SROI

SUSTAINABLE RETURN ON INVESTMENT

A Triple Bottom Line Decision Making Framework

Sustainability Round-Table, Denver

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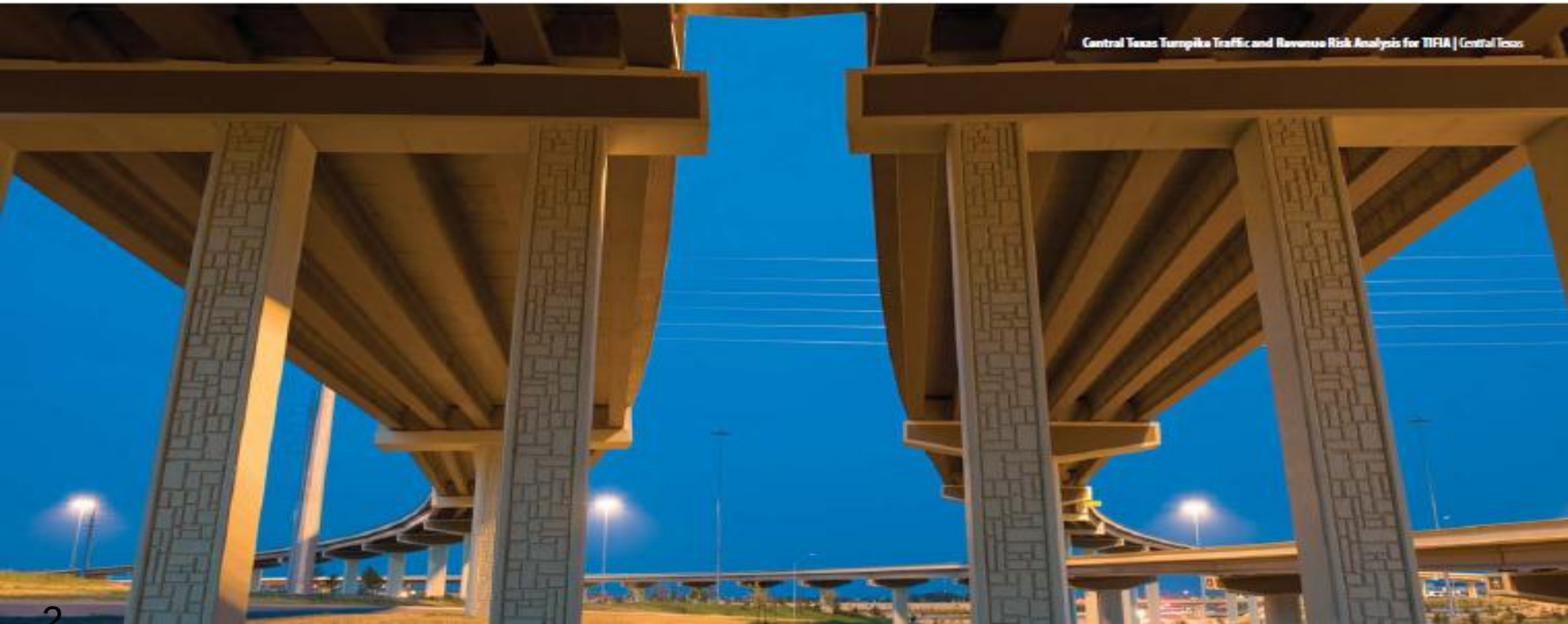


Full Portfolio of HDR Economics and Finance Services

- Alternative Delivery Methods
- Business Case Analysis
- Contingency Management
- Cost and Schedule Risk Analysis
- Cost-Benefit Analysis
- Cost Risk Analysis and Value Engineering (CRAVE™)
- Decision Support Frameworks
- Demand Forecasting
- Economic Development
- Economic Impact Analysis
- Enterprise Risk Management
- Financial Feasibility Analysis
- Financial Planning
- Grant Application Support
- Least Cost Planning
- Life Cycle Cost Analysis
- Operational Risk Analysis
- Policy Analysis
- Pricing and Revenue Forecasting
- Program Management Support
- Public-Private Partnership Program Support
- Regulatory Impact Analysis
- Schedule Optimization
- Statistical Analysis
- Sustainable Return on Investment (SROI)
- Third Party Review

Traditional Business Case Analysis

Life-Cycle Cost Analysis involves the analysis of the costs of a system or a component over its entire life span

Financial Analysis involves evaluation of cash flow impacts to determine investment suitability

Traditional models often fall short:

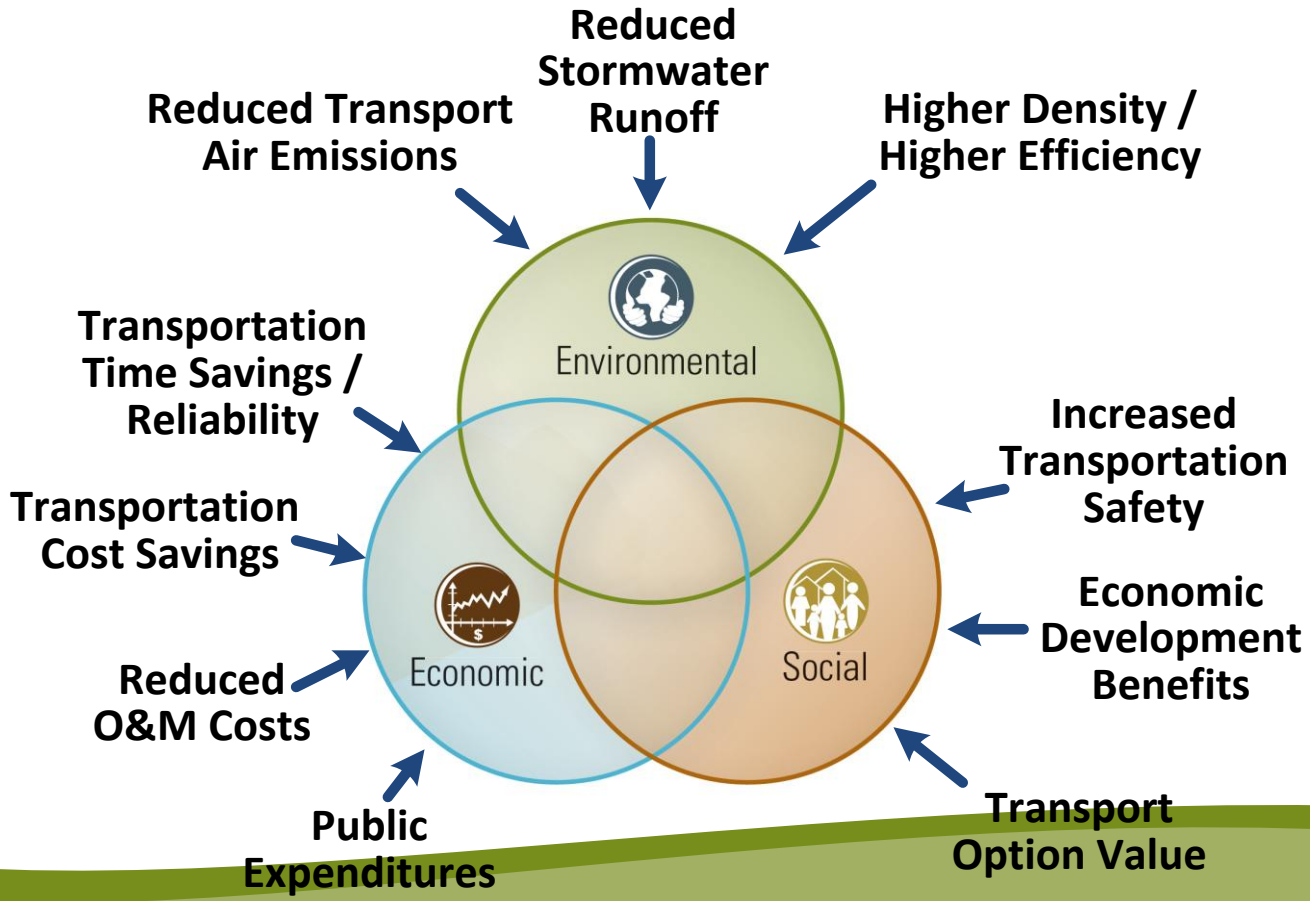
- Only consider cash impacts
- Do not account for uncertainty
- Lack transparency

What is SROI?

Triple Bottom Line Decision Making Framework

It's best practice in Cost-Benefit Analysis and Financial Analysis over a project's entire life-cycle, augmented by:

- Accounting for uncertainty using state-of-the-art risk analysis techniques
- Engaging stakeholders directly to generate consensus and transparency



SROI: Origins

Developed by HDR's Decision Economics Group

Input from Columbia University's Graduate School of International and Public Affairs

Launched into the public domain at the 2009 Clinton Global Initiative annual meeting

CLINTON GLOBAL INITIATIVE

COLUMBIA UNIVERSITY™

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Elements of the SROI process have been used to evaluate the monetary value of sustainability programs and projects valued at over $10B

Sustainability: A Priority at the Federal Level

Executive Order 13514

Federal Leadership In Environmental, Energy, and Economic Performance

"…to establish an integrated strategy towards sustainability in the Federal Government and to make reduction of greenhouse gas emissions a priority…agencies shall prioritize actions based on a full accounting of both economic and social benefits and costs"

Sustainability: Additional Priorities

Assistant Secretary of the Treasury: National Infrastructure Bank will *"improve the efficacy of our infrastructure investment by having a merit-based selection process"*

Transportation Infrastructure Finance and Innovation Act (TIFIA)

Application: "*emphasis on projects that minimize lifecycle costs and use environmentally sustainable practices and materials. For example, describe reductions in pollution (e.g., air, water, noise, etc.) that would result from the project*"

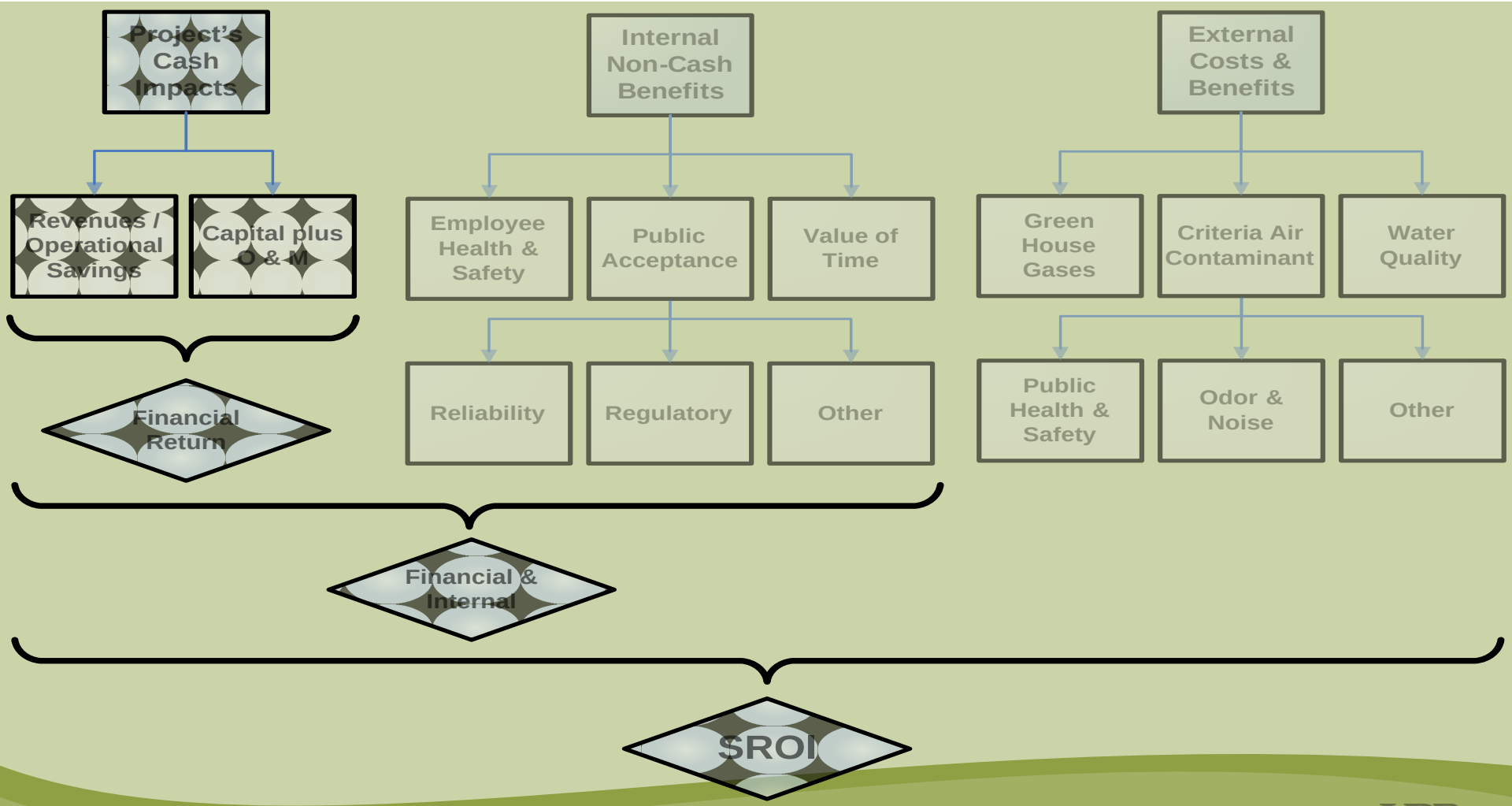
US Government Accountability Office (GAO)

"Surface Freight Transportation" – Jan 2011 Report

Summarizes efforts to do full cost accounting for freight modes: identifying and quantifying all "external costs"….

The Triple Bottom Line Framework

SROI adds to traditional financial analysis the monetized value of non-cash benefits and externalities



SROI Flow Diagram

PROJECT TYPES

- Capacity Expansion
- Modernization / Enhancements
- Communication / Security
- Preventative Maintenance

SERVICE ATTRIBUTES

- Access
- Frequency of Service
- Vehicle Speed
- Safety and Comfort

Change in Ridership

User Benefits

BENEFITS

- Time Savings
- Out-of-pocket Cost Savings
- Safety

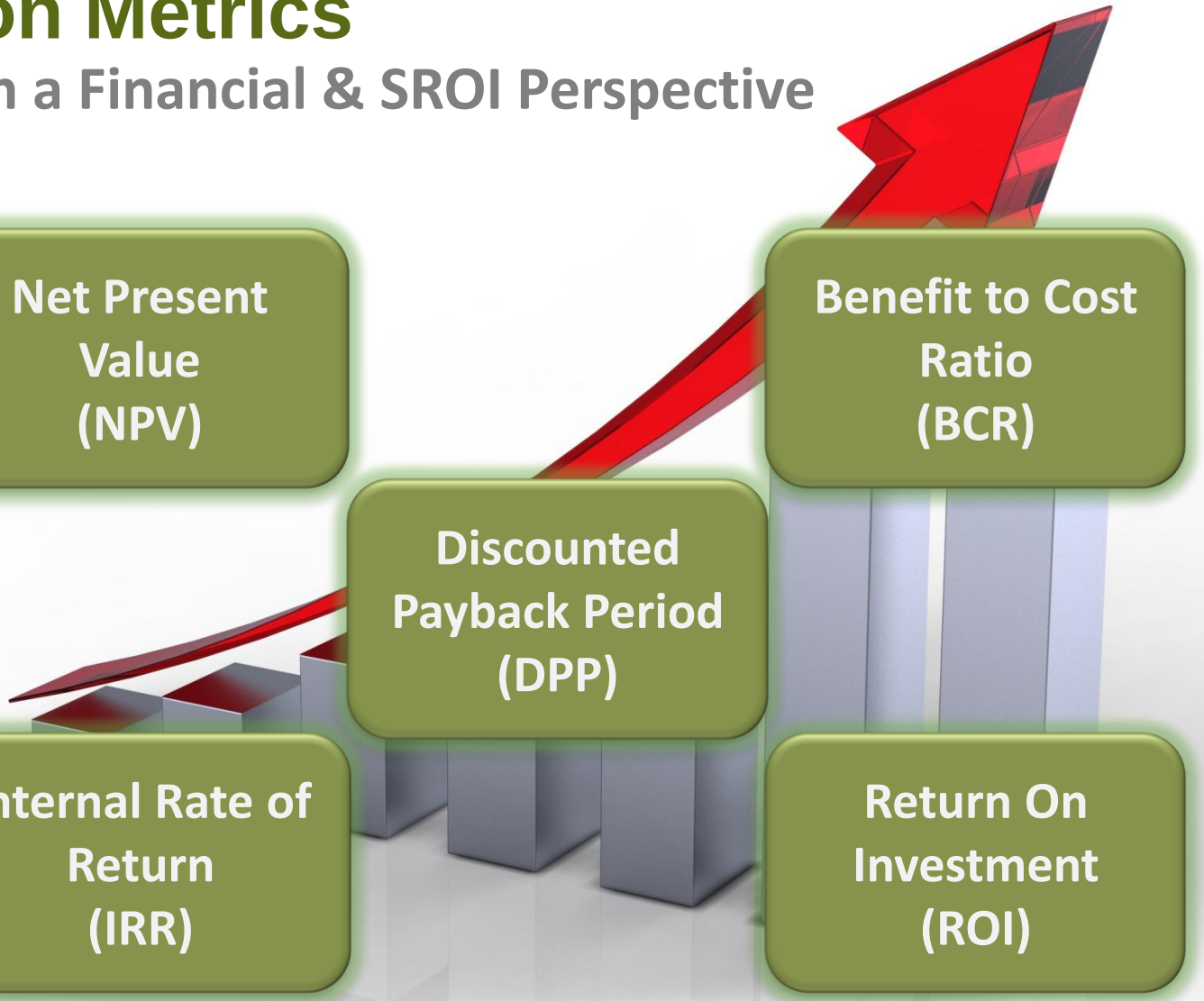
Non-user Benefits

BENEFITS

- Congestion relief
- Reduced Emissions
- Reduced System Costs
- Reduced Public Costs
- Economic Development
- Option Value

Decision Metrics

From Both a Financial & SROI Perspective



Examples of Recent SROI Projects

Client	Project
Department of Defense	**SROI analysis of the Fort Belvoir Community Hospital, USAG Humphreys in Korea , Fort Bliss in El Paso TX, etc.**
BNSF, CSX & UP Railroads	**Proved the public benefit of dozens of new infrastructure projects resulting in over $700M in State & Federal grants**
City and County of Honolulu	**SROI analysis of the merits of the local Waste-to-Energy plant as compared to alternative uses of the waste**
Boston Redevelopment Authority	**The city of Boston used SROI to analyze its portfolio of ARRA funded projects**
Chicago Area Waterway System	**Using SROI to help determine the most sustainable form of barrier between the Great Lakes and the Mississippi**
Denver Metro Wastewater Reclamation District	**Using SROI to make design & construction decisions on Denver's proposed new wastewater treatment facility**
Johns Hopkins University	**Provided SROI analysis of JHU's Campus Sustainability Initiative project in order to secure LEED certification**
Department of Energy	**SROI analysis of energy and water reduction initiatives at Argonne National Laboratory Energy Sciences Building**

HDR Decision Economics and Transit Investment - Federal Agencies

Transit Benefits for Strategic Corridors, FTA

- Congestion management study of several corridors. Developed a model to measure the performance of transit in several cities, including: Washington DC, Portland, St. Louis, Sacramento, Dallas and Chicago.

Economic Development Benefits of Transit, FTA

- Applied hedonic land value methods to measure the direct and indirect benefits associated with doing business in transit accessible centers. Measured impact of mass transit on commercial property value.

Performed Analysis of Cost Escalation, FTA

- Analyses were associated with six FTA New Starts projects based on individual cost components.

Transit Investments Cost Benefit Analysis Tool, Transport Canada

- Conducted an economic study to establish a cost-benefit framework for the evaluation of various types of transit investments.

HDR Decision Economics and Transit Investment – State and Local Agencies

Benefits of Transit for WISDOT, PennDOT, VADRPT, MIDOT, SD DOT, SORTA (Cincinnati), MCTS (Milwaukee), GRTC (Richmond), Valley Metro (Roanoke)

- Conducted studies to identify the social and economic benefits of public transportation services to the main economic sectors in each State.

Transit Investments Cost Benefit Analysis Tool, VADRPT.

- Conducted an economic study to establish a cost-benefit framework for the evaluation of various types of transit investments.

Financial Plan for New Starts Projects

- Assisted in preparation of Financial Plans for New Starts projects in Cincinnati, Columbus, Austin, and Portland.

Paratransit Forecast for NYMTA, WMATA, SEPTA, OC Transpo, Access Services, RTA, King County Department of Metropolitan Services.

- Econometric forecast of demand for, and productivity of, paratransit services.

Conducted Risk Assessment for Transit Investments, Various Cities

- Projects located in Phoenix, Portland, Seattle, New York, and Boston

"Public leaders need to understand the triple bottom line of the policy and programmatic choices before them. **The ability to assign monetary values to the full costs and benefits associated with sustainable initiatives will unlock the door to additional public investment**. Now, mayors can actually measure and articulate the monetary value of green."

Thomas Menino
Four-term Mayor of the City of Boston

SROI Methodology

A Four Step Process

"SROI reveals the hidden value in projects."

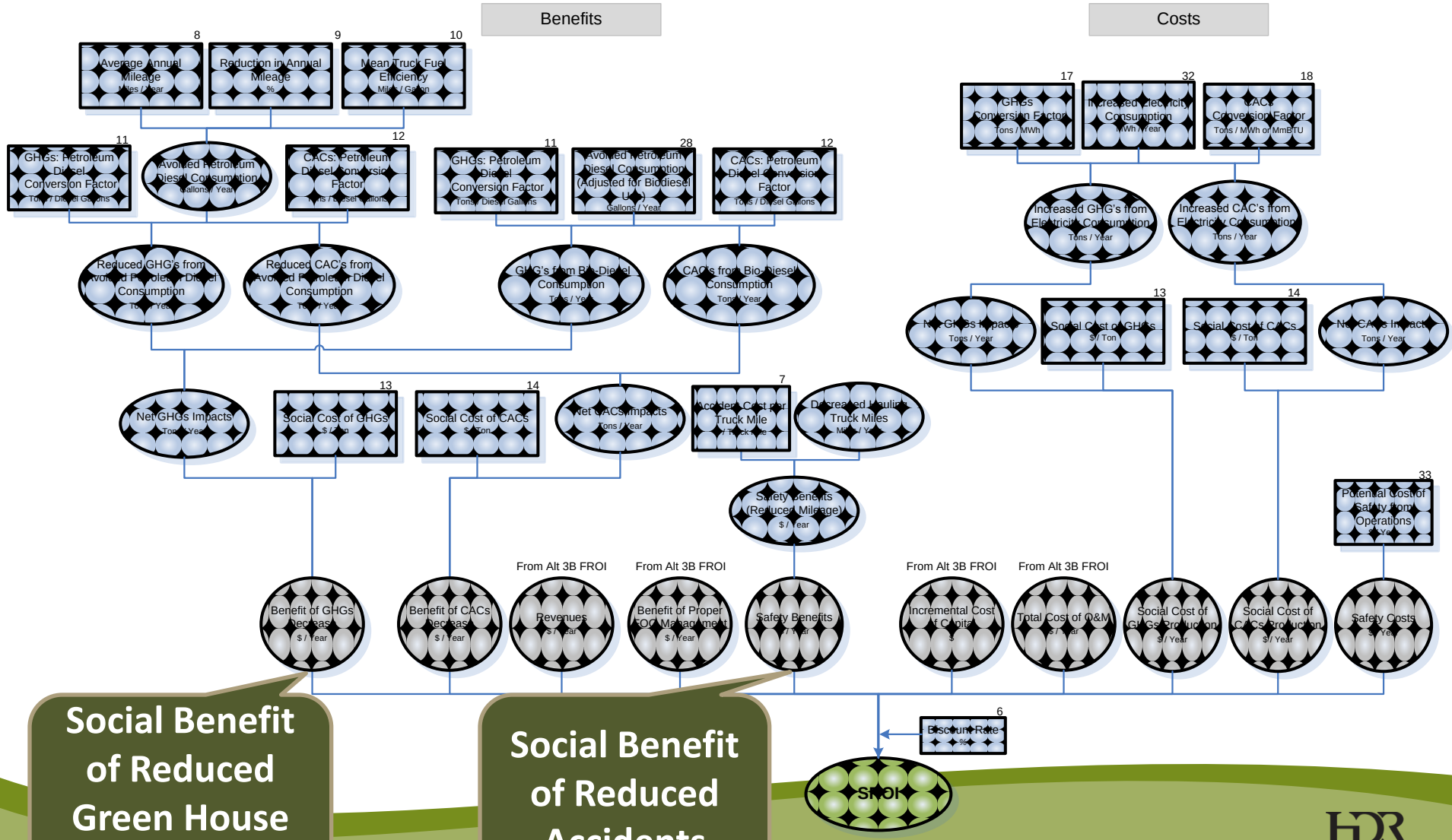
David Lewis, PhD
Former Principal Economist at the US Congressional Budget Office
Author "*Policy and Planning as a Public Choice: Mass Transit in the United States*"

SROI Methodology – Step 1

Develop Structure and Logic Diagrams

S&L depicts variables and cause/effect relationships

Grease to Biodiesel Blending Facility: City of Tempe, AZ



SROI Methodology – Step 2

Quantifying Inputs – Sources of Data and Evidence

Data Sources	• Over 8,000 Engineers, Architects, Scientists & Economists • Meta-analysis of third party research & data • Financial & insurance markets • Contingent valuation i.e. willingness to pay surveys • Bayesian analysis/expert opinion

Accident & Safety Example: Value of a Statistical Life

	Units	Most Likely	Low	High
Value of a Statistical Life	$ per life	$6,000,000	$3,300,000	$8,700,000

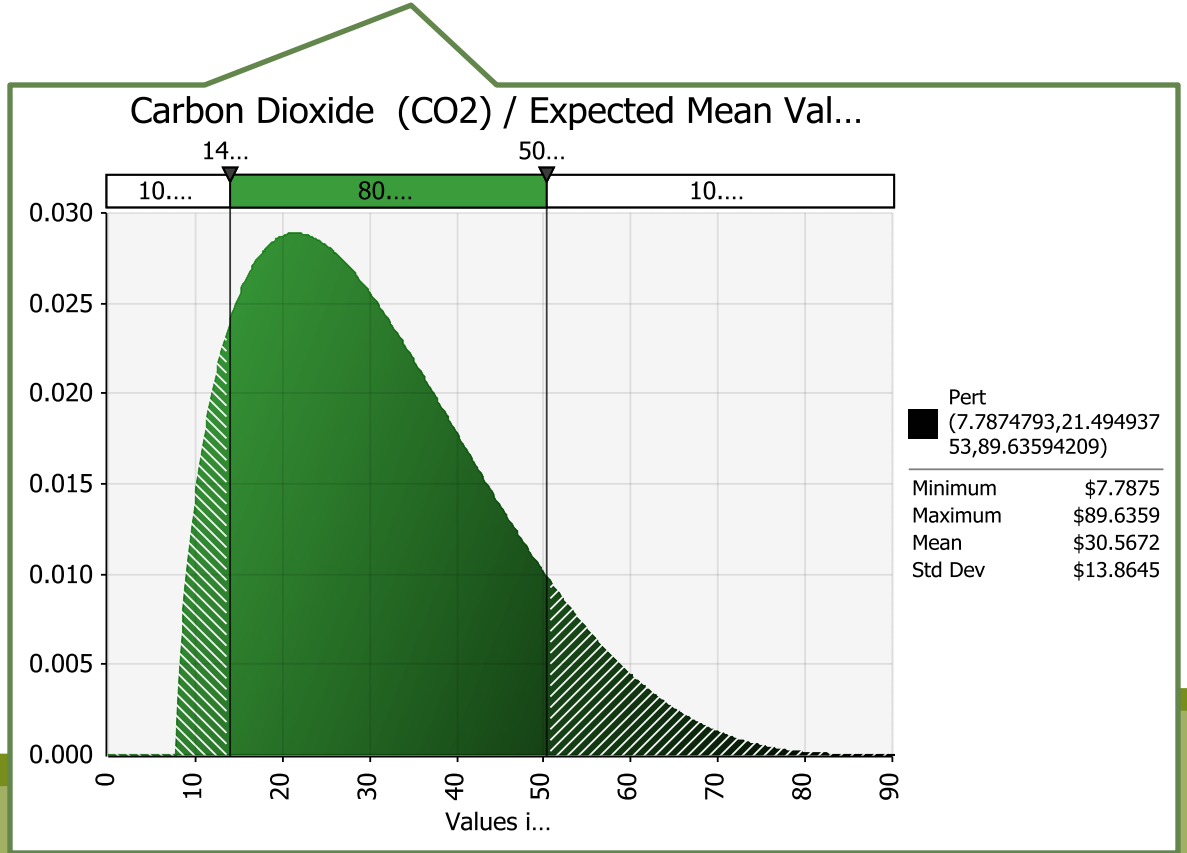
Relative Disutility Factors by Injury Severity Level (Maximum Abbreviated Injury Scale)		
MAIS 1 - Minor injury	fraction of VSL	0.0020
MAIS 2 - Moderate injury	fraction of VSL	0.0155
MAIS 3 - Serious injury	fraction of VSL	0.0575
MAIS 4 - Severe injury	fraction of VSL	0.1875
MAIS 5 - Critical injury	fraction of VSL	0.7625
MAIS 6 - Fatality	fraction of VSL	1.0000

Source: US DOT

SROI Methodology – Step 2

Quantifying Inputs – Values & Distributions

Greenhouse Gases	Expected Mean Value	Probability Distribution	$/Short Ton (2011 $)	Source
Carbon Dioxide (CO2)	**$30.57**	Median	$ 21.49	IWGSCC (2010)
		Min	$ 7.79	Nordhaus (2008)
		Max	$ 89.64	Stern Review (2006)



SROI Methodology – Step 3

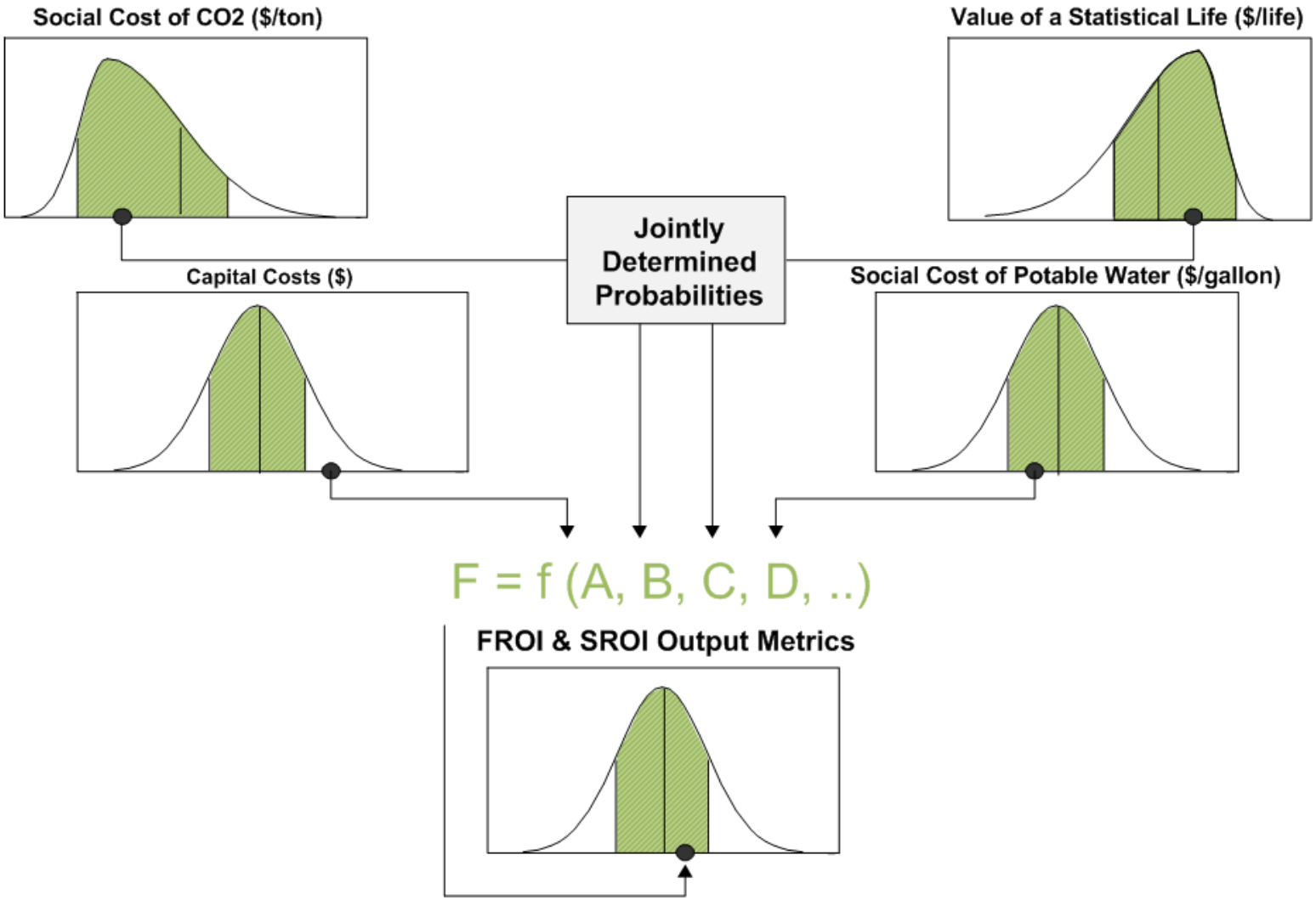
Risk Analysis Process Session

Sample Participants

- **Client:**
  - Project team
  - Technical specialists
  - Financial experts
- **HDR:**
  - Facilitator
  - Economists
  - Technical specialists
- **Outside Experts:**
  - Costing experts
  - Energy modelers
  - Other consulting firms
  - Public agencies & officials

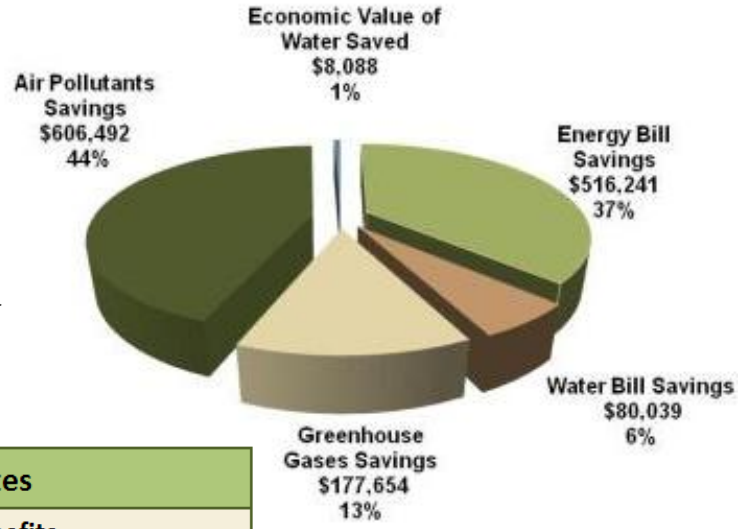
SROI Methodology – Step 4

Run the Model and Produce Results



Examples of SROI Results

Ft Belvoir Hospital, VA – US Army



SROI	Current Design	Alternative	Notes
Annual Value of Benefits	$1,284,097	$1,388,514	Aggregate annual benefits
Energy Reduction	*$474,470*	*$516,241*	Cash benefit
Water Reduction	*$80,039*	*$80,039*	Cash benefit
Greenhouse Gases Savings	*$163,461*	*$177,654*	Non-cash benefit
Air Pollutants Savings	*$558,039*	*$606,492*	Non-cash benefit
Reduced Water Use Social Benefit	*$8,088*	*$8,088*	Non-cash benefit
Net Present Value	$15,773,620	$13,798,340	PV Benefits / PV All Costs
Return on Investment	39.30%	18.00%	Average % Return on Capital
Discounted Payback Period	4.6	7.7	Years until positive discounted cash flow
Internal Rate of Return (%)	31.00%	18.10%	Discount rate making NPV = 0
Benefit to Cost Ratio	4.7	2.8	PV Benefits / PV Costs

FROI	Current Design	Alternative	Notes
Annual Value of Benefits	$554,870	$596,193	Aggregate annual benefits
Net Present Value	$4,353,935	$1,391,047	PV Benefits / PV All Costs
Return on Investment	15.90%	5.50%	Average % Return on Capital
Discounted Payback Period	12.9	25	Years until positive discounted cash flow
Internal Rate of Return (%)	14.20%	6.80%	Discount rate making NPV = 0
Benefit to Cost Ratio	2	1.2	PV Benefits / PV Costs

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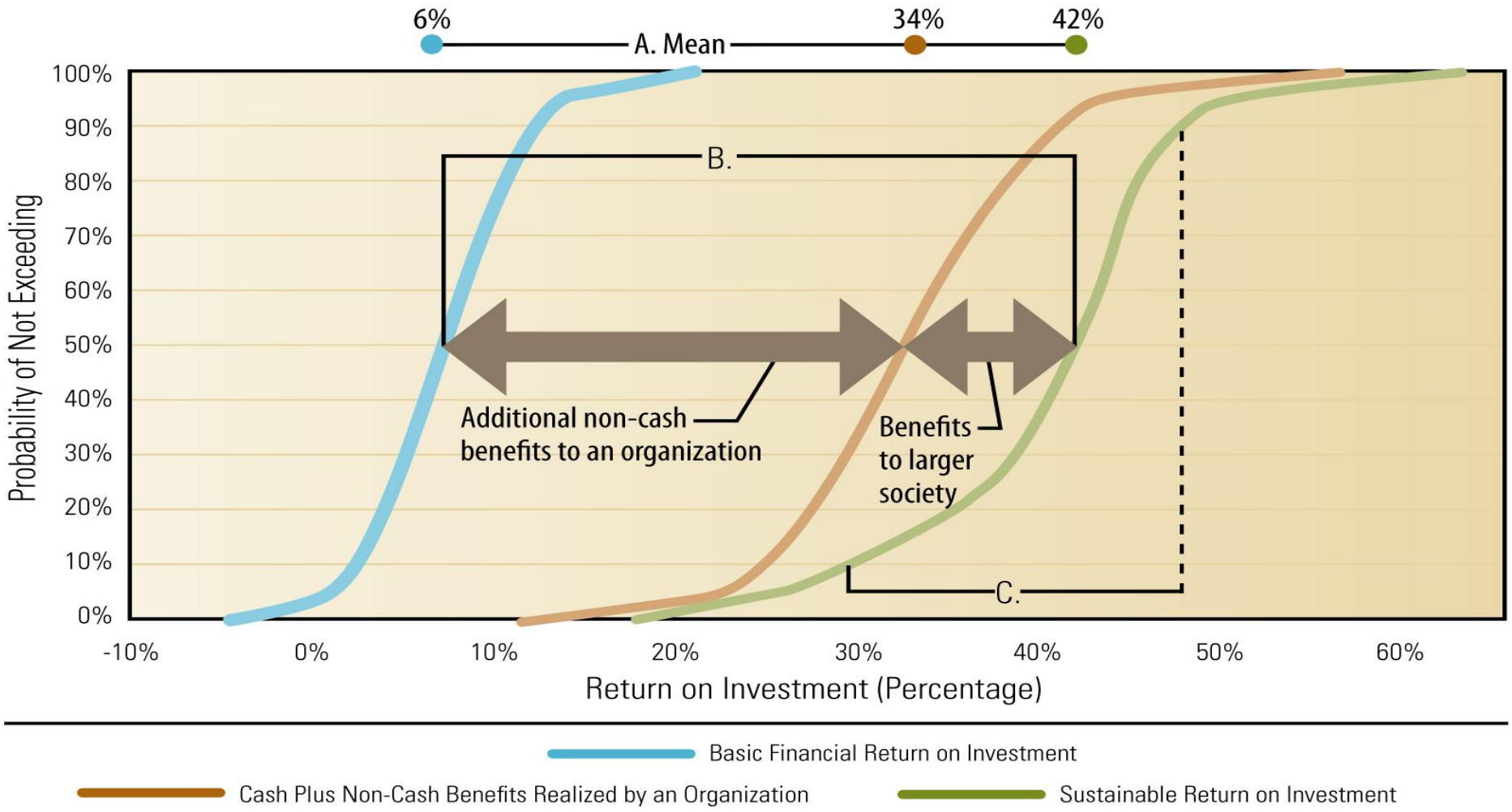
Examples of SROI Results

Tehachapi Trade Corridor, California – BNSF Railroad

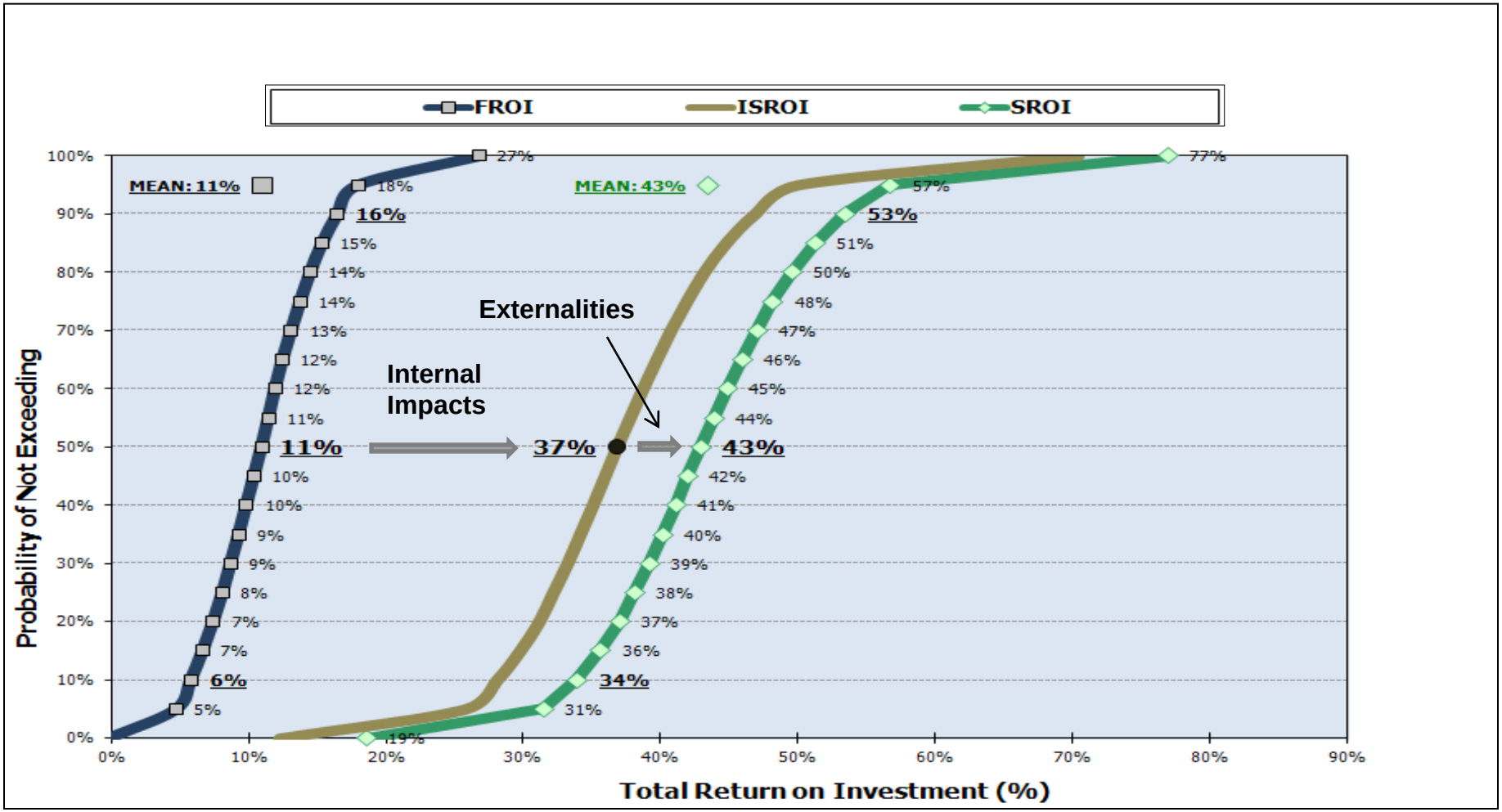
Net Benefit #	Net Benefit Name	Net Benefit Category	Total Discounted Value (2007 US$ M)		
1	Reduced Cost of Train Delay at Current Capacity	Transportation System Savings	$11	$7.2	$14.7
2	Reduced Transportation Costs from Displacing Heavy Truck Travel	Transportation System Savings	$580	$324	$847
3	Change in Inventory Costs from Displacing Heavy Truck Travel	Transportation System Savings	-$48	-$65	-$33
4	Change in Inventory Costs from Reduced Train Delay	Transportation System Savings	$6.6	$4.2	$9.4
5	Savings From Reduced Highway Congestion	Transportation System Savings	$16.4	$12.1	$21.0
6	Reduction in Maintenance Costs from Displacing Heavy Truck Travel	Transportation System Maintenance	$85	$47	$127
7	Environmental Savings from Displacing Heavy Truck Travel	Environmental Improvements	$31	$16	$48
8	Environmental Savings from Reduced Train Delay (Idling)	Environmental Improvements	$.2	$.01	$.04
9	Reduced Accident Costs from Displacing Heavy Truck Travel	Transportation Safety	$96	$63	$130
10	Aid in Case of Massive Natural Disaster Relief / Terrorist Attack	Emergency Relief	$4.1	$1.0	$8.1
Total Discounted Value of Net Benefits (Note: Separate calculations, may not add)			$782	$507	$1,071

Sustainability S-Curve Diagram



Examples of SROI Results

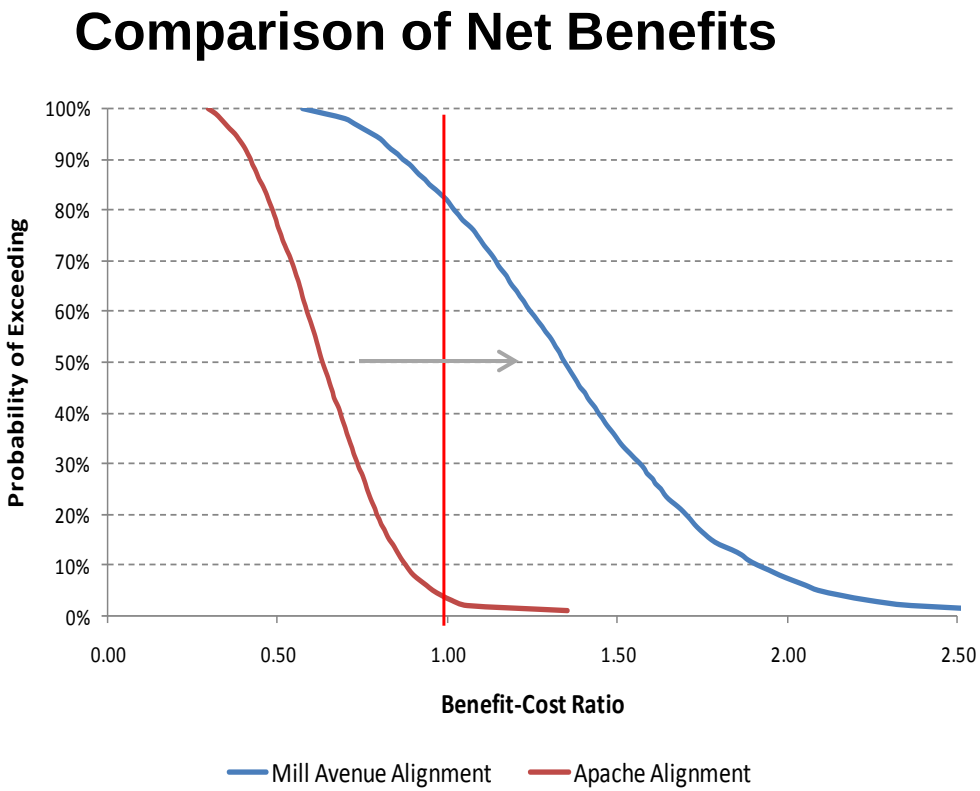
Campus Sustainability - John Hopkins University, Baltimore



Valley Metro, AZ: Tempe Street Car Alignment Analysis

Project Characteristics

- Cost-benefit analysis for a streetcar project aimed to spur economic redevelopment activity in downtown Tempe
- Estimated life-cycle costs and benefits of each alignment option
- Alignment chosen has potential benefits of $181.1M and $45.3 NPV
- Over 80% of benefits are derived from economic development



NYCDOT: Fordham Bus Transit Plaza Reconstruction

Project Characteristics

- Improvements to bus facility
- Cost-benefit analysis of feasibility and economic development
- Estimated the impacts of the planned improvements on accident rates, based on Federal Highway Administration data and guidelines
- Potential $77.5M in benefits
- NPV-TIGER grant awarded

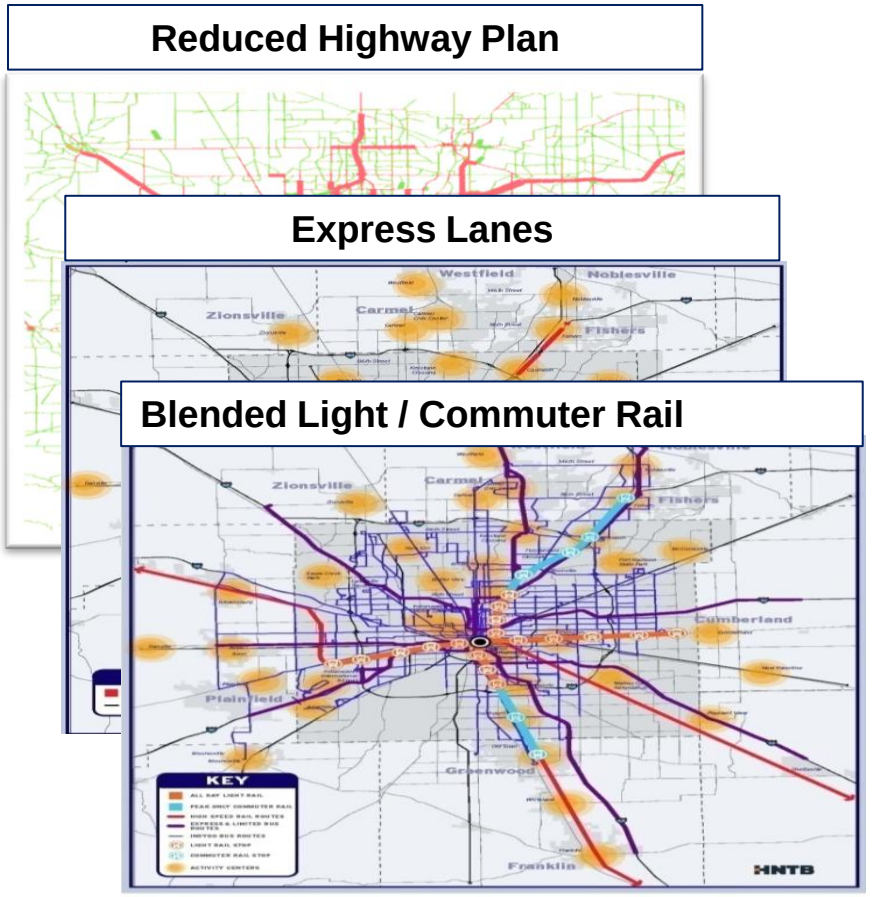
Distribution of Benefits

Long-Term Outcomes	Benefit Categories	NPV
Economic Competitiveness	Travel Time Savings	$12.7
	Vehicle Operating Cost Savings	$0.3
Livability	Low Income Mobility & Budgetary Savings to Low Income Households	$5.8
Environmental Sustainability	Reductions in Air Emissions	$0.02
Safety	Accident Reduction	$58.7
Total Benefit Estimates		$77.5

SROI Applications for Master Planning

SROI reveals benefits in:

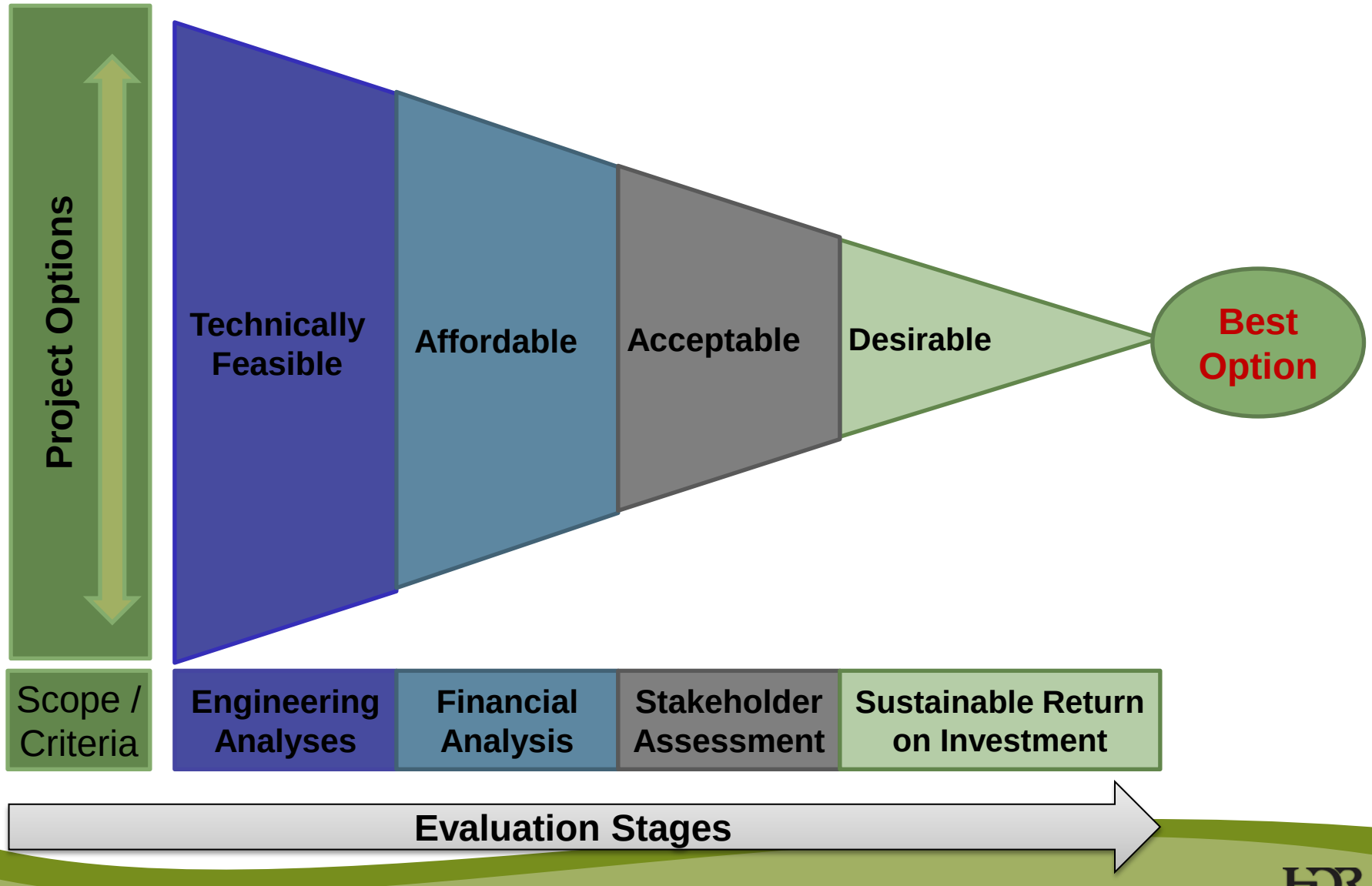
- Community form: compact vs. sprawl
- Economic development benefits
- Environmental benefits
- Modal mix
- Congestion management
- Cross-sector/social benefits



Central Indiana Transportation Plan

Ensuring Success with SROI

Project Screening of Alternatives

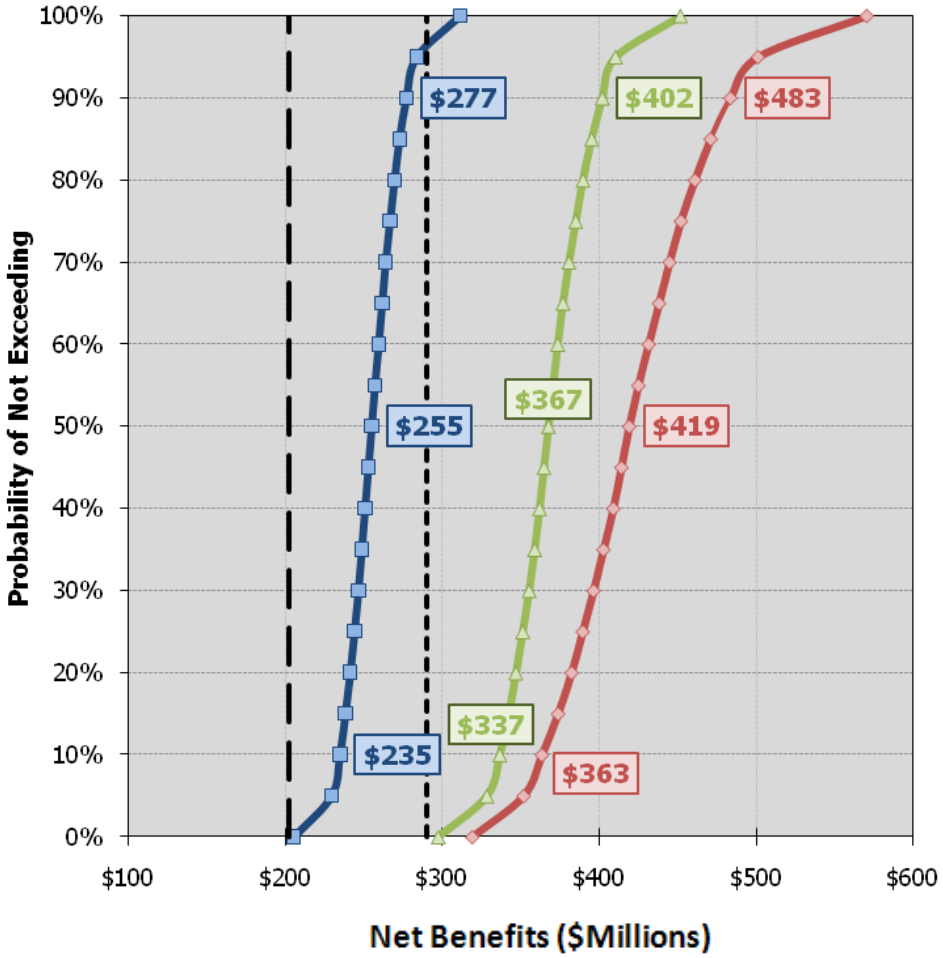


Prioritizing Projects – Hypothetical Example

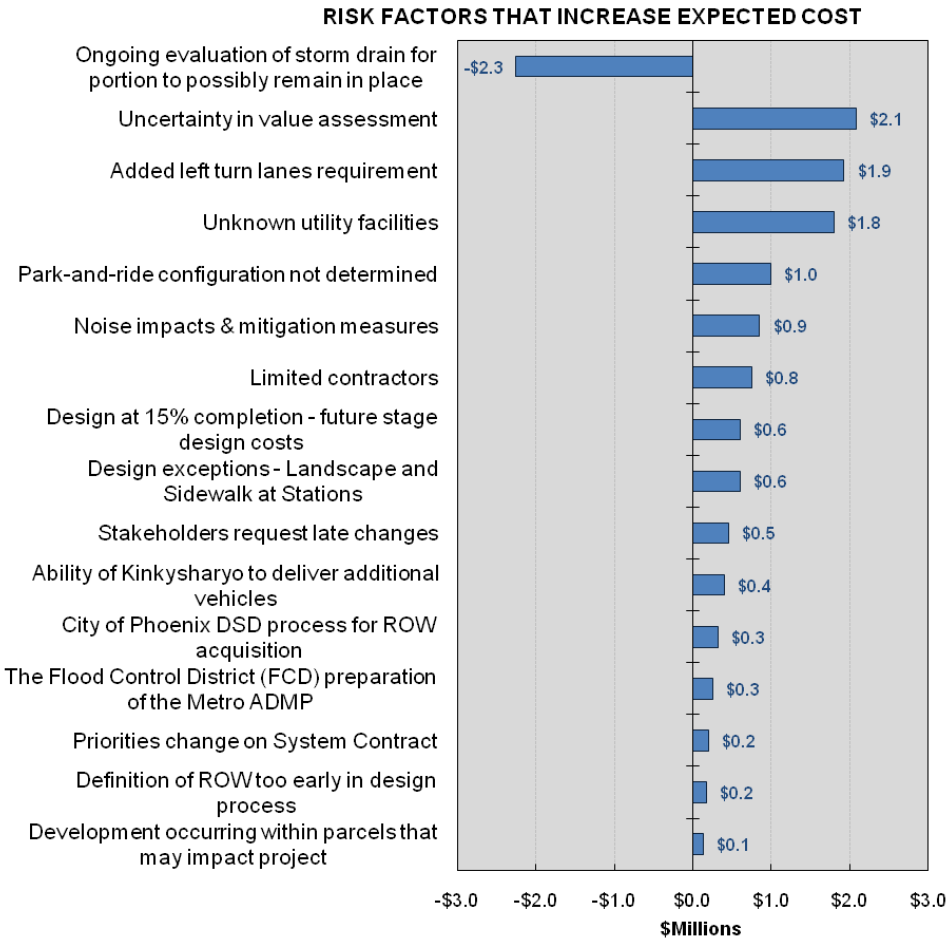
Projects on Radar Screen	Project Name	Project Description	Profitability IRR	Project Rank	Capital Required ($M)	Cumulative Capital ($M)	Project Grouping
	Foxtrot	Solar Caps	25%	1	$ 58	$ 58	
	Delta	Landfill Gas Collection	21%	2	$ 321	$ 379	
	Victor	WTE 1	20%	3	$ 72	$ 451	Projects that should be implemented
	Mike	Long Haul Rail Option	19%	4	$ 95	$ 546	
	Juliet	MRF refurbishment	17%	5	$ 150	$ 696	
Capital Budget Line	Sierra	Anaerobic digestion of waste	17%	6	$ 265	$ 961	
Max Annual Capital $1B	Quebec	Autoclave	15%	7	$ 250	$ 1,211	
	Lima	Waste Park	14%	8	$ 170	$ 1,381	
	Alpha	Road haul Option	14%	9	$ 60	$ 1,441	
	Whiskey	WTE 2	13%	10	$ 143	$ 1,584	
	November	Additional MRF 1	12%	11	$ 86	$ 1,670	
	Uniform	Standardized Garbage Bins	12%	12	$ 77	$ 1,747	Good projects that lack funding
	Zulu	Additional MRF 2	11%	13	$ 99	$ 1,846	
	Golf	Landfill 1	10%	14	$ 112	$ 1,958	
	Tango	Natural Gas Trucks	9%	15	$ 41	$ 1,999	
	Charlie	Solar Panels on HQ	8%	16	$ 250	$ 2,249	
NPV Break-Even Line	India	Wind Turbines on capped L/F	7%	17	$ 14	$ 2,263	
Hurdle Rate 7% IRR	Bravo	Hybrid Trucks	6%	18	$ 87	$ 2,350	
	X-ray	Landfill 2	5%	19	$ 300	$ 2,650	
	Oscar	Plasma Gasification	5%	20	$ 12	$ 2,662	Projects that aren't worth pursuing
	Hotel	Wind Turbine for HQ	2%	21	$ 357	$ 3,019	
	Romeo	3 R's Education Program	1%	22	$ 37	$ 3,056	

Decision Support & Risk Management

Alternatives Assessment



Risk Ranking (Tornado Chart)



TIGER – Example

Transportation Investments Generating Economic Recovery

- $2 billion awarded on a competitive basis (TIGER I&II)
- $525 million for TIGER III
- Part of ARRA (2009) and Appropriations Act (2010, 2011)
- Required a CBA and estimates of employment and production impacts (livability, safety, economic impacts, sustainability, etc.)

Highways, bridges, roadway (FHWA)

Public transportation including New Starts and Small Starts projects (FTA)

Passenger and freight rail projects (FRA)

Port infrastructure investments (MARAD)

TIGER – HDR Results

TIGER I – 2009

3% of Applications ➡ 20% of Value ($300M)

TIGER II – 2010

20% of Value ($114M of $557M)

New Project
Creating BCA Guidelines for US DOT: The Need

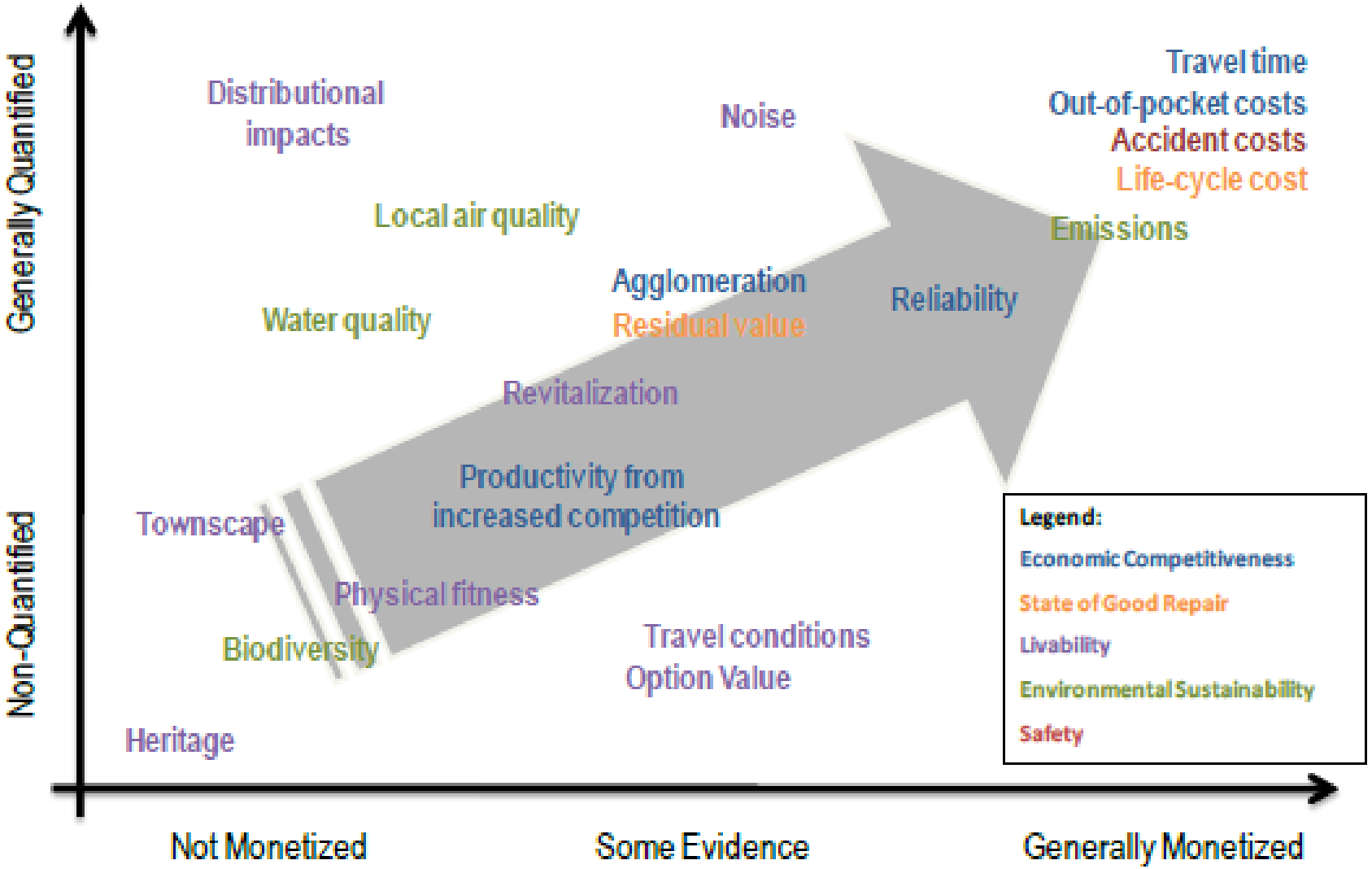
The need for clear technical guidance for incorporating a number of emerging benefits categories into BCA analyses

The public policy framework seeks a broader understanding of the way benefits and costs need to be identified, measured and presented

An evolving federal policy framework seeks additional measures of performance

What emerges is a need to consider multiple perspectives and measures of a project, while still maintaining comparisons of projects on a level playing field

DOT CBA: Common Ground Comparison



Decision makers want BCA-based information to enable budgetary decisions that reflect value-for-money comparisons of investment proposals among different modes and different geographic regions (more so, against a specific goal)

So Why Use SROI?

- ✓ It's a proven Cost-Benefit Analysis based approach to making planning & budgeting decisions
- ✓ It fully incorporates non-cash benefits and externalities into the decision making process
- ✓ It provides a full range of possible outcomes using state-of-the-art risk analysis techniques
- ✓ It helps generate consensus by being both interactive and transparent
- ✓ It's an invaluable tool to help organizations secure funding, generate public support, generate internal approval, etc.