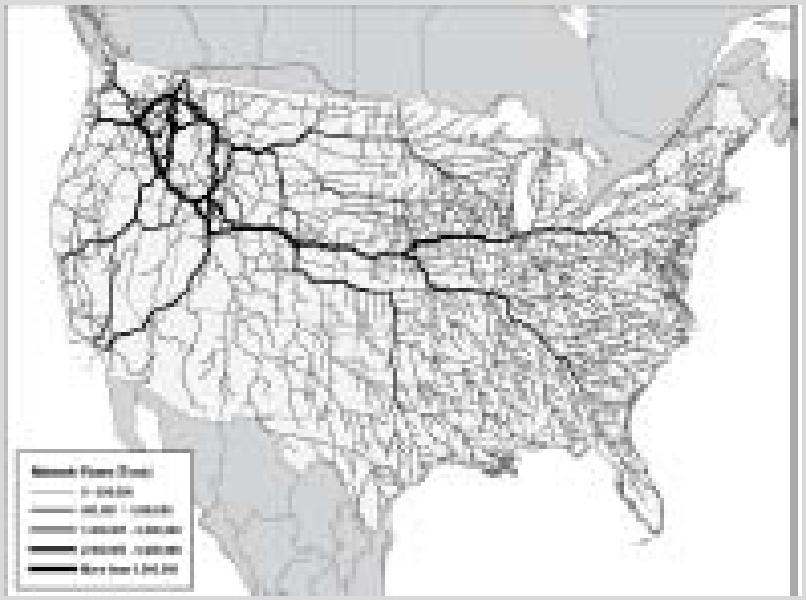
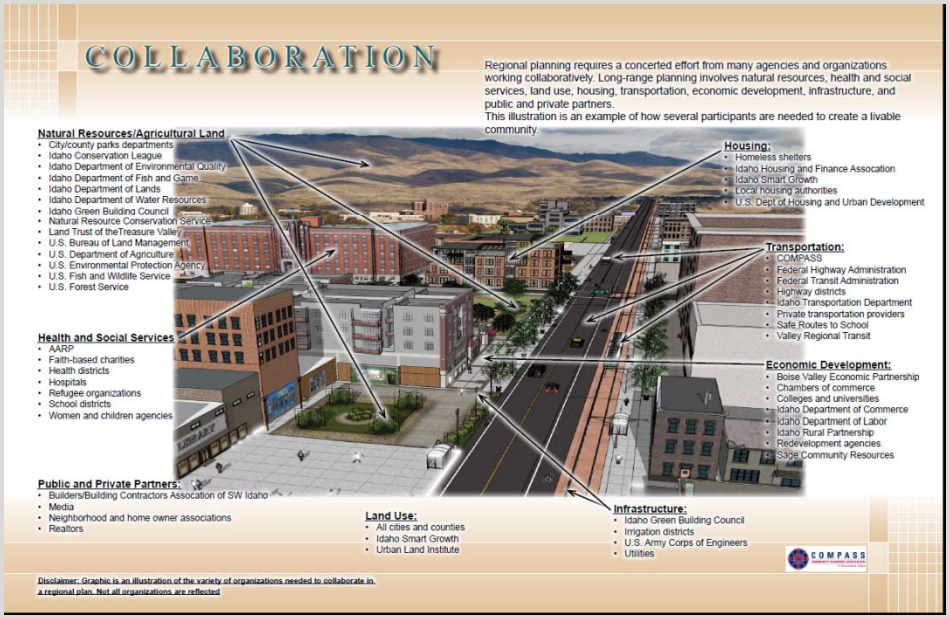
Reducing transportation to dollars and applying common sense





Gary R. McVoy, Ph.D.
mcvoygr@pbworld.com

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Reducing transportation to dollars and applying common sense - 1/23/2014

- Price, Value & Decision making
- Applicability to transportation

- How dollar valuations can help
  - Set priorities
  - Engage constituencies
  - Forge consensus
  - Document decisions
  - Make good use of MAP-21 Metrics

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Price, Value & Decision making

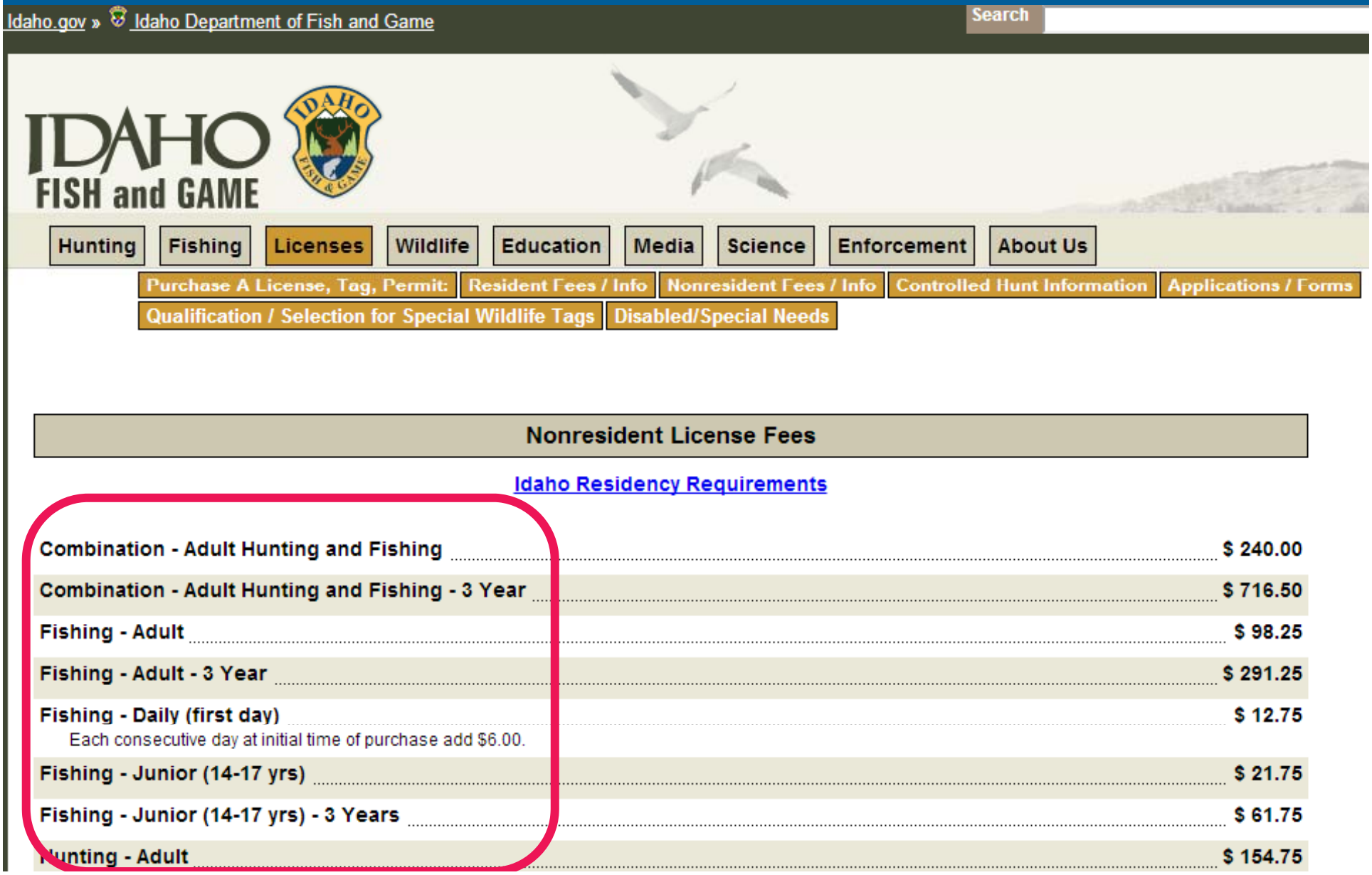
Nonresident License Fees

Idaho Residency Requirements

Combination - Adult Hunting and Fishing	$ 240.00
Combination - Adult Hunting and Fishing - 3 Year	$ 716.50
Fishing - Adult	$ 98.25
Fishing - Adult - 3 Year	$ 291.25
Fishing - Daily (first day) Each consecutive day at initial time of purchase add $6.00.	$ 12.75
Fishing - Junior (14-17 yrs)	$ 21.75
Fishing - Junior (14-17 yrs) - 3 Years	$ 61.75
Hunting - Adult	$ 154.75

Price, Value & Decision making

Price, Value & Decision making



Price, Value & Decision making

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- Driving in the snow is stressful. Let's have less stress with more buses and carpools.
- Because the gas pump is not the fountain of youth!
- There will be over a million people here. Need I say more?
- Even if we can't afford everything, I want to know what we need to accommodate all that future growth!
- Walking and biking are important – we need to build in a way that encourages them.
- "Roads? Where we're going, we don't need roads." (From *Back to the Future*) Will you need roads in your future?

PARSONS BRINCKERHOFF

Vision - COMPASS Board, October 15, 2012

The *Communities in Motion 2040* Vision provides new housing and jobs along transit corridors and in **major activity centers** with a strong focus on maintaining the region's **recreation and open space** areas. New growth would be comprised of **a variety of housing** types, served by infrastructure, nearby services, **and outside of prime farmland or environmental constraints.** This vision supports local **comprehensive plan goals** and densities, and includes **entitled developments** as of July 2012. This vision would support **high capacity transit** for State Street (Highway 44) and a route parallel to Interstate-84, as well as **multimodal infrastructure and services** throughout the region. Key goals include walkability, preserving farmland, minimizing congestion, increasing transportation options, improving jobs-housing balance, better access to parks, and maintaining environmental resources. (Adopted by the COMPASS Board October 15, 2012

PARSONS BRINCKERHOFF

Vision - COMPASS Board, October 15, 2012 (excerpted)

- new housing and jobs in **major activity centers**
- strong focus on **recreation and open space**
- growth comprised of **a variety of housing** types
- **outside of prime farmland or environmental constraints**
- supports local **comprehensive plan goals** and densities
- includes **entitled developments** as of July 2012

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Vision - COMPASS Board, October 15, 2012 (excerpted)

- support **high capacity transit** for State Street Street (Highway 44) and a route parallel to Interstate-84, as well as

- **multimodal infrastructure and services** throughout the region.

- Key goals: **walkability, preserving farmland, minimizing congestion, increasing transportation options, improving jobs-housing balance, better access to parks, and maintaining environmental resources**.

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Communities in Motion 2040:
Long-Range Plan Elements

Economic Development
- Jobs/housing balance
- Population near major activity centers

Housing
- Housing affordability
- Housing + transportation affordability
- Housing mix

Land Use
- Day and night population
- Land use mix
- Population density
- Employment density

Transportation
- Average distance from housing to transit
- Transit service coverage area
- Walkability
- Vehicle miles traveled (VMT)

Health
- Number of buildings in environmentally sensitive areas
- Population near transit routes
- Buildiings in floodplain
- Population near parks and population near public schools

Open Space
- Acres of open space by type
- Recreation space per capita

Farmland
- Working agricultural acres
- Agricultural loss

Community Infrastructure
- Cost of new residential infrastructure
- Water use
- Wastewater use
- Waste generation

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Communities in Motion 2040: Performance Measures

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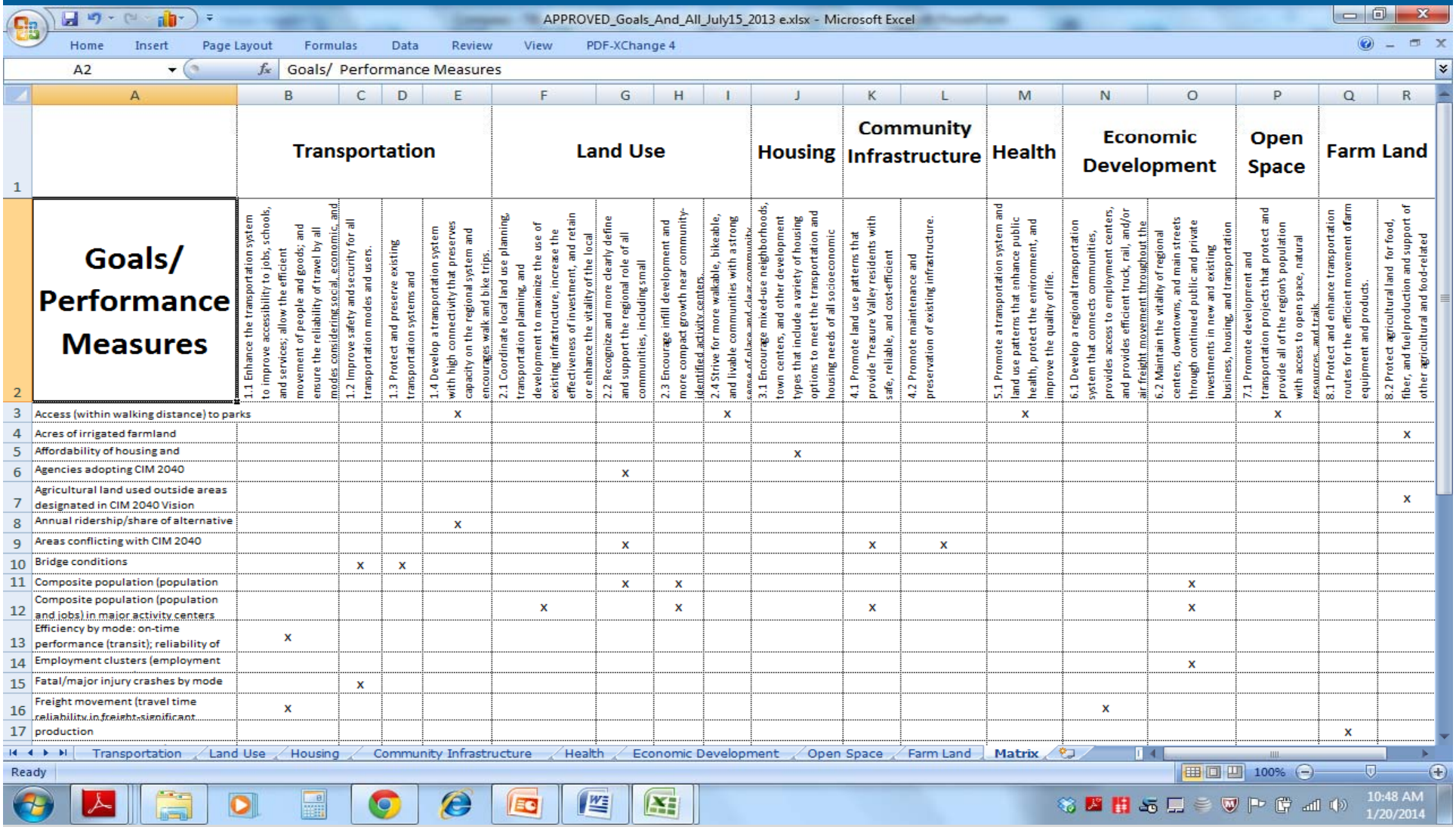
2040 -- Goals / Performance Measures



APPROVED_Goals_And_All_July15_2013 e.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View PDF-XChange 4

A2 Goals/ Performance Measures

		Transportation				Land Use				Housing	Community Infrastructure		Health	Economic Development		Open Space	Farm Land	
	Goals/ Performance Measures	1.1 Enhance the transportation system to improve accessibility to jobs, schools, and services; allow the efficient movement of people and goods; and ensure the reliability of travel by all modes considering social, economic, and	1.2 Improve safety and security for all transportation modes and users.	1.3 Protect and preserve existing transportation systems and	1.4 Develop a transportation system with high connectivity that preserves capacity on the regional system and encourages walk and bike trips.	2.1 Coordinate local land use planning, transportation planning, and development to maximize the use of existing infrastructure, increase the effectiveness of investment, and retain or enhance the vitality of the local	2.2 Recognize and more clearly define and support the regional role of all communities, including small	2.3 Encourage infill development and more compact growth near community-identified activity centers.	2.4 Strive for more walkable, bikeable, and livable communities with a strong sense of place and clear communities	3.1 Encourage mixed-use neighborhoods, town centers, and other development types that include a variety of housing options to meet the transportation and housing needs of all socioeconomic	4.1 Promote land use patterns that provide Treasure Valley residents with safe, reliable, and cost-efficient	4.2 Promote maintenance and preservation of existing infrastructure.	5.1 Promote a transportation system and land use patterns that enhance public health, protect the environment, and improve the quality of life.	6.1 Develop a regional transportation system that connects communities, provides access to employment centers, and provides efficient truck, rail, and/or air freight movement throughout the	6.2 Maintain the vitality of regional centers, downtowns, and main streets through continued public and private investments in new and existing business, housing, and transportation	7.1 Promote development and transportation projects that protect and provide all of the region's population with access to open space, natural resources, and trails.	8.1 Protect and enhance transportation routes for the efficient movement of farm equipment and products.	8.2 Protect agricultural land for food, fiber, and fuel production and support of other agricultural and food-related
3	Access (within walking distance) to parks				x				x				x			x		
4	Acres of irrigated farmland																	x
5	Affordability of housing and									x								
6	Agencies adopting CIM 2040						x											
7	Agricultural land used outside areas designated in CIM 2040 Vision																	x
8	Annual ridership/share of alternative				x													
9	Areas conflicting with CIM 2040						x				x	x						
10	Bridge conditions		x	x														
11	Composite population (population						x	x							x			
12	Composite population (population and jobs) in major activity centers					x		x			x				x			
13	Efficiency by mode: on-time performance (transit); reliability of	x																
14	Employment clusters (employment														x			
15	Fatal/major injury crashes by mode		x															
16	Freight movement (travel time reliability in freight-significant	x												x				
17	production																x	

Transportation | Land Use | Housing | Community Infrastructure | Health | Economic Development | Open Space | Farm Land | Matrix

Ready 100%

10:48 AM 1/20/2014

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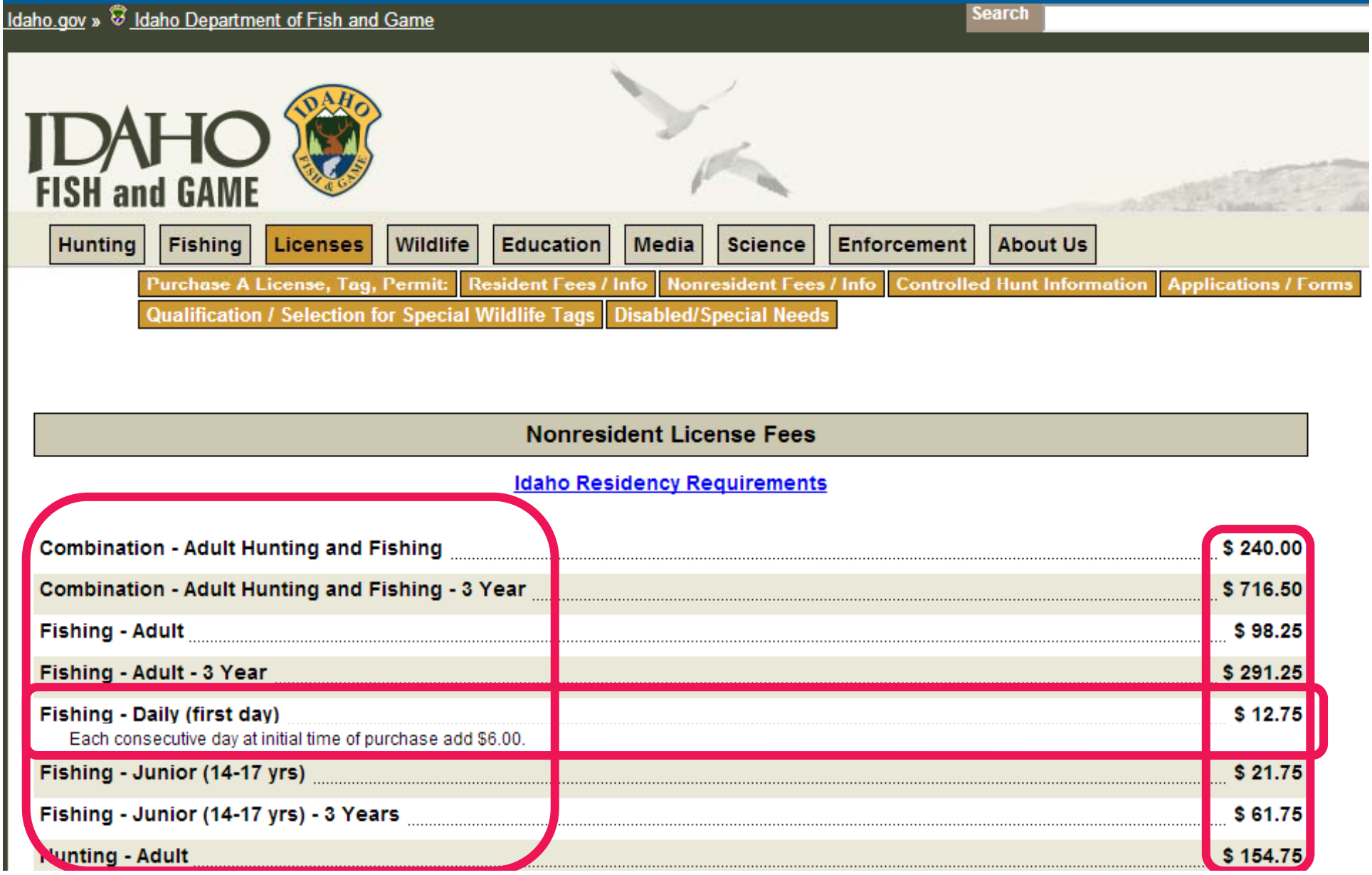
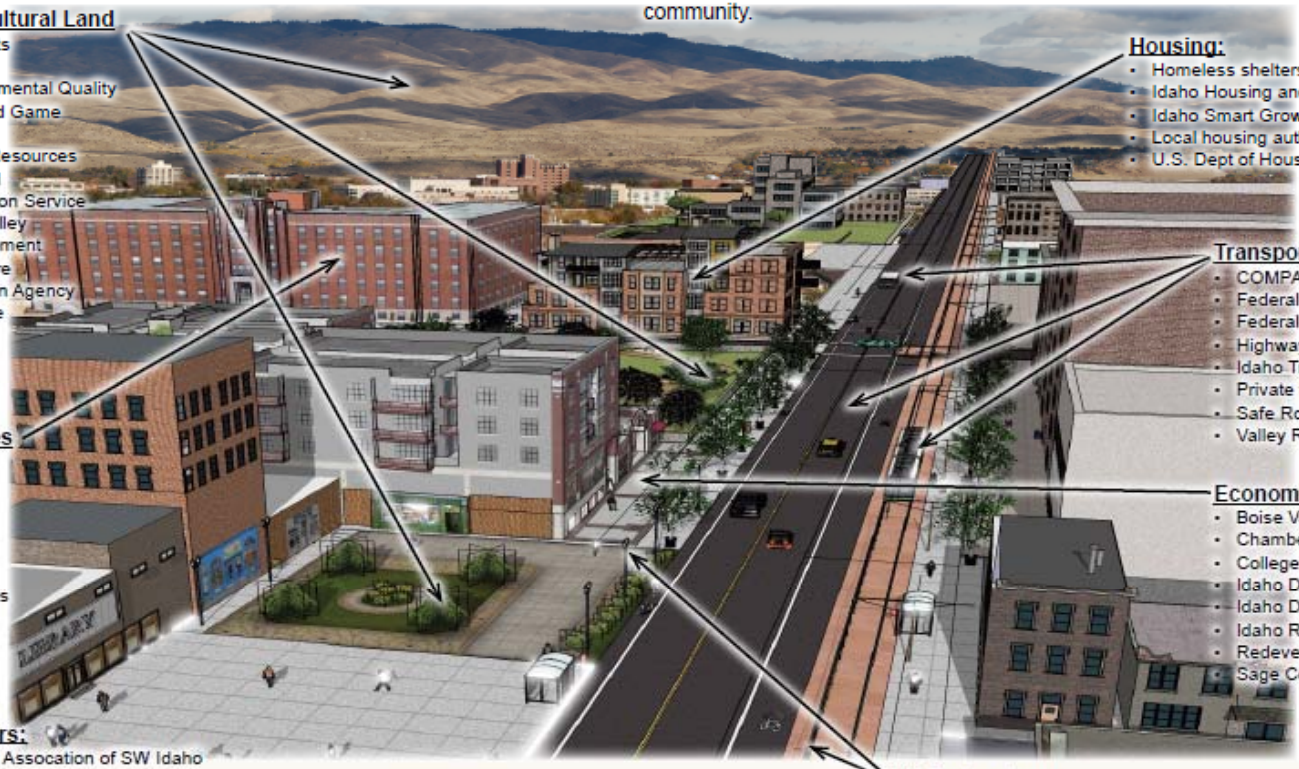
Price, Value & Decision making



So different?

COLLABORATION

Regional planning requires a concerted effort from many agencies and organizations working collaboratively. Long-range planning involves natural resources, health and social services, land use, housing, transportation, economic development, infrastructure, and public and private partners.
This illustration is an example of how several participants are needed to create a livable community.



Natural Resources/Agricultural Land
- City/county parks departments
- Idaho Conservation League
- Idaho Department of Environmental Quality
- Idaho Department of Fish and Game
- Idaho Department of Lands
- Idaho Department of Water Resources
- Idaho Green Building Council
- Natural Resource Conservation Service
- Land Trust of theTreasure Valley
- U.S. Bureau of Land Management
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Forest Service

Health and Social Services
- AARP
- Faith-based charities
- Health districts
- Hospitals
- Refugee organizations
- School districts
- Women and children agencies

Public and Private Partners:
- Builders/Building Contractors Assocation of SW Idaho
- Media
- Neighborhood and home owner associations
- Realtors

Land Use:
- All cities and counties
- Idaho Smart Growth
- Urban Land Institute

Infrastructure:
- Idaho Green Building Council
- Irrigation districts
- U.S. Army Corps of Engineers
- Utilities

Housing:
- Homeless shelters
- Idaho Housing and Finance Assocation
- Idaho Smart Growth
- Local housing authorities
- U.S. Dept of Housing and Urban Development

Transportation:
- COMPASS
- Federal Highway Administration
- Federal Transit Administration
- Highway districts
- Idaho Transportation Department
- Private transportation providers
- Safe Routes to School
- Valley Regional Transit

Economic Development:
- Boise Valley Economic Partnership
- Chambers of commerce
- Colleges and universities
- Idaho Department of Commerce
- Idaho Department of Labor
- Idaho Rural Partnership
- Redevelopment agencies
- Sage Community Resources

COMPASS

Disclaimer: Graphic is an illustration of the variety of organizations needed to collaborate in a regional plan. Not all organizations are reflected

How dollar equivalent valuations can help

- Set priorities
- Engage constituencies
- Forge consensus
- Document decisions
- Make good use of MAP-21 Metrics

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Informed buying - Price

Economic Development
- Jobs/housing balance
- Population near major activity centers

$ Cost?

Housing
- Housing affordability
- Housing + transportation affordability
- Housing mix

$ Cost?

Land Use
- Day and night population
- Land use mix
- Population density
- Employment density

$ Cost?

Transportation
- Average distance from housing to transit
- Transit service coverage area
- Walkability
- Vehicle miles traveled (VMT)

$ Cost?

Health
- Number of buildings in environmentally sensitive areas
- Population near transit routes
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$ Cost?

Open Space
- Acres of open space by type
- Recreation space per capita

$ Cost?

Farmland
- Working agricultural acres
- Agricultural loss

$ Cost?

Community Infrastructure
- Cost of new residential infrastructure
- Water use
- Wastewater use
- Waste generation

$ Cost?

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Informed buying – Price, Value

$ Cost?	$ Value?
$ Cost?	$ Value?
$ Cost?	$ Value?
$ Cost?	$ Value?
$ Cost?	$ Value?
$ Cost?	$ Value?
$ Cost?	$ Value?
$ Cost?	$ Value?

Informed buying – Price, Value, Decision Making

 **Economic Development** •Jobs/housing balance •Population near major activity centers	**$ Value?**	**$ Cost?**	**B/C?**
 **Housing** •Housing affordability •Housing + transportation affordability •Housing mix	**$ Value?**	**$ Cost?**	**B/C?**
 **Land Use** •Day and night population •Land use mix •Population density •Employment density	**$ Value?**	**$ Cost?**	**B/C?**
 **Transportation** •Average distance from housing to transit •Transit service coverage area •Walkability •Vehicle miles traveled (VMT)	**$ Value?**	**$ Cost?**	**B/C?**
 **Health** •Number of buildings in environmentally sensitive areas •Population near transit routes •Buildiings in floodplain •Population near parks and population near public schools	**$ Value?**	**$ Cost?**	**B/C?**
 **Open Space** •Acres of open space by type •Recreation space per capita	**$ Value?**	**$ Cost?**	**B/C?**
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- We need to make the argument for more transportation funding – the plan is a tool for doing that.

$ - Explicit Benefits & Costs

$ - Access to TIGER and other funds

- Building the Interstate highway system was the largest public works project since the Egyptian pyramids. If past generations can think ahead for us, we should think ahead for others!

$ - Discount Rates

$ - Life Cycle Costs

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Communities in Motion: Why Do You Care? Part IX

- The leading cause of death for teens is traffic accidents. Let's plan for better safety.

$ - Crashes vs. other investments

- Just because we're living longer doesn't mean we want to spend those extra years sitting in traffic.

$ - Hours of Congestion / Delay

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Communities in Motion: Why Do You Care? Part IX

- Driving in the snow is stressful. Let's have less stress with more buses and carpools.

$ - To show and prioritize full values

- Because the gas pump is not the fountain of youth!

$ - To show energy savings

- There will be over a million people here. Need I say more?

$ - To show quality of life

PARSONS BRINCKERHOFF

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- Even if we can't afford everything, I want to know what we need to accommodate all that future growth!

$ - To make a business case for balanced investment

- Walking and biking are important – we need to build in a way that encourages them.

$ - To make a business case for balanced investment

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Communities in Motion: Why Do You Care? Part IX

- "Roads? Where we're going, we don't need roads." (From *Back to the Future*) Will you need roads in your future?

$ - Just in case…

$ - Usually the smart bet

$ - First make a plan

$ - Follow the money…

PARSONS BRINCKERHOFF

Reducing transportation to dollars and applying common sense - 1/23/2014

- ***Price, Value & Decision making***
- ***Applicability to transportation***

- How dollar valuations can help
  - Set priorities
  - Engage constituencies
  - Forge consensus
  - Document decisions
  - Make good use of MAP-21 Metrics

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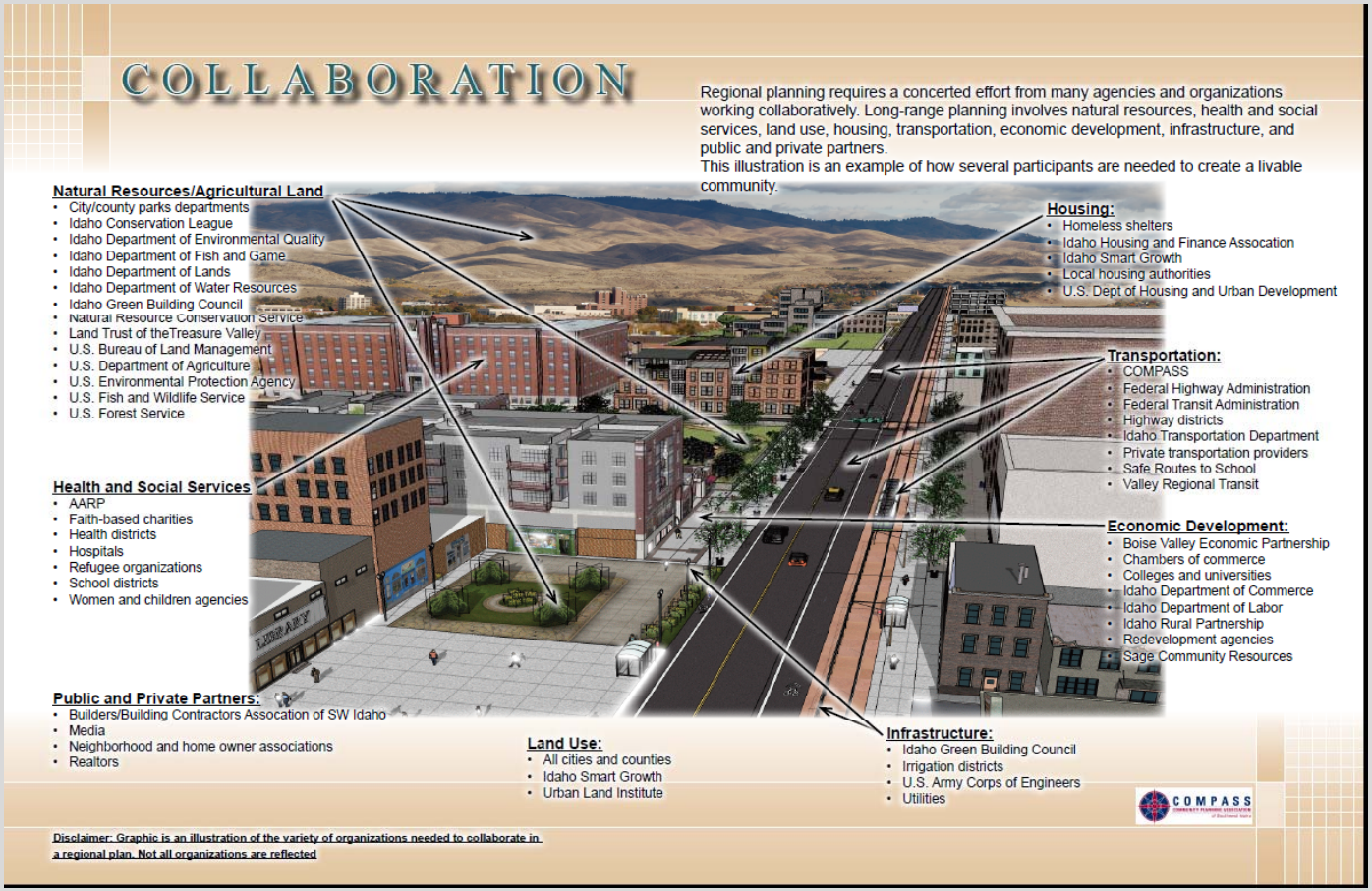
Performance measures for multimodal transportation investments and a common metric for assessing net benefits across the "Triple Bottom Line"



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How dollar equivalent valuations can help

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- Engage constituencies
- Forge consensus
- Document decisions
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Transportation Effects

Economic	Environmental	Societal
Congestion	Air Pollution	Impact Inequity
Mobility	Carbon Emission	Property value
Crash Savings	Habitat Loss	Health
Facility Benefits	Water Quality	Cohesion
Consumer Benefits	Hydrologic	Livability
Improved Commerce	Noise	Aesthetics

Source: Adapted from "Sustainable Transportation and TDM: Planning That Balances Economic, Social and Ecological Objectives;" Victoria Transport Policy Institute (An independent Canadian research organization)

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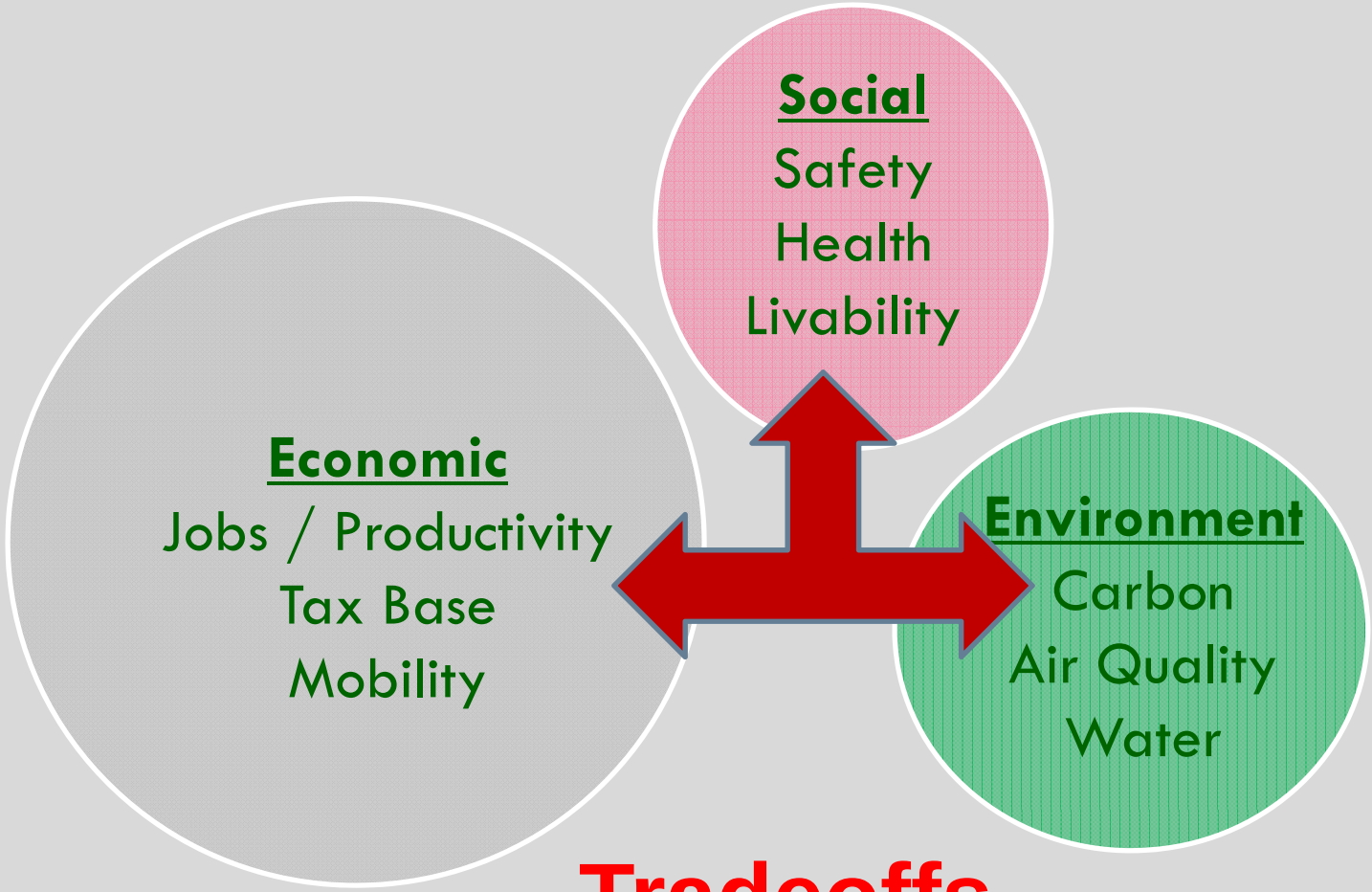
Optimization / Prioritization?



Tradeoffs

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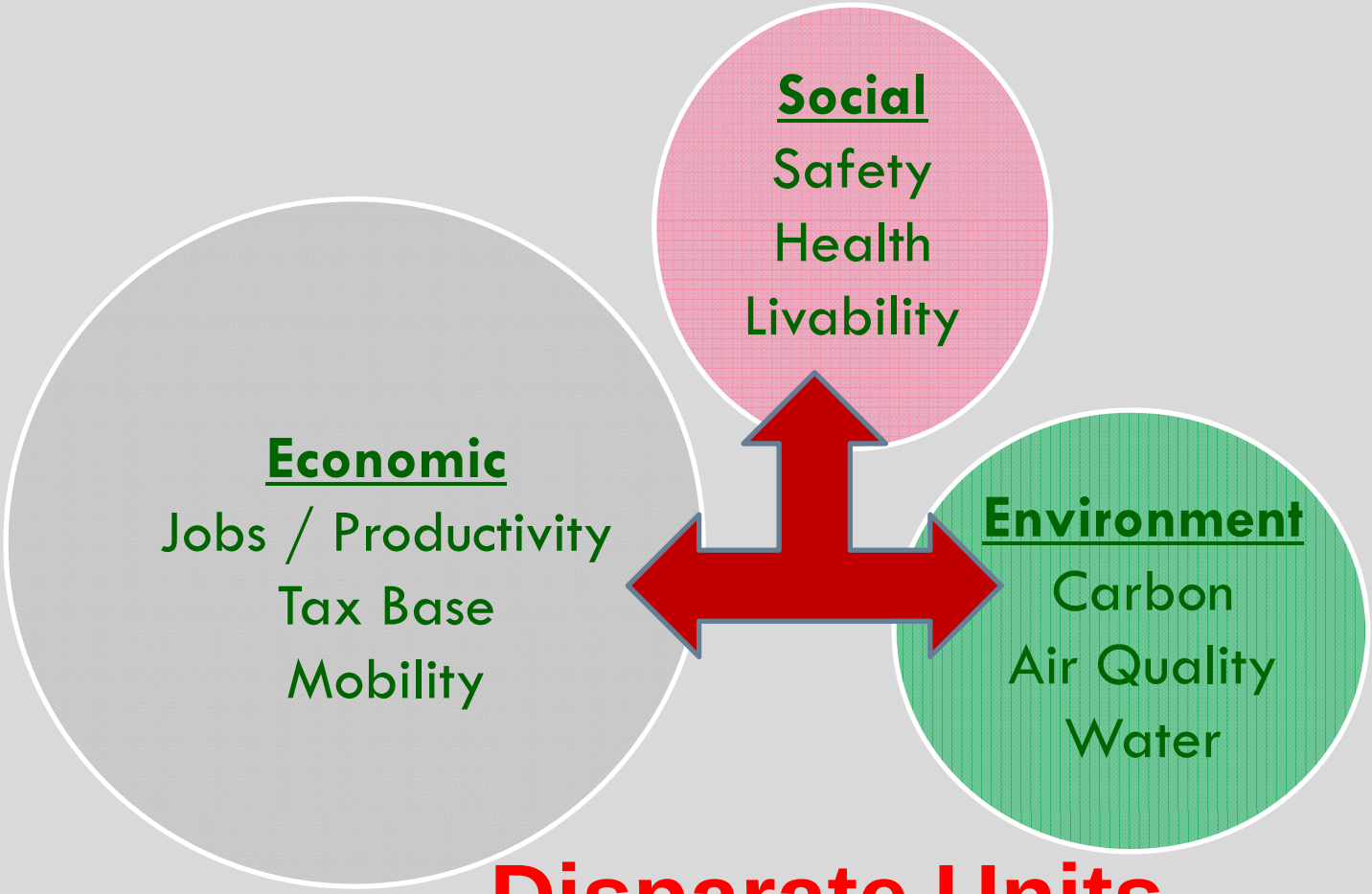
Assessment / Communication?



Disparate Units

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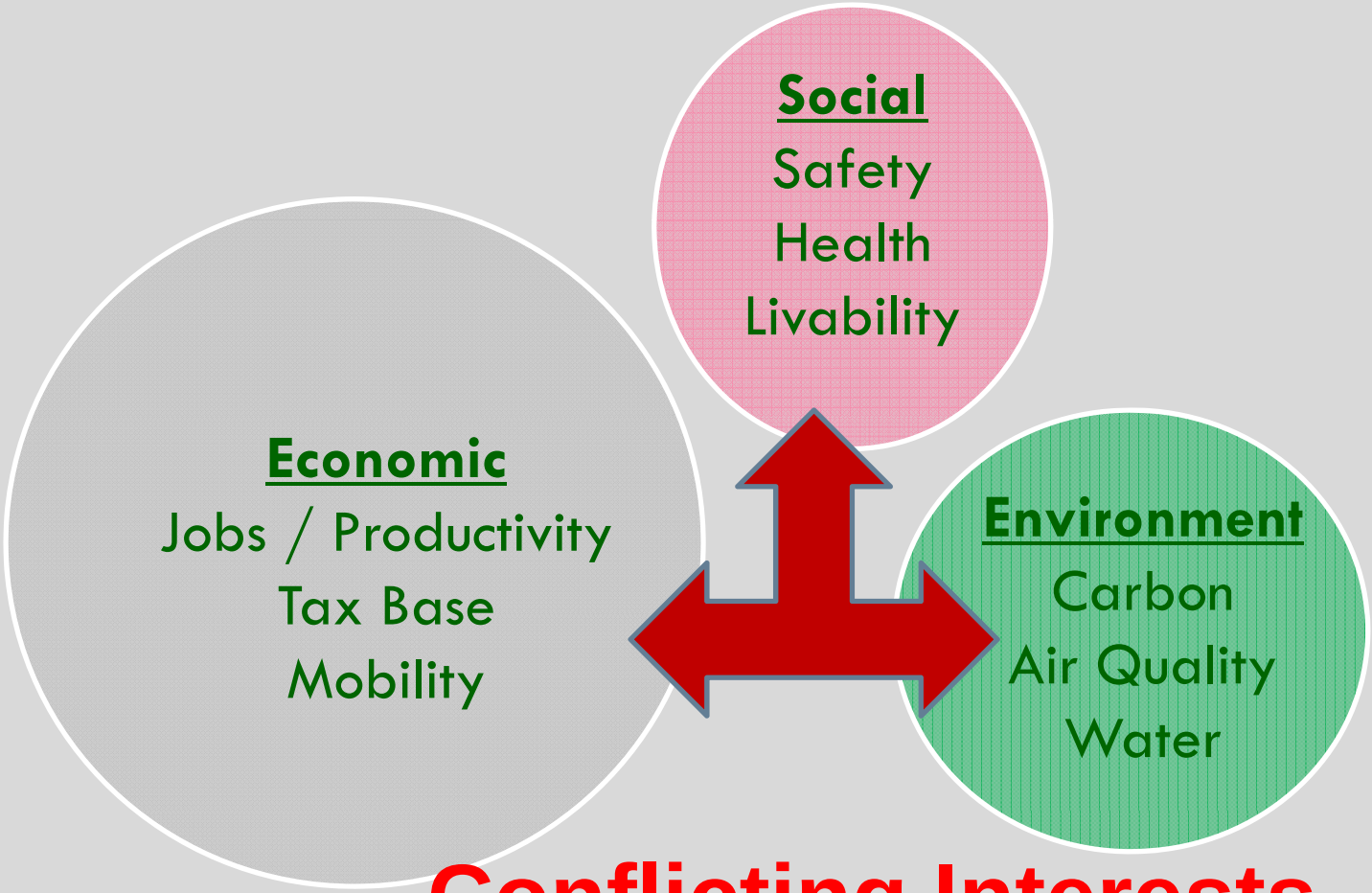
Fairness / Transparency?



Conflicting Interests

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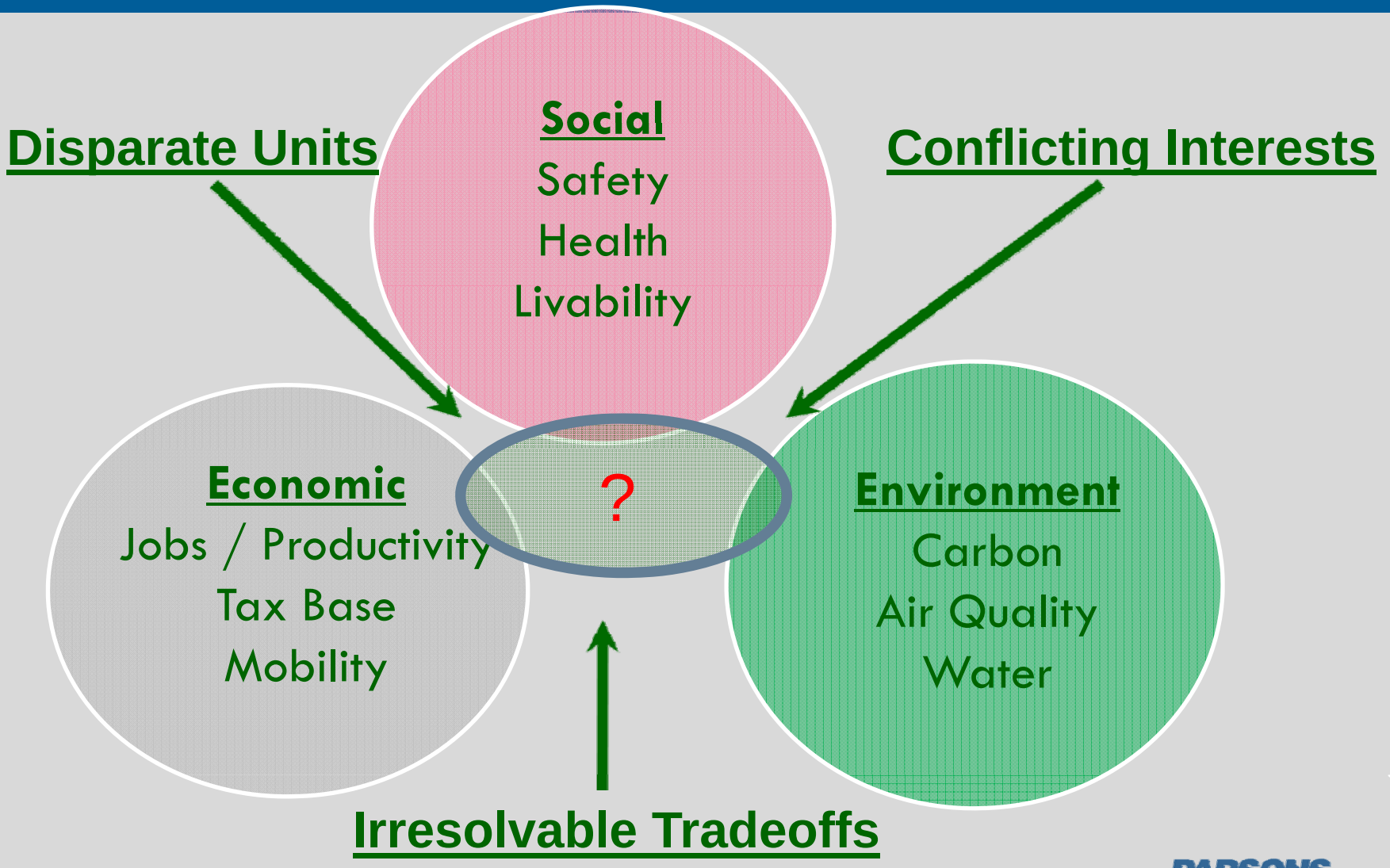
Breaking Down Issues - Common Ground Values



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Effects as $ EQUIVELANTS

Triple Bottom Line Metric (1-5)	
Direct Agency Savings - Short Term	
	Maintenance Costs
	Energy Costs
	Other
Direct Agency Savings - Long Term	
	Life Cycle Cost Savings
	Pavement
	Bridge
	Facility
	Payroll
	Other
TBL Economic Benefits	
	Travel Time
	Reliability
	connectivity
	Other
TBL Environmental Benefits	
	GHG Emissions
	NAAQS / Air Toxics Emissions
	Wetlands
	Runoff Effects
	Habitat
	Noise
	Other
TBL Social Benefits	
	Safety
	Accessability
	Livibility
	Health
	Aestetics
	Other

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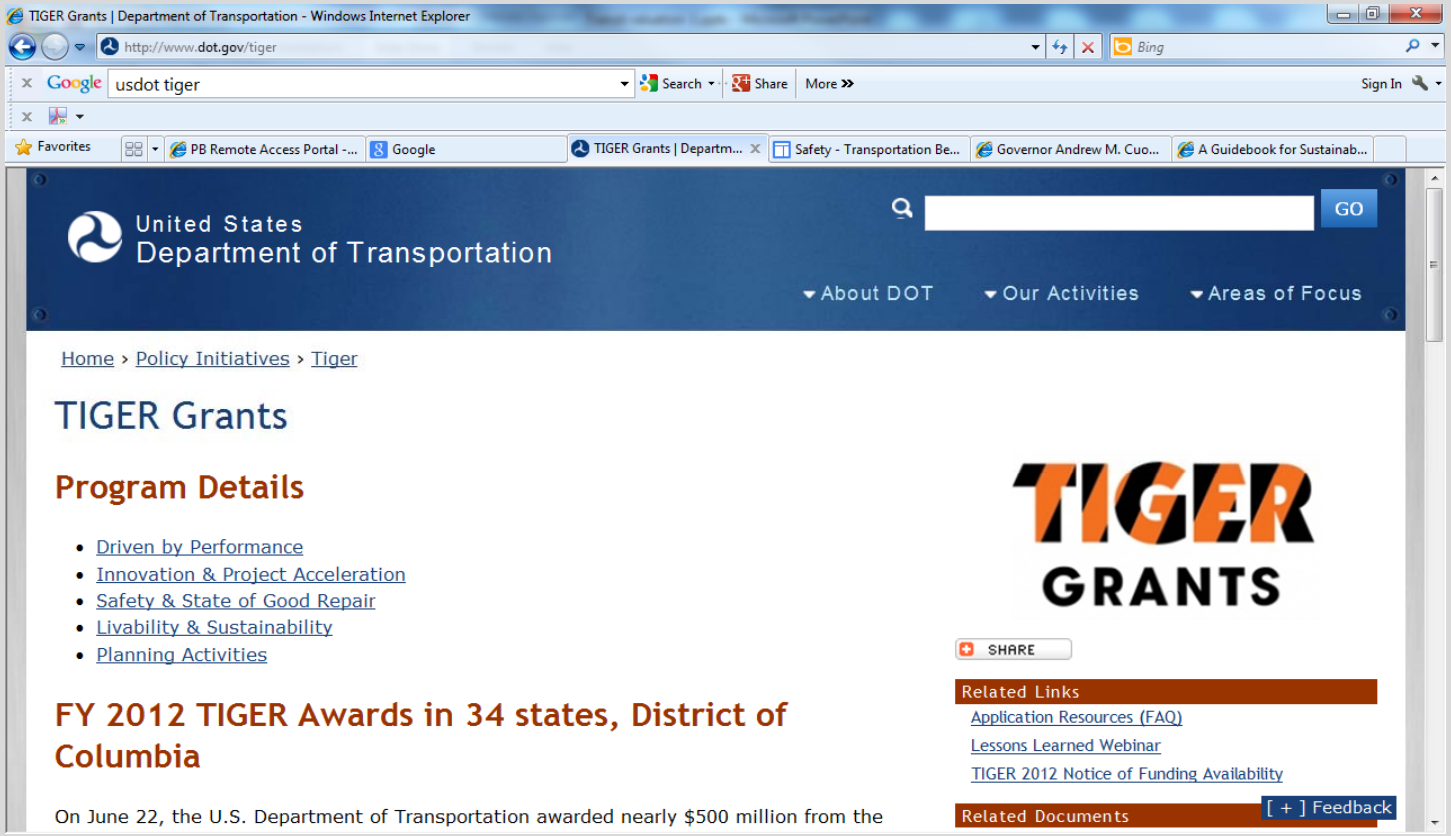
Example: USDOT - TIGER



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Tiger Criteria

TABLE 3 U.S. DOT TIGER Considerations

Long-Term Outcome	Type of Societal Benefits
Livability	Land Use Changes that reduce VMT Accessibility Property Value Increases
Economic Competitiveness	Travel Time Savings Operating Cost Savings
Safety	Prevented Accidents (property damage), Injuries and Fatalities
State of Good Repair	Long Term Replacement Maintenance & Repair Savings Reduced VMT from not closing bridges
Environmental Sustainability	Environmental benefits from reduced emissions

Source: Federal Register Volume 77, No. 20, January 2012.

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$ benefits

Cost/Benefit Category	Recommended Monetized Value(s)
Value of Travel Time	

Recommended Hourly Values of Travel Time Savings (2009 U.S. $ per person-hour)

Category	Surface Modes* (except High-Speed Rail)	Air and High-Speed Rail Travel
Local Travel		
Personal	$12.00	
Business	$22.90	
All Purposes **	$12.50	
Intercity Travel		
Personal	$16.70	$31.90
Business	$22.90	$62.60
All Purposes **	$18.00	$44.30

Truck Drivers	$23.70
Bus Drivers	$23.60
Transit Rail Operators	$38.90
Locomotive Engineers	$33.00
Airline Pilots and Engineers	$73.30

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And costs - including human lives

Table 1. Recommended Monetized Values

Cost/Benefit Category	Recommended Monetized Value(s)
Value of Statistical Life (VSL)	$6,200,000 per fatality ($2011)
Value of Injuries	

AIS Level	Severity	Fraction of VSL	Unit value ($2011)
AIS 1	Minor	0.003	$ 18,600
AIS 2	Moderate	0.047	$ 291,400
AIS 3	Serious	0.105	$ 651,000
AIS 4	Severe	0.266	$ 1,649,200
AIS 5	Critical	0.593	$ 3,676,600
AIS 6	Unsurvivable	1.000	$ 6,200,000

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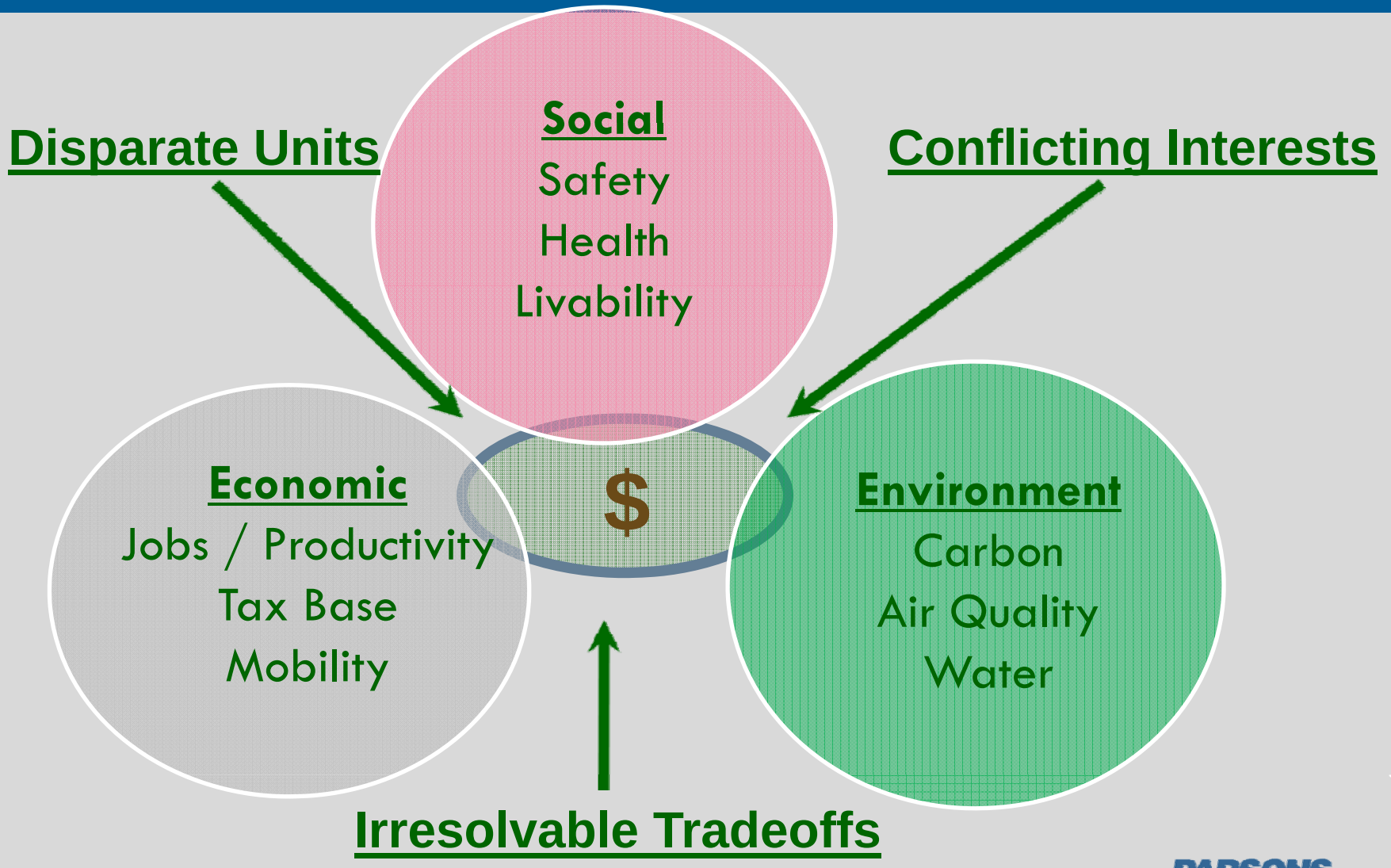
Breaking Down Issues / Common Ground Values



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TIGER - $ -- Triple Bottom Line

Long-Term Outcome	Types of Societal Benefits
Livability (Social)	Land Use Changes that reduce VMT Accessibility Property Value Increases
Economic Competiveness (Economic)	Travel Time Savings Operating Cost Savings
Safety (Social)	Prevented Accidents (property damage), Injuries, and Fatalities
State of Good Repair (Economic)	Long-Term Replacement Maintenance & Repair Savings Reduced VMT from not closing bridges.
Environmental Sustainability (Environment)	Environmental Benefits from Reduced Emissions

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Gaps = Sub-optimization

Economic	Environmental	Societal
Congestion ★	Air Pollution ★	Impact Inequity
Mobility ★	Carbon Emission ★	Property value ★
Crash Savings ★	Habitat Loss	Health
Facility Benefits ★	Water Quality	Cohesion
Consumer Benefits	Hydrologic	Livability
Improved Commerce	Noise	Aesthetics

Source: Adapted from "Sustainable Transportation and TDM: Planning That Balances Economic, Social and Ecological Objectives;" Victoria Transport Policy Institute (An independent Canadian research organization)

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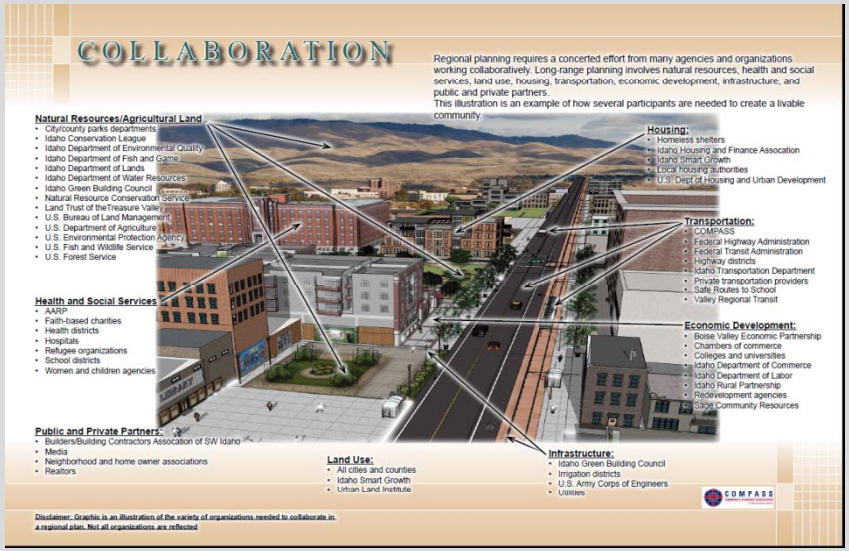
Zero value for a “sense of place”?



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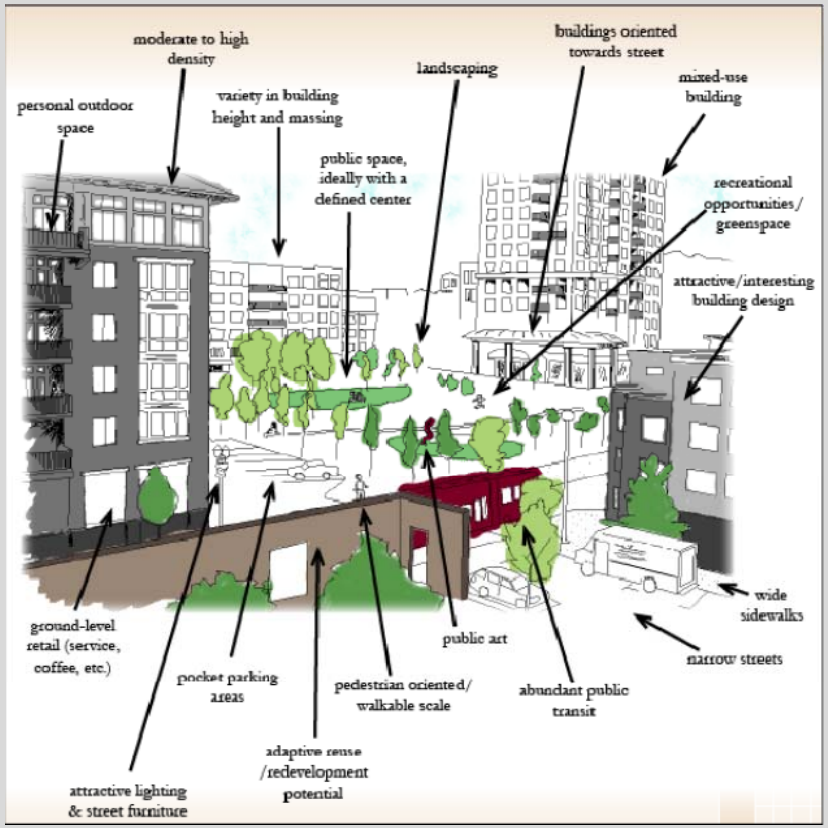
Community Values / Aesthetics…



Communities in Motion - Page 2 - 22 September 2010

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Optimization

"The obligation of any component is to contribute its best to the **system**, not to maximize its own production, profit, or sales … “

-- Dr. Edward Deming

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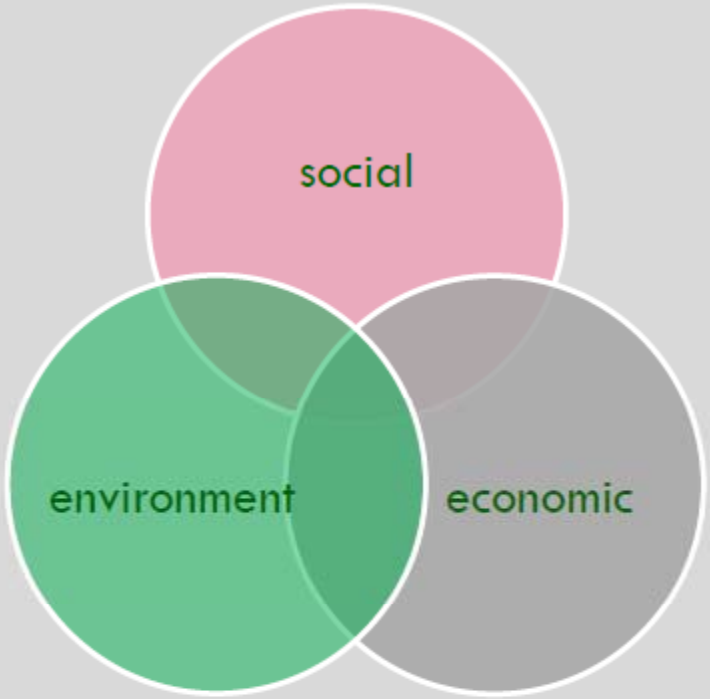
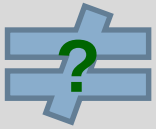
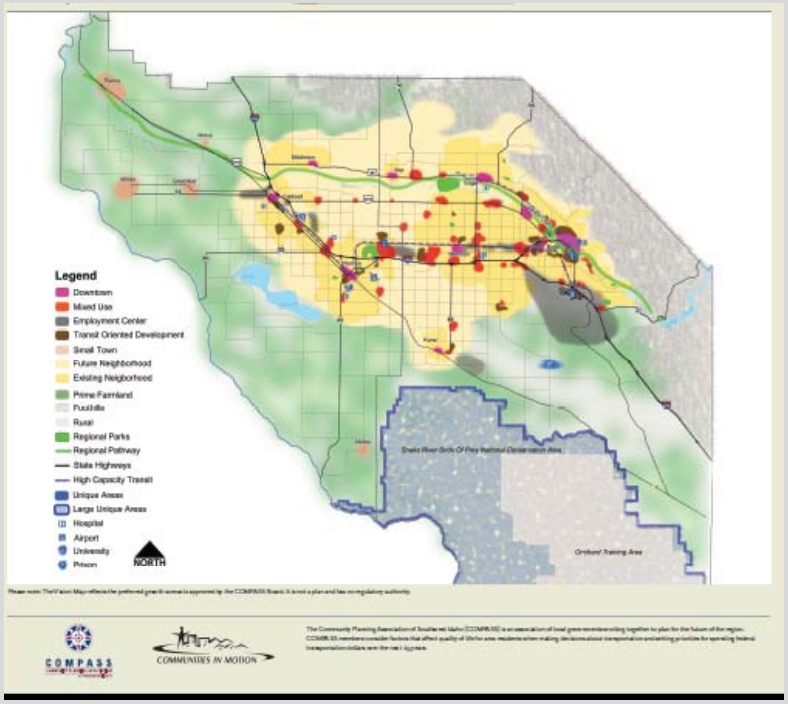
“Other Factors…”







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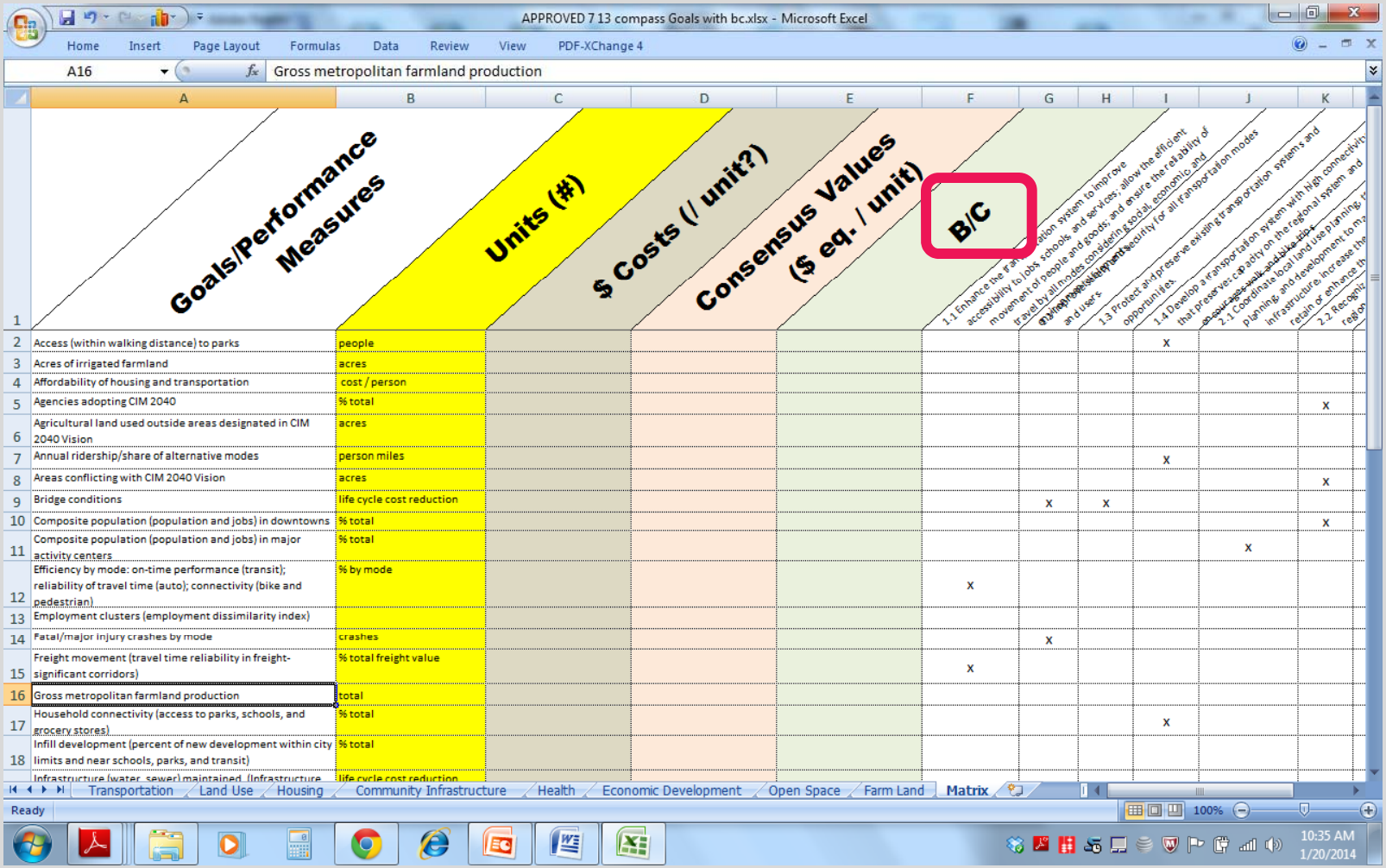
Informed buying - Price, Value & Decision making



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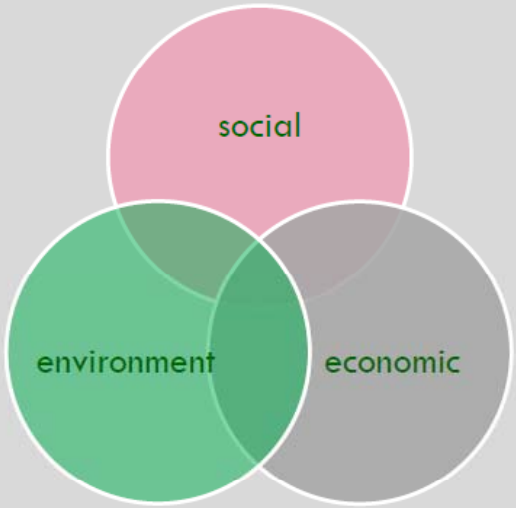
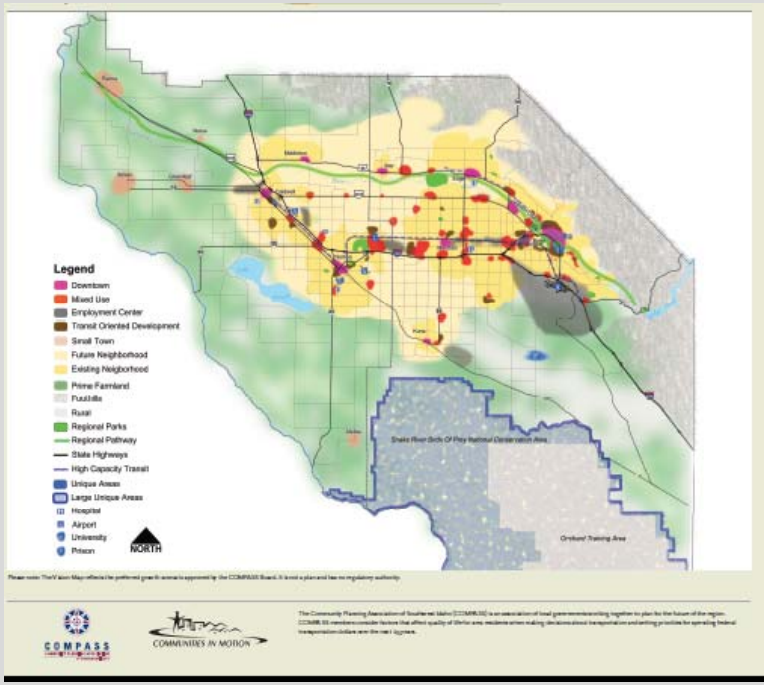
Better communications / decisions…



Informed processes



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How dollar equivalent valuations can help

- Set priorities
- **Engage constituencies**
- Forge consensus
- Document decisions
- Make good use of MAP-21 Metrics

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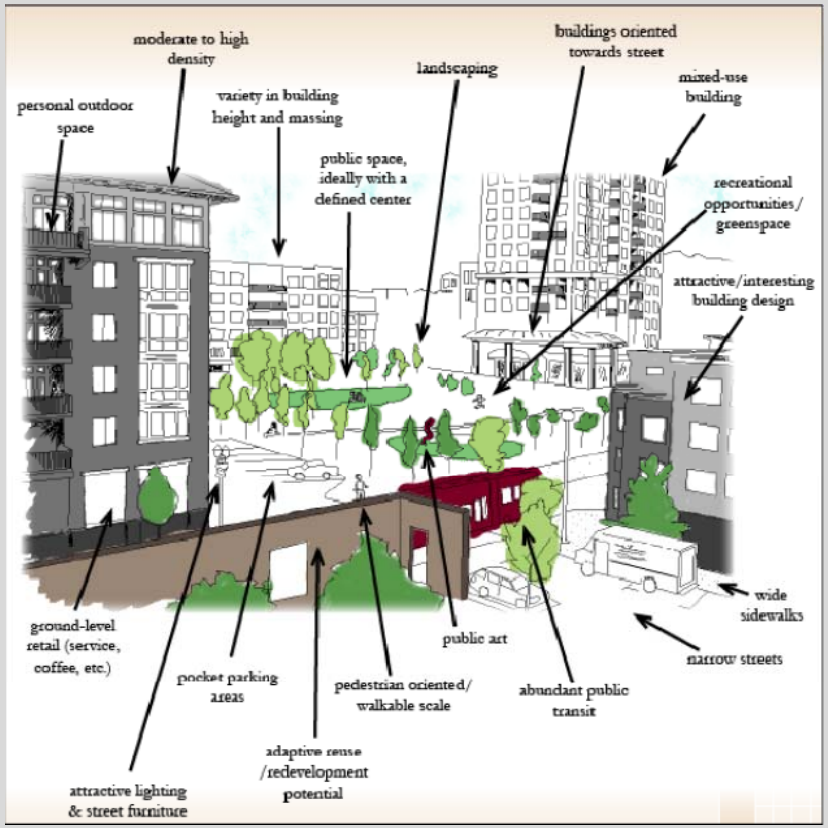
Marginal Costs for Community Values / Aesthetics…



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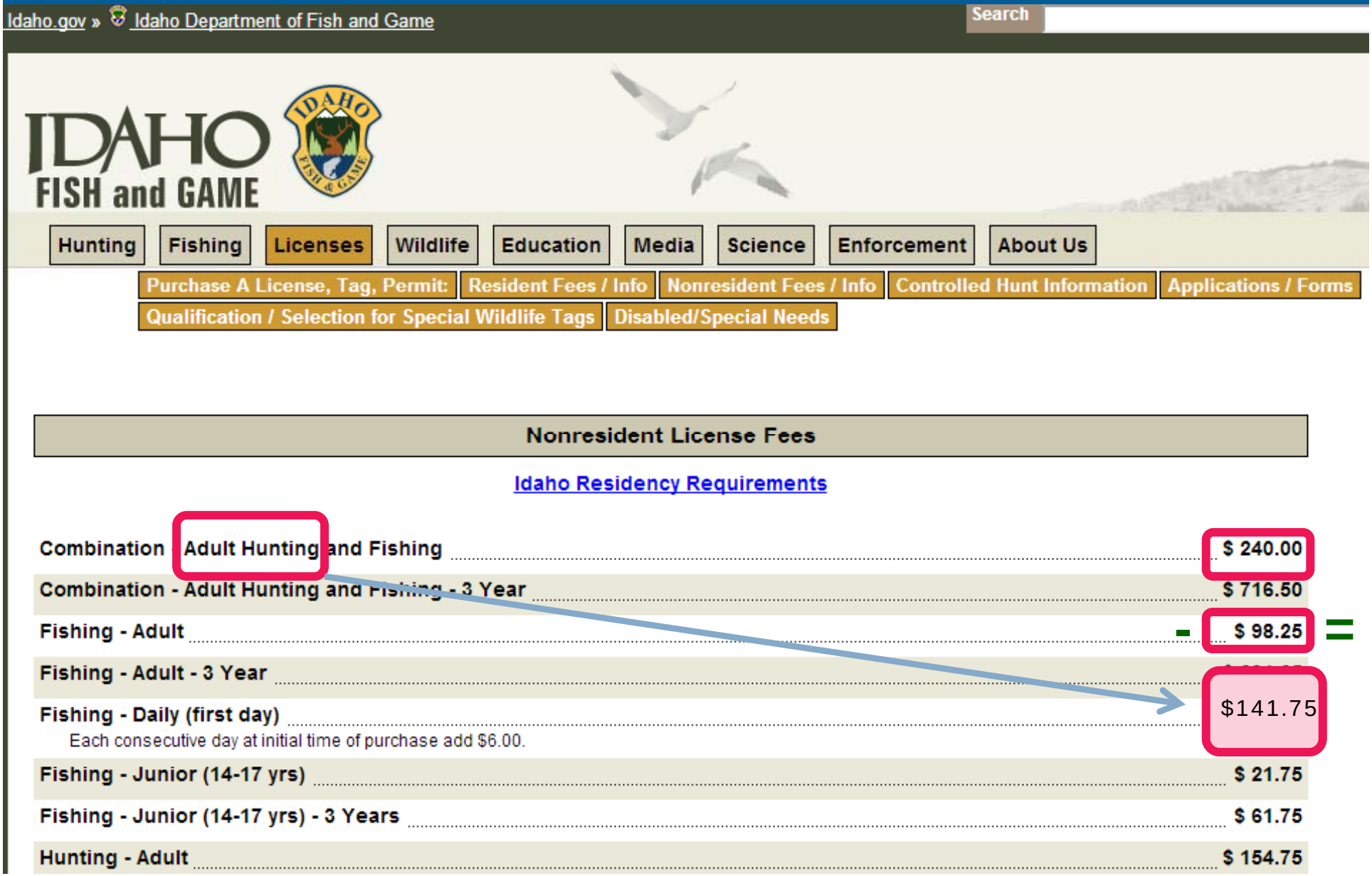
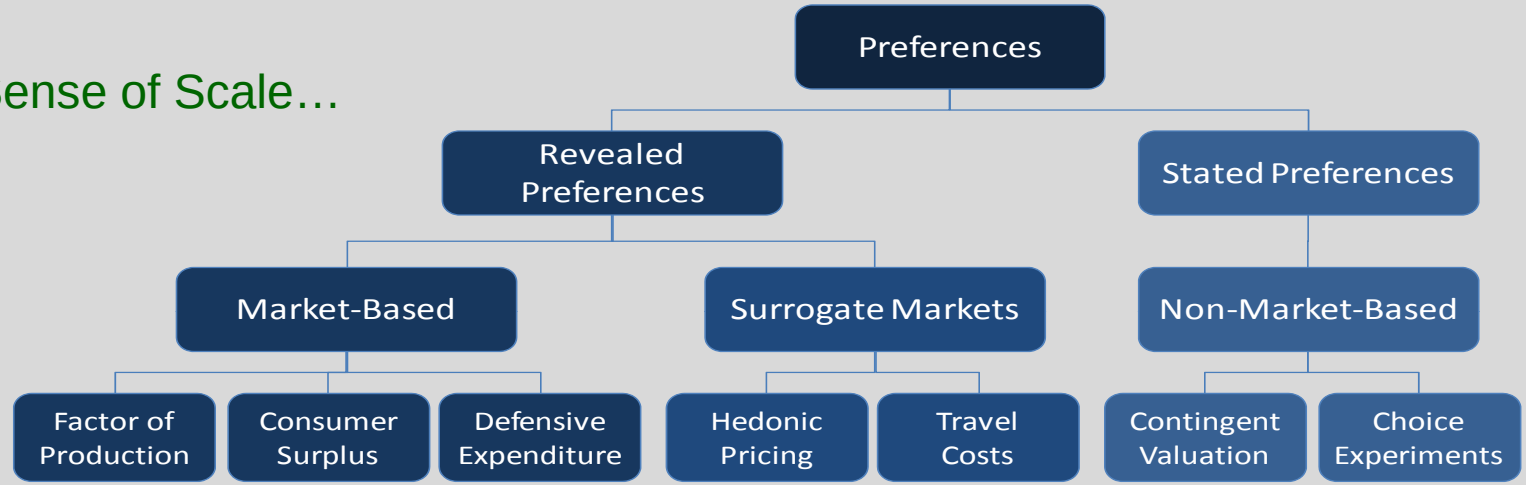
Price, Value - "Invisible Remainder Method"



Valuation Methods

Sense of Scale…



- **Factor of Production:** land, labor, capital, natural resources, etc
- **Consumer (Producer) Surplus:** willingness to pay vs. price
- **Defensive Expenditures:** cost to prevent adverse effects
- **Hedonic Pricing:** surrogate valuation, e.g.. real estate market
- **Travel Cost:** willingness to pay to get there
- **Contingent Valuation:** surveys, questionnaires, and interviews
- **Choice Experiments:** menu of alternatives

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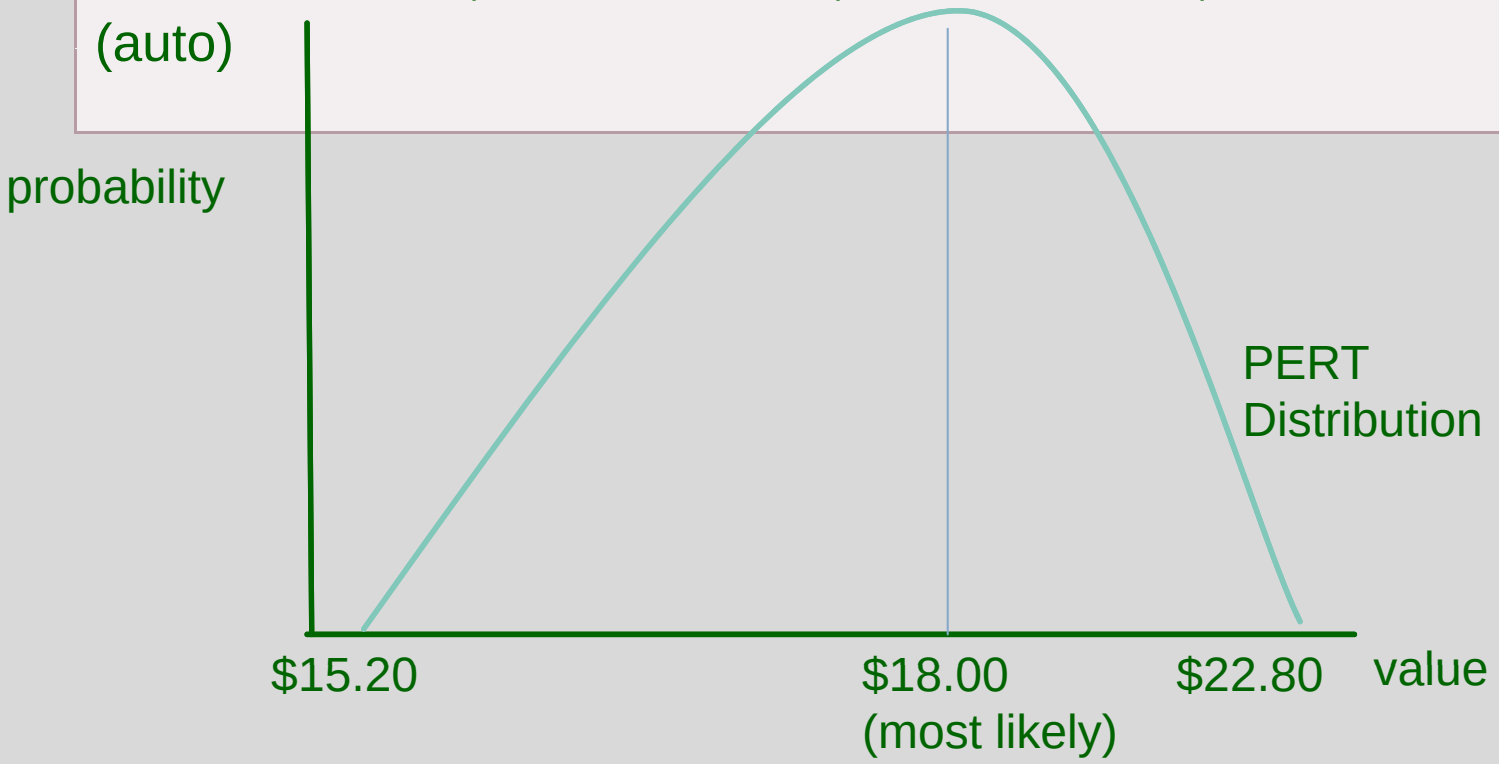
Community input to reflect their values…

	Low	Most Likely	High
Value of Time (auto)	$15.20	$18.00	$22.80



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How dollar equivalent valuations can help

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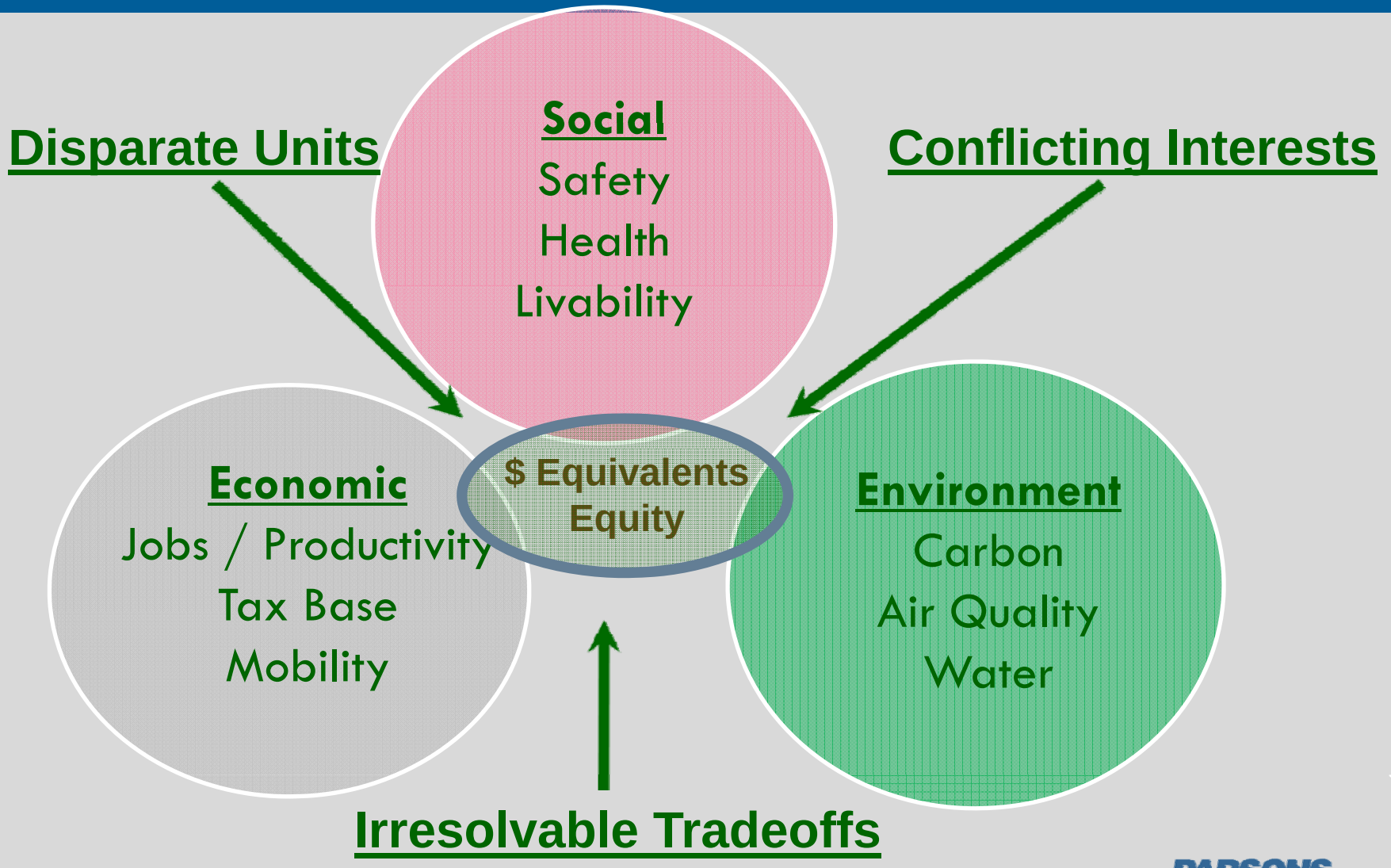
Breaking Down Issues - Common Ground Values



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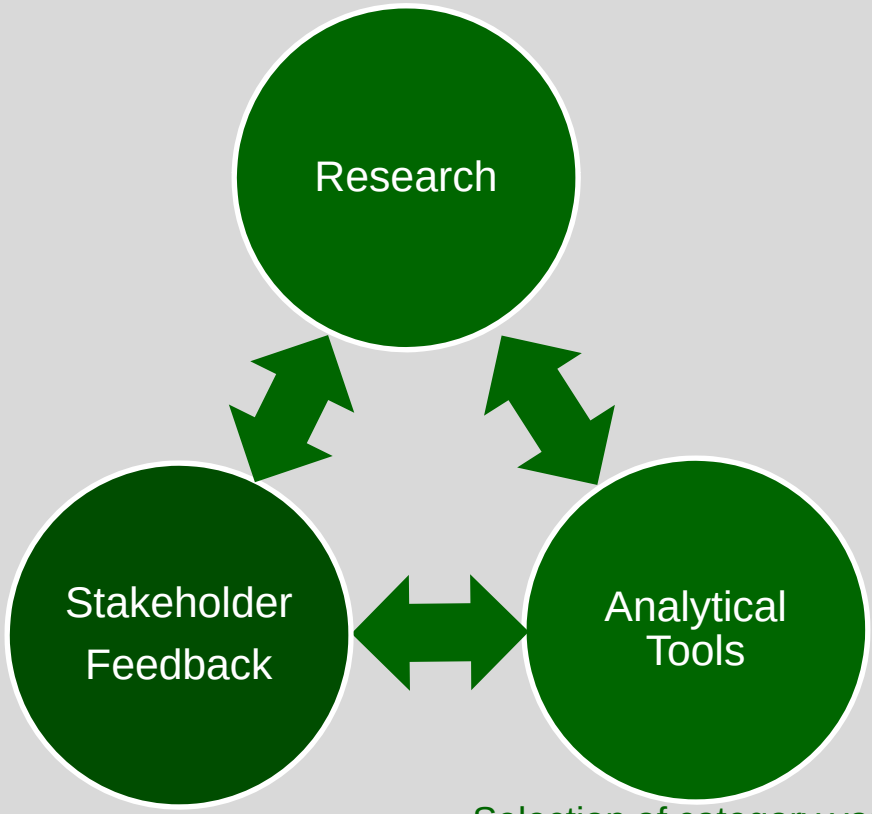
Enriching the conversation…

- Surrogate Market Methods
- Non-market methods



- Workshops and Interviews
- Web surveys

- Selection of category variables.
- Cost and project information
- Discount rates

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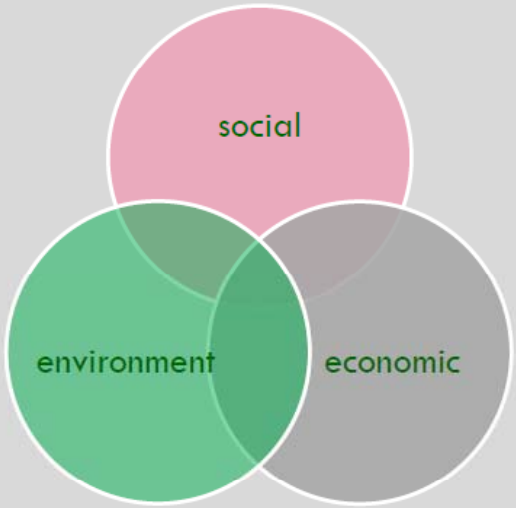
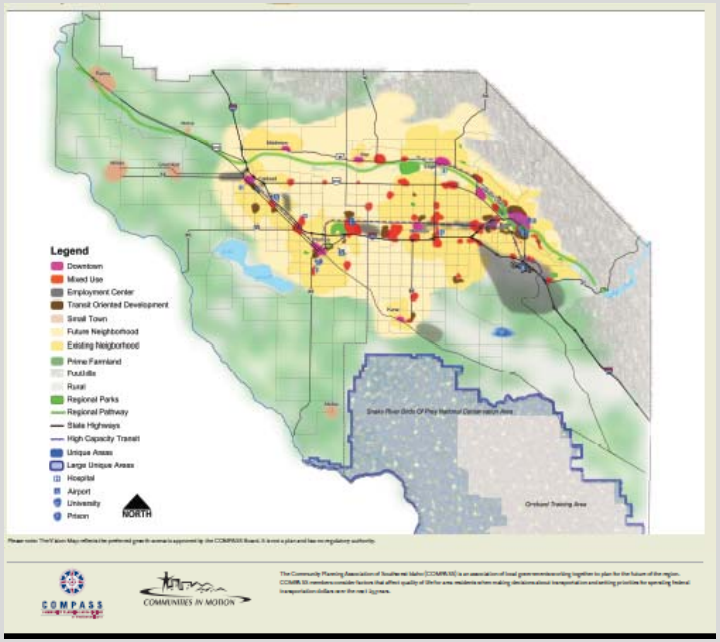
Better communication among constituents…



Informed processes



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How dollar equivalent valuations can help

- Set priorities
- Engage constituencies
- Forge consensus
- **Document decisions**
- Make good use of MAP-21 Metrics

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Example: Sustainable Return on Investment in Maintenance

MAINTENANCE -- TRIPLE BOTTOM LINE TABULATION

Program	Activity	Cycle (yrs)	#	#/ YR TARGET	# STATE FORCES	# CONTRACT	LIFECYCLE $ CAPITAL $	LIFECYCLE $ STATE CASH $	MOBILITY $	JOBS $	AIR $	WATER $	HABITAT $	SAFETY $	ACCESS $	LIVABILITY $	BENEFIT / COST
Bridges	Bridge Cleaning						X	x y									X
	Bridge Painting						X	x y									X
	Deck Sealing						X	x y									X
	Deck Treatment						X	x y									X
	Joints						X	x y									X
	Bearing Restoration						X	x y									X
	Punch list From Inspection						X	x y									X
	Environmental Protection							y	x	x	x						X
	Storm Water Facility							y	x	x	x						X
	Stream Channel							y	x	x	x						X
	Check for Invasive Species							y	x	x	x						X
	Regulatory Cost (Fines)						x	y	x	x	x						X
	Safety							x y				x	x	x			X
	Public Parking / Access							y				x	x	x			X
	Historic / Cultural Signing							y				x	x	x			X
Pavement																	
Drainage																	
Signals & Lighting																	
Roadside																	
Guiderail																	
Signs																	
SNOW & ICE																	
Facilities																	
$$ TOTAL																	

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Program VALUE…

TBL	Economic Cost to Agency	Economic Savings to Agency	Economic Benefits to region	Net Env. Benefits	Net Social Benefits	Benefit / Cost Ratio
Sample Metrics	$	Life cycle	Mobility Jobs	Emissions	Safety Access	
Project / Program						
A						**x**
B						**x**
C						**x**
D						**x**

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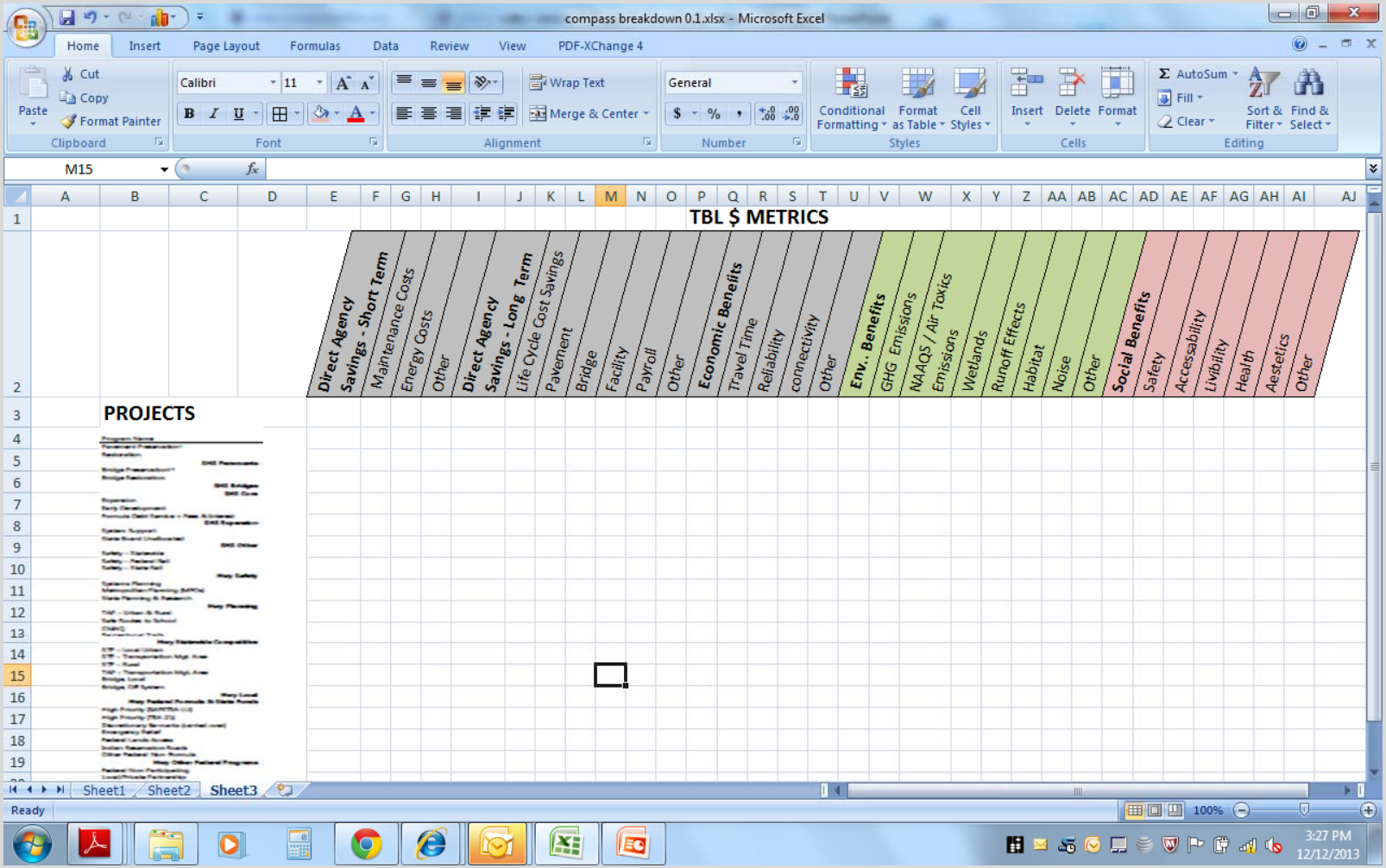
Project Rankings



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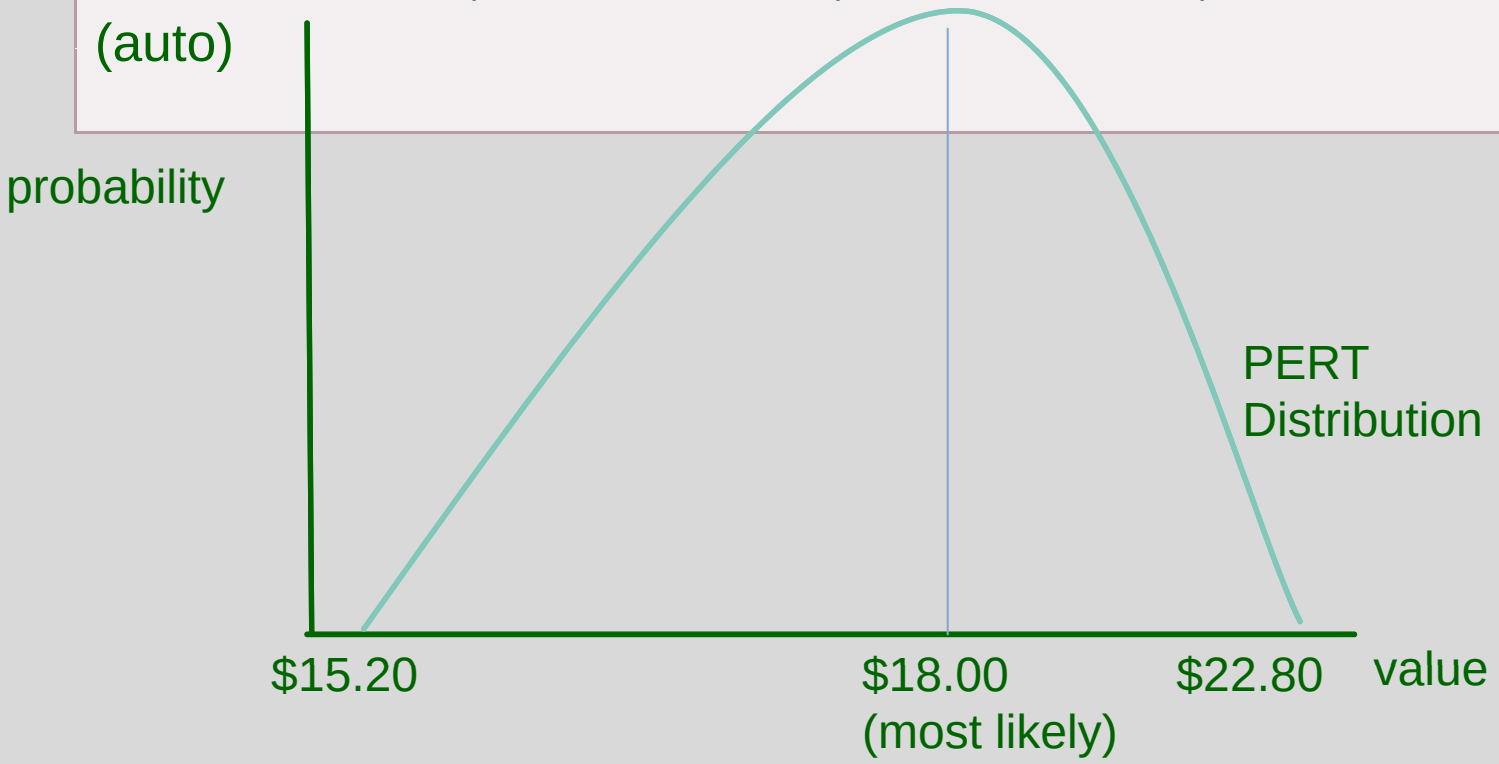
Reflecting Community values…

	Low	Most Likely	High
Value of Time (auto)	$15.20	$18.00	$22.80



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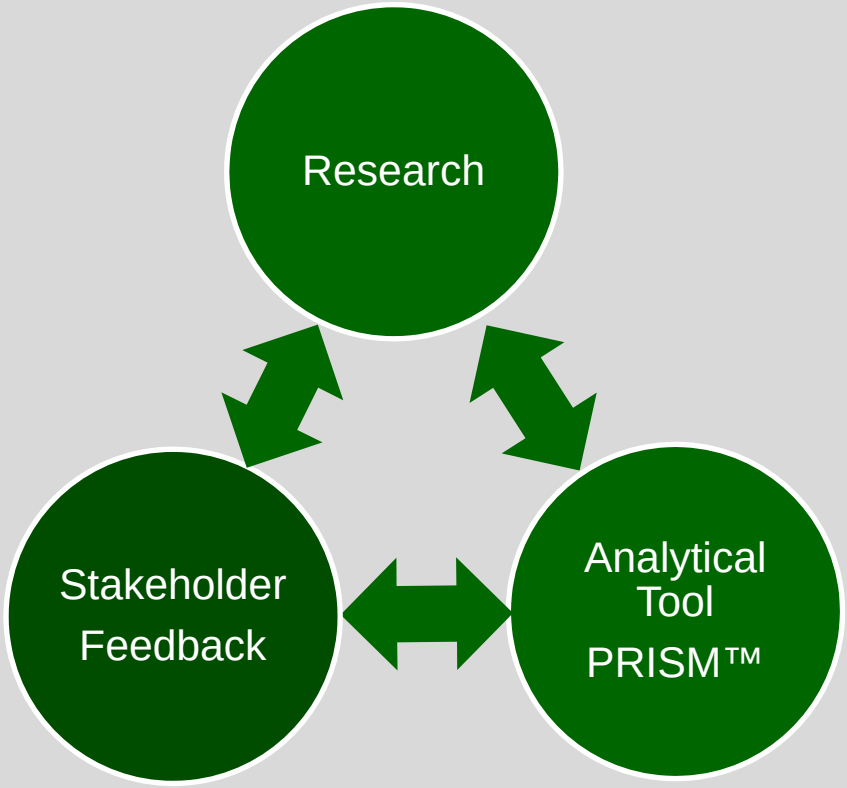
Enriching the conversation…



Extensive Research

- Surrogate Market Methods
- Non-market methods

PRISM™

- Cost and project information
- Selection of category variables.
- Assign unit values based on research
  - Effect quantity
  - Value per quantity
  - Monte Carlo ability (most probable, low, high)
- Discount rates

Stakeholder Feedback

- Workshops and Interviews
- Web surveys
- Ability to publish / interact on web.

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How dollar equivalent valuations can help

- Set priorities
- Engage constituencies
- *Forge consensus*
- Document decisions
- Make good use of MAP-21 Metrics

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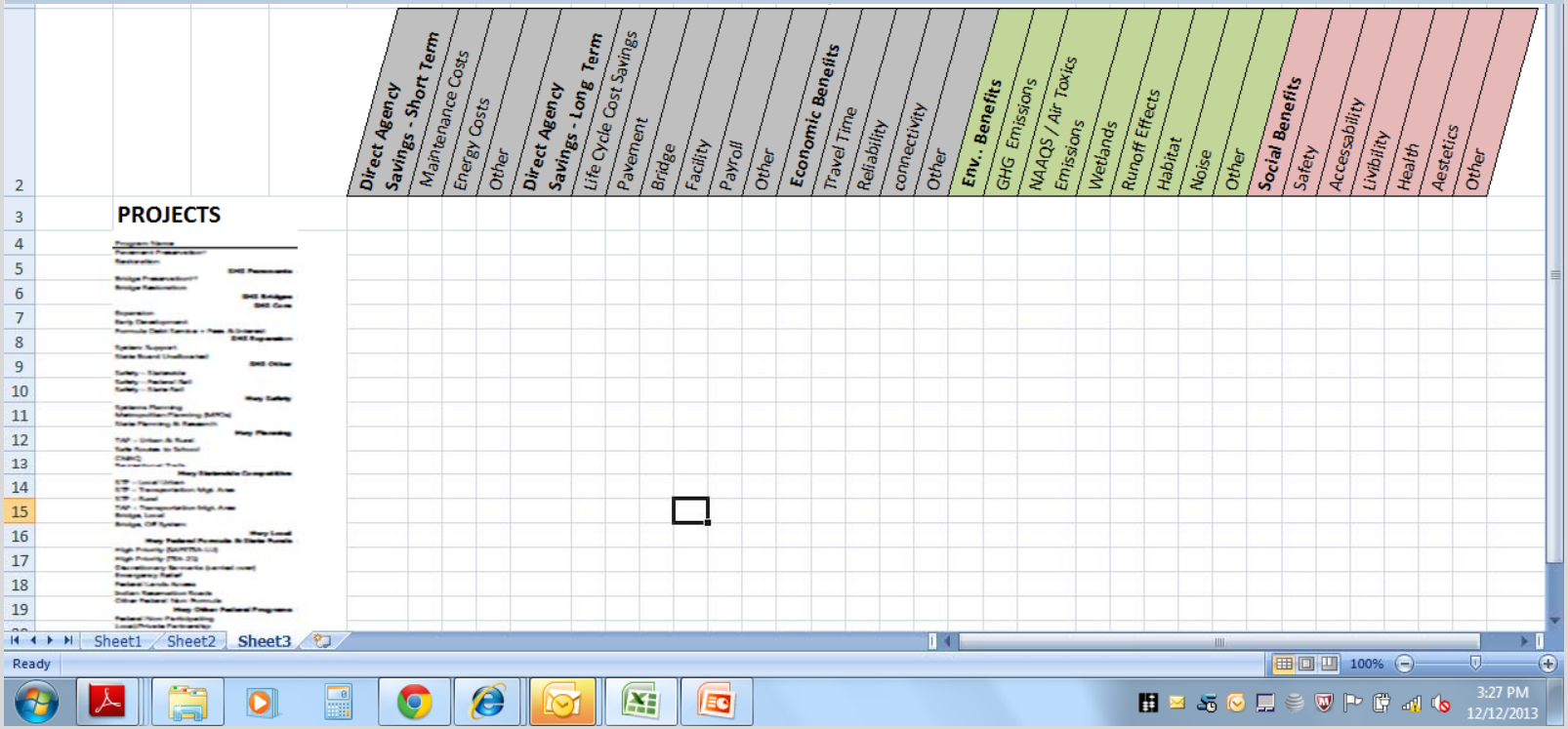
PROJECT LIST with *Price & Value…*

YOUR METRICS ACCORDING TO YOUR VALUES…



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How dollar equivalent valuations can help

- Set priorities
- Engage diverse constituencies
- Forge consensus
- Document decisions
- **Make good use of MAP-21 Metrics**

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Performance Metric Integration for Trade Off Analysis

MAP-21 Metrics	TIGER B/C ($) Valuation
•Pavement Condition,	YES
•Bridge Condition,	YES
•Passenger and Freight Mobility,	YES
•Congestion,	YES
•Air Emissions,	YES
•Safety	YES

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MAP - 21 Performance Metrics / Tradeoffs

	Quantity	Value /	Total value	Total Cost	Benefit / Cost
Safety					A
-Lives	# / year	$9.12M	X	X	
-Crashes	# / year	by type	X	X	
Emissions					B
- NOx	Tons / year	$5.3 k	X	X	
-PM	Tons / year	$290k	X	X	
-CO2	Tons / year	by year	X	X	
Congestion					C
-Delay	Hours / year	$12.50	X	X	
-Reliability	Hours / year	$12.50	X	X	

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How dollar equivalent valuations can help

- Set priorities
- Engage diverse constituencies
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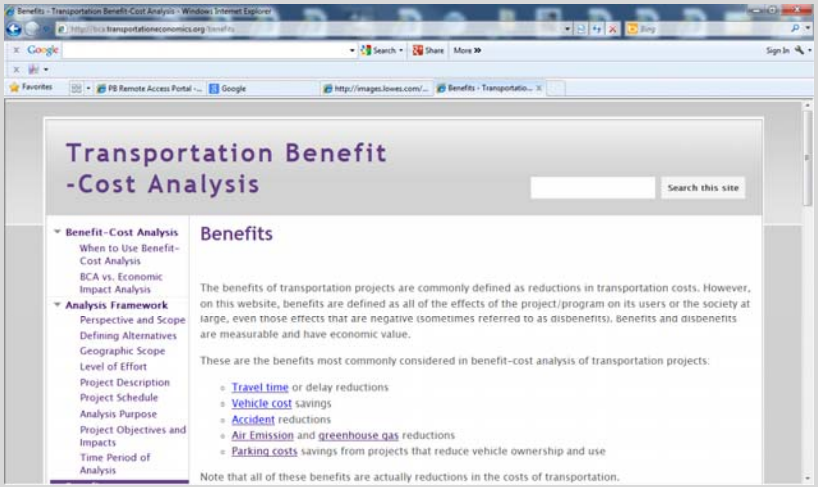
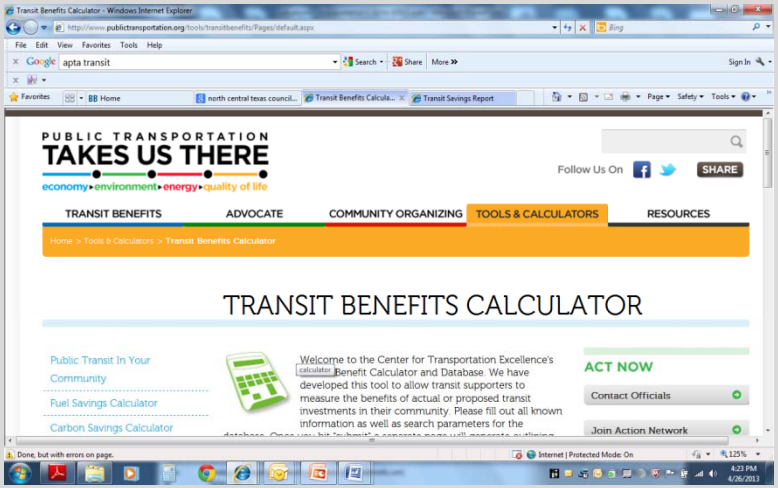
Tools & Data Sources





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Analysis Tool - PRISM™

- Developed in 2007
- Estimates the economic, environmental, and social effects of transport infrastructure
- Easy-to-use, flexible and transparent online tool - http://prism.pbworld.net/
- Customized uniquely for any region / project
- Original model architects
- Seamless interface with the travel demand model

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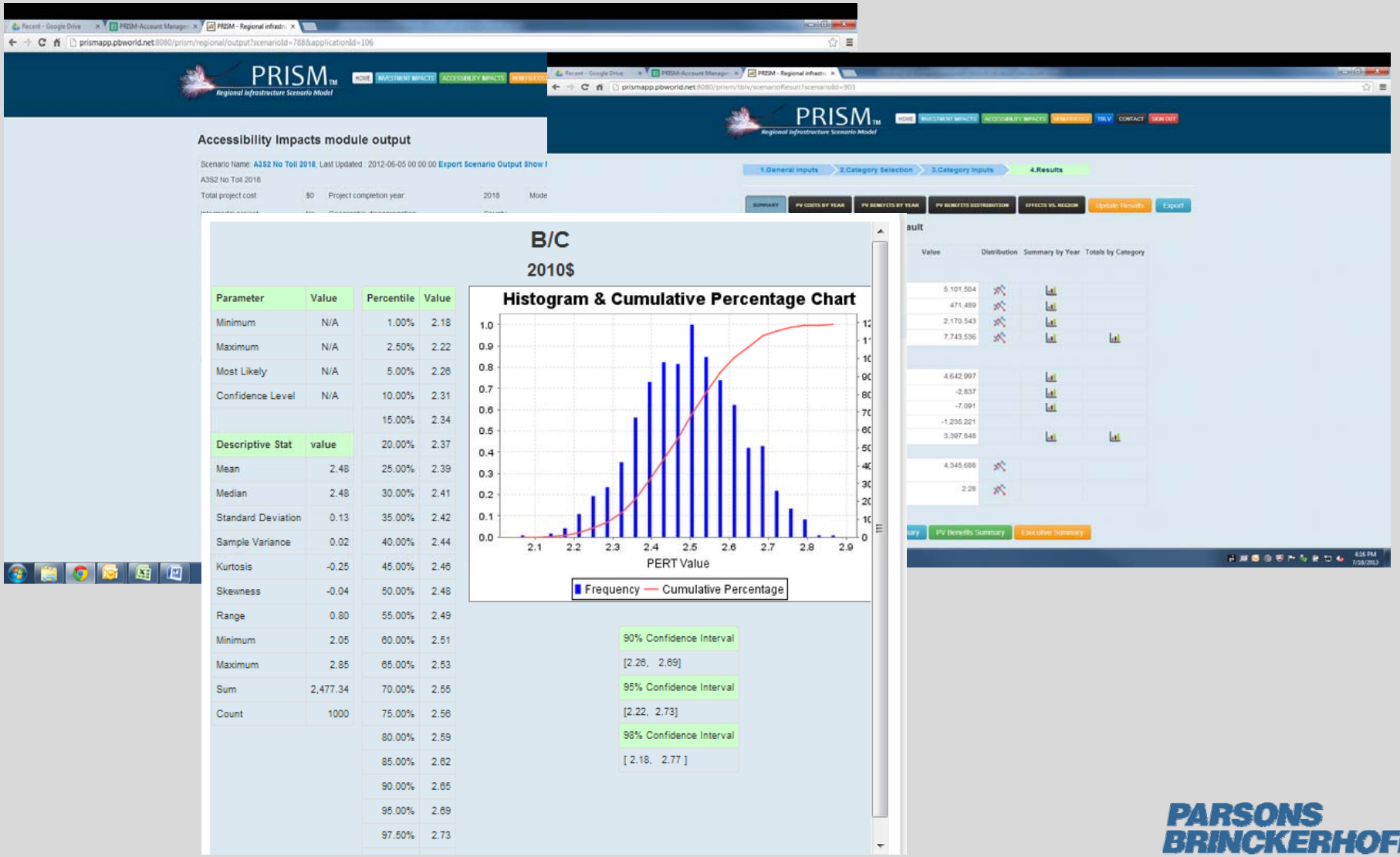
PRISM™ – Online Tool



Parameter	Value
Minimum	N/A
Maximum	N/A
Most Likely	N/A
Confidence Level	N/A

Descriptive Stat	value
Mean	2.48
Median	2.48
Standard Deviation	0.13
Sample Variance	0.02
Kurtosis	-0.25
Skewness	-0.04
Range	0.80
Minimum	2.05
Maximum	2.85
Sum	2,477.34
Count	1000

Percentile	Value
1.00%	2.18
2.50%	2.22
5.00%	2.26
10.00%	2.31
15.00%	2.34
20.00%	2.37
25.00%	2.39
30.00%	2.41
35.00%	2.42
40.00%	2.44
45.00%	2.46
50.00%	2.48
55.00%	2.49
60.00%	2.51
65.00%	2.53
70.00%	2.55
75.00%	2.56
80.00%	2.59
85.00%	2.62
90.00%	2.65
95.00%	2.69
97.50%	2.73

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Dollar equivalent valuations can help

- ✓ Set priorities
- ✓ Engage diverse constituencies
- ✓ Forge consensus
- ✓ Document decisions
- ✓ Make good use of MAP-21 Metrics

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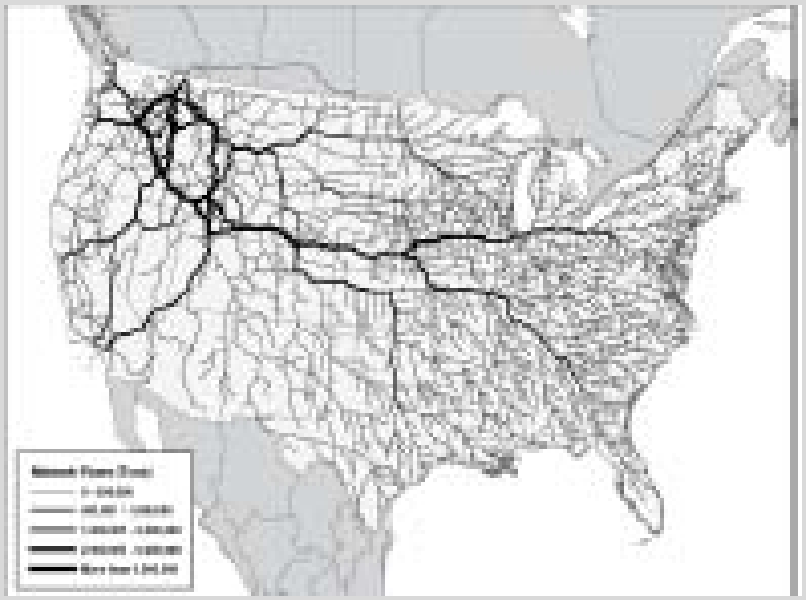
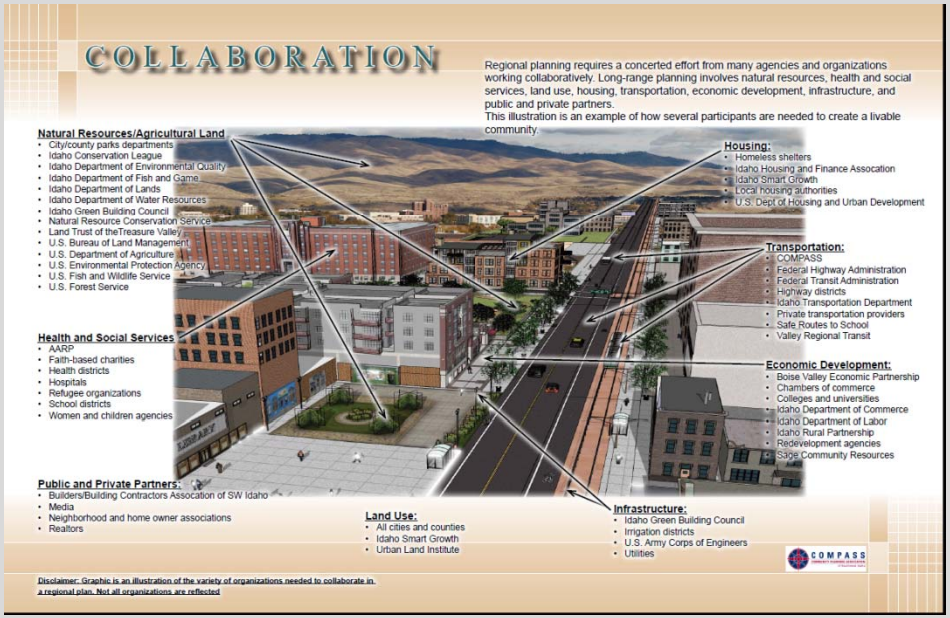
Reducing transportation to dollars and applying common sense





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mcvoygr@pbworld.com

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PRISM - State DOTs

Client	Project
Maine DOT / Maine Turnpike Authority	York County Connector Study
Minnesota DOT	CIMS Initiative US 14 Economic Analysis
Illinois DOT	Illiana Expressway (TIER 1, 2012 & TIER 2, 2013)
Indiana DOT	Illiana Expressway (TIER 1, 2012 & TIER 2, 2013)
Pennsylvania DOT	I-95 Corridor Study
Rhode Island DOT	Sakonnet River Bride Tolling Study
Connecticut DOT	Platform Improvement Project
Maryland DOT / Maryland Transit Authority	Corridor Cities Transitway

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PRISM - Transit Agencies

Client	Project
New Orleans Regional Transit Authority (NORTA)	Streetcar Expansion Project
Rhode Island Public Transit Authority (RIPTA)	Streetcar Expansion Project
South Florida Regional Transit Authority (SFRTA)	Layover Relocation
Miami-Dade Transit	Enhanced Bus Service
Northern New England Passenger Rail Authority (NNEPRA)	Downeaster Service Optimization
Stark Area Regional Transit Authority (SARTA)	Fuel Cell Bus Fleet
Regional Transportation Commission (Nevada)	Rapid Transit Corridor
Wilmington Area Planning Council (WILMAPCO)	Station Relocation
National Capital Region Transportation Planning Board	Metrorail Station Access
SANDAG	NCC I-5 Economic Impact Analysis

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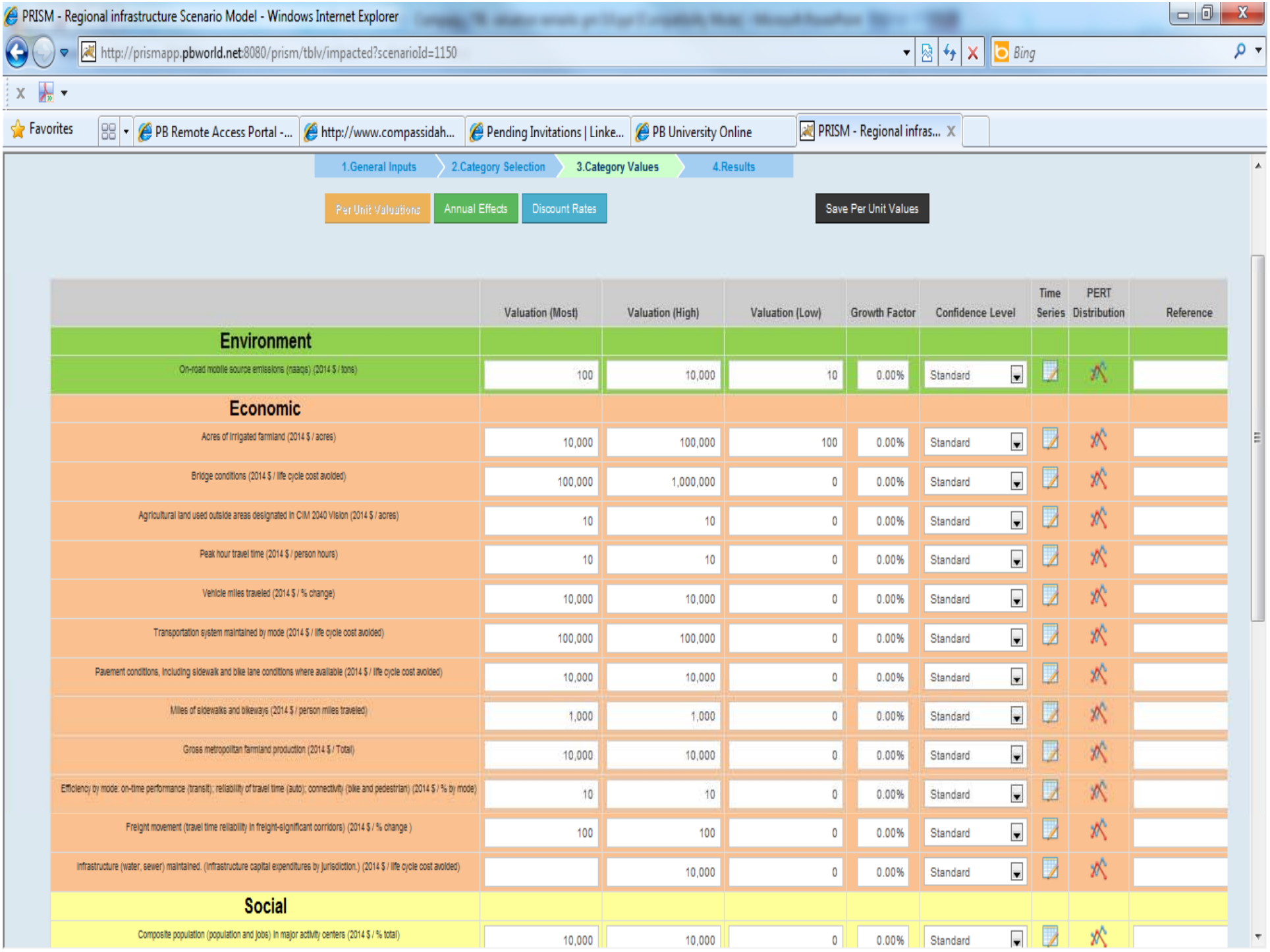
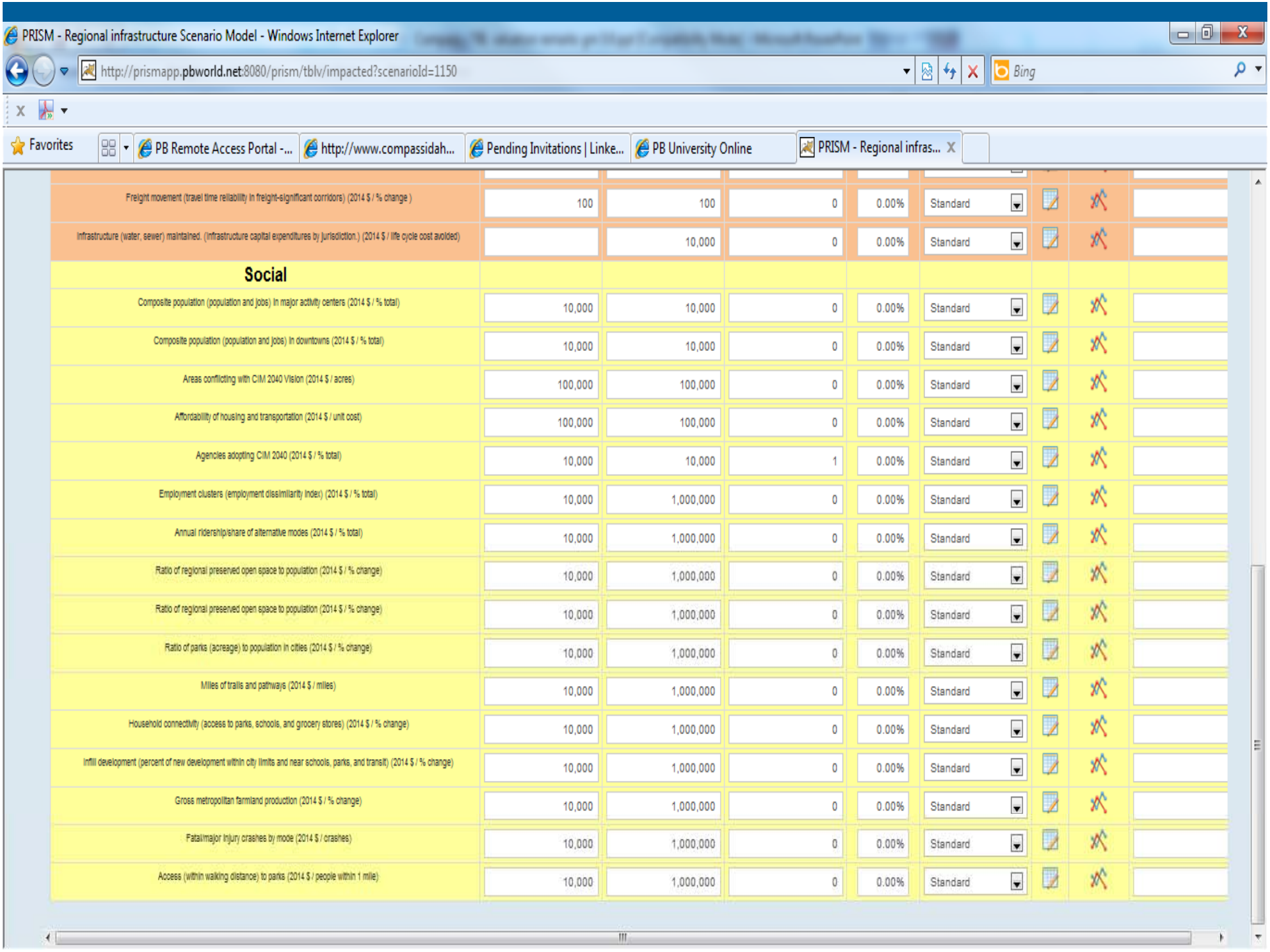

PRISM - Regional infrastructure Scenario Model - Windows Internet Explorer
http://prismapp.pbworld.net:8080/prism/tblv/impacted?scenarioId=1150
Bing
Favorites
PB Remote Access Portal -...
http://www.compassidah...
Pending Invitations | Linke...
PB University Online
PRISM - Regional infras...
1.General Inputs
2.Category Selection
3.Category Values
4.Results
Per Unit Valuations
Annual Effects
Discount Rates
Save Per Unit Values
Valuation (Most)
Valuation (High)
Valuation (Low)
Growth Factor
Confidence Level
Time Series
PERT Distribution
Reference
Environment
On-road mobile source emissions (naaqs) (2014 $ / tons)
100
10,000
10
0.00%
Standard
Economic
Acres of irrigated farmland (2014 $ / acres)
10,000
100,000
100
0.00%
Standard
Bridge conditions (2014 $ / life cycle cost avoided)
100,000
1,000,000
0
0.00%
Standard
Agricultural land used outside areas designated in CIM 2040 Vision (2014 $ / acres)
10
10
0
0.00%
Standard
Peak hour travel time (2014 $ / person hours)
10
10
0
0.00%
Standard
Vehicle miles traveled (2014 $ / % change)
10,000
10,000
0
0.00%
Standard
Transportation system maintained by mode (2014 $ / life cycle cost avoided)
100,000
100,000
0
0.00%
Standard
Pavement conditions, including sidewalk and bike lane conditions where available (2014 $ / life cycle cost avoided)
10,000
10,000
0
0.00%
Standard
Miles of sidewalks and bikeways (2014 $ / person miles traveled)
1,000
1,000
0
0.00%
Standard
Gross metropolitan farmland production (2014 $ / Total)
10,000
10,000
0
0.00%
Standard
Efficiency by mode: on-time performance (transit); reliability of travel time (auto); connectivity (bike and pedestrian) (2014 $ / % by mode)
10
10
0
0.00%
Standard
Freight movement (travel time reliability in freight-significant corridors) (2014 $ / % change)
100
100
0
0.00%
Standard
Infrastructure (water, sewer) maintained. (infrastructure capital expenditures by jurisdiction.) (2014 $ / life cycle cost avoided)
10,000
0
0.00%
Standard
Social
Composite population (population and jobs) in major activity centers (2014 $ / % total)
10,000
10,000
0
0.00%
Standard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PB University Online
PRISM - Regional infras...
Freight movement (travel time reliability in freight-significant corridors) (2014 $ / % change) 100 100 0 0.00% Standard
Infrastructure (water, sewer) maintained. (infrastructure capital expenditures by jurisdiction.) (2014 $ / life cycle cost avoided) 10,000 0 0.00% Standard
Social
Composite population (population and jobs) in major activity centers (2014 $ / % total) 10,000 10,000 0 0.00% Standard
Composite population (population and jobs) in downtowns (2014 $ / % total) 10,000 10,000 0 0.00% Standard
Areas conflicting with CIM 2040 Vision (2014 $ / acres) 100,000 100,000 0 0.00% Standard
Affordability of housing and transportation (2014 $ / unit cost) 100,000 100,000 0 0.00% Standard
Agencies adopting CIM 2040 (2014 $ / % total) 10,000 10,000 1 0.00% Standard
Employment clusters (employment dissimilarity index) (2014 $ / % total) 10,000 1,000,000 0 0.00% Standard
Annual ridership/share of alternative modes (2014 $ / % total) 10,000 1,000,000 0 0.00% Standard
Ratio of regional preserved open space to population (2014 $ / % change) 10,000 1,000,000 0 0.00% Standard
Ratio of regional preserved open space to population (2014 $ / % change) 10,000 1,000,000 0 0.00% Standard
Ratio of parks (acreage) to population in cities (2014 $ / % change) 10,000 1,000,000 0 0.00% Standard
Miles of trails and pathways (2014 $ / miles) 10,000 1,000,000 0 0.00% Standard
Household connectivity (access to parks, schools, and grocery stores) (2014 $ / % change) 10,000 1,000,000 0 0.00% Standard
Infill development (percent of new development within city limits and near schools, parks, and transit) (2014 $ / % change) 10,000 1,000,000 0 0.00% Standard
Gross metropolitan farmland production (2014 $ / % change) 10,000 1,000,000 0 0.00% Standard
Fatal/major injury crashes by mode (2014 $ / crashes) 10,000 1,000,000 0 0.00% Standard
Access (within walking distance) to parks (2014 $ / people within 1 mile) 10,000 1,000,000 0 0.00% Standard