPECIFICATION FOR ROUTINE & WINTER MAINTENANCE**

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Life Cycle Model Metrics - Buildings

**Condition Index**

\[
\text{Condition Index} = 1 - \frac{\text{repair needs}}{\text{Replacement Value}} \times 100%
\]

Federal Real Property Council (2005)

1. Full Visual Assessment
2. Parametric Estimating
3. Asset Inventory Based
4. Questionnaire Based
5. Scalable Modeling

Ref: July, IMFA’s FMJ, “Condition Indices and Strategic Planning” or GSA, Office of Governmentwise Policy (OGP)
## UK PPP Example – Wiltshire Police Authority

### General Information
- **Location**: Wiltshire, UK
- **Authority**: Wiltshire Police Authority

### Sub-Structure
- **A10**: Structure
  - **4.20%**: 1,680,000
  - **1.10%**: 15,200

### Super-Structure
- **B10**: Structure
  - **5.00%**: 2,000,000
  - **0.06%**: 200

### Exteriors
- **B20**: Exteriors
  - **24.90%**: 9,960,000
  - **4.06%**: 404,667

### Interior Walls
- **B20**: Exteriors
  - **5.80%**: 2,320,000
  - **4.84%**: 112,254

### Interior Doors
- **B20**: Exteriors
  - **1.10%**: 440,000
  - **6.69%**: 29,431

### Roofing
- **C20**: Roofs
  - **2.00%**: 800,000
  - **24.78%**: 198,247

### Partitions
- **C20**: Partitions
  - **2.70%**: 1,080,000
  - **8.98%**: 96,940

### Interior Doors
- **C20**: Interior Doors
  - **3.00%**: 1,200,000
  - **7.72%**: 92,582

### Fittings
- **C20**: Fittings
  - **0.70%**: 280,000
  - **65.85%**: 184,367

### Stair Construction
- **C20**: Stair Construction
  - **1.60%**: 640,000
  - **2.46%**: 15,773

### Wall Finishes
- **C30**: Wall Finishes
  - **2.20%**: 880,000
  - **78.05%**: 686,861

### Floor Finishes
- **C30**: Floor Finishes
  - **2.90%**: 1,160,000
  - **24.78%**: 287,458

### Ceiling Finishes
- **C30**: Ceiling Finishes
  - **3.20%**: 1,280,000
  - **14.99%**: 191,916

### Conveying
- **D10**: Conveying
  - **4.20%**: 1,680,000
  - **10.54%**: 177,087

### Plumbing Fixtures
- **D20**: Plumbing Fixtures
  - **3.10%**: 1,240,000
  - **14.99%**: 185,918

### Domestic Water Distribution
- **D20**: Domestic Water Distribution
  - **0.30%**: 120,000
  - **38.58%**: 46,299

### Rain Water Drainage
- **D20**: Rain Water Drainage
  - **0.70%**: 280,000
  - **11.47%**: 32,104

### Energy Supply
- **D30**: Energy Supply
  - **6.00%**: 2,400,000
  - **43.17%**: 1,036,192

### Heat Generating Systems
- **D30**: Heat Generating Systems
  - **0.00%**

### Cooling Generating Systems
- **D30**: Cooling Generating Systems
  - **0.00%**

### Terminal & Package Units
- **D30**: Terminal & Package Units
  - **6.30%**: 2,520,000
  - **48.25%**: 1,215,977

### Other HVAC Systems & Equipment
- **D30**: Other HVAC Systems & Equipment
  - **0.00%**

### Sprinklers
- **D40**: Sprinklers
  - **1.90%**: 760,000
  - **30.83%**: 234,318

### Standpipes
- **D40**: Standpipes
  - **0.00%**

### Electrical Service/Distribution
- **D50**: Electrical Service/Distribution
  - **1.10%**: 440,000
  - **20.10%**: 88,456

### Lighting & Branch Wiring
- **D50**: Lighting & Branch Wiring
  - **6.80%**: 2,720,000
  - **38.58%**: 1,049,450

### Communications & Security
- **D50**: Communications & Security
  - **0.50%**: 200,000
  - **97.54%**: 195,089

### Other Electrical Systems
- **D50**: Other Electrical Systems
  - **0.10%**: 40,000
  - **72.05%**: 28,818

### Equipment & Furnishings
- **E**: Equipment & Furnishings
  - **10.00%**: 4,000,000
  - **97.54%**: 3,901,787

### Special Construction
- **F**: Special Construction
  - **0.00%**

---

**Total Value**: 40,000,000

**Total Repair Need**: 10,524,874

**Annual Repair Cost**: 350,829

**Preventive Maintenance Cost**: 800,000

**Total Annual Lifecycle Cost**: 1,150,829

---

**Non-Linear Deterioration Over Time**

- **Time**
  - 0% 1 7 13 19 25 31 37 43 49 55 61 67 73 79 85 91 97

- **Condition Index**
  - 0% 20% 40% 60% 80% 100% 120%

---

**Condition Index**

- **Non-Linear Deterioration Over Time**
Theoretical condition assessment

you need the following **minimum** information:

- **Age** of the building,
- the **type** of building it is,
- the **component breakdown** for that type of building,
- the **expected useful life** of each system type.
- use more info if known…
### BASIC Age and Building-Type Data

<table>
<thead>
<tr>
<th>Condition Index Accuracy</th>
<th>&lt;10 YRS</th>
<th>&lt;25 YRS</th>
<th>&lt;30 YRS</th>
<th>&lt;35 YRS</th>
<th>&lt;40 YRS</th>
<th>&lt;45 YRS</th>
<th>&lt;50 YRS</th>
<th>OVERALL TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25% Variance</td>
<td>93.36%</td>
<td>90.89%</td>
<td>89.44%</td>
<td>89.49%</td>
<td>88.92%</td>
<td>86.93%</td>
<td>84.94%</td>
<td>80.15%</td>
</tr>
<tr>
<td>&lt;20% Variance</td>
<td>91.60%</td>
<td>87.25%</td>
<td>85.80%</td>
<td>85.73%</td>
<td>84.88%</td>
<td>82.28%</td>
<td>79.87%</td>
<td>75.18%</td>
</tr>
<tr>
<td>&lt;15% Variance</td>
<td>88.28%</td>
<td>83.60%</td>
<td>81.90%</td>
<td>81.56%</td>
<td>80.39%</td>
<td>77.25%</td>
<td>74.63%</td>
<td>68.71%</td>
</tr>
<tr>
<td>&lt;10% Variance</td>
<td>82.23%</td>
<td>76.01%</td>
<td>72.90%</td>
<td>71.45%</td>
<td>70.21%</td>
<td>66.99%</td>
<td>63.61%</td>
<td>58.06%</td>
</tr>
<tr>
<td>&lt;5% Variance</td>
<td>72.07%</td>
<td>62.55%</td>
<td>58.35%</td>
<td>56.54%</td>
<td>55.09%</td>
<td>51.82%</td>
<td>48.77%</td>
<td>42.35%</td>
</tr>
<tr>
<td>&lt;2% Variance</td>
<td>60.94%</td>
<td>44.94%</td>
<td>41.39%</td>
<td>39.53%</td>
<td>37.87%</td>
<td>35.44%</td>
<td>33.01%</td>
<td>25.96%</td>
</tr>
<tr>
<td>&lt;1% Variance</td>
<td>51.56%</td>
<td>35.93%</td>
<td>32.81%</td>
<td>30.95%</td>
<td>29.42%</td>
<td>27.41%</td>
<td>24.82%</td>
<td>18.23%</td>
</tr>
<tr>
<td>&lt;1% Variance</td>
<td>31.68%</td>
<td>20.58%</td>
<td>19.09%</td>
<td>16.79%</td>
<td>14.31%</td>
<td>11.67%</td>
<td>10.16%</td>
<td>5.72%</td>
</tr>
</tbody>
</table>
Life Cycle Model Metrics - Infrastructure

• Real-time infrastructure asset modeling, simulation and management application

• Integrates data from GIS, costing, mapping and enterprise asset management systems

• Financial modeling for infrastructure assets for consistent and accurate decisions.
  • Capital Inventory and Valuation
  • Full Life –Cycle Cost Analysis
  • Capital Asset Management Planning

http://www.envistasoftware.com/
Full Life-Cycle Cost Analysis
Asset Management Planning
Resources

- http://www.reason.org/commentaries/balaker_20060601.shtml (REASON FOUNDATION)
- www.FOSonline.org
- http://www.iris.umd.edu/adass/proj/soccappubs.asp
- http://www.muninetguide.com/articles/PublicPrivate-Partnerships-Allow-188.php
- http://www.pwblf.org/csr/csrwebassist.nsf/content/f1d2a3b4c5.html
- www.socialresearchmethods.net
- http://www.corporate-citizenship.co.uk/resources/articles.asp
- http://www.undp.org/ppp/gln/resources.htm
- http://www.un.org/esa/coordination/Alliance/PPPInfrastructure.pdf (Spencer Street Station, Victoria)
- http://www.partnerships.vic.gov.au/CA25708500035EB6/0/0FB129CD8B4D8742CA2570D900188615 (Spencer Street Station, Australia)