Public Transit Conference

October 7, 2013

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Transportation Programs Manager
Objectives of this Presentation

- Review project goals and accomplishments
- Introduce the new Mosaic website, User Guide, and analysis tool
- Discuss next steps and goals for beta-testing activities
Legislature’s Definition:

“Least cost planning means a process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost-effective mix of options.”

HB 2001 (passed in 2009) directed ODOT to develop a least cost planning methodology “for use as a decision-making tool in the development of plans and projects at both the state and regional level”.
ODOT’s Goals

• Meet the legislative definition with Mosaic
• Strive to enable fair and transparent analysis of many different kinds of solutions
• Create useful products that can be employed during the planning process to help decision making
How Mosaic Fits into the Planning Process

Mosaic helps agencies evaluate solutions and make recommendations.
Mosaic: What it is, What it Does

- A web-based resource for use in transportation planning decision-making.
- An effective and efficient way to evaluate the social, environmental and financial costs and benefits of transportation plans.
- A method that is scalable based on a jurisdiction’s transportation staff, available data and particular needs.
- Establishes a common set of measures to evaluate options and assist selection of the best actions and investments.
- Offers a transparent record of the evaluation process for transportation actions and investments.
Comparison Process

Value measured in dollars

Decision

Value informed by stakeholders
Who’s Been Involved?

• Oregon Transportation Commission
• STIP Stakeholder Committee
  – A diverse group of transportation stakeholders
• Work Group
  – Affected ODOT and MPO staff
• Technical Teams
  – Indicators: experts for each analysis category
  – Tool: small diverse team with varied experience
  – Test: varied potential future users of Mosaic
What’s Been Accomplished

• Discussion paper with case studies completed
• Key Mosaic framing questions answered
  – E.g. focus on planning level first
• Nine categories of transportation impacts to evaluate
  – Categories relate closely to OTP goals and policies
• Comparison process determined
  – Benefit-Cost plus MODA
• Mosaic User Guide and Tool developed and ready to test
Mosaic User Guide
Website Tour
Home

Mosaic is Oregon's value and cost informed transportation planning tool, developed by the Oregon Department of Transportation (ODOT) in collaboration with a group of stakeholders representing a diverse range of interests. It offers Oregon transportation planners and decision makers an efficient, transparent way to evaluate the social, environmental, and economic costs and benefits of transportation programs and investments. By supporting decision makers with identifying investments that provide the best value for money, it will help make the most of limited resources.

Mosaic can be used at the local, regional, and state levels, and is scalable to accommodate varying staff sizes, available data, and unique community needs and goals. It is user friendly, designed to be used frequently within the transportation planning process. Learn more . . .

Benefits

For decision makers

For citizens

For transportation professionals

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In 2009, the Oregon State Legislature adopted the Oregon Jobs and Transportation Act, which directed ODOT to explore developing a "least cost planning" decision-making tool.

The development of Mosaic was initiated by Oregon's 2009 Jobs and Transportation Act, which called for ODOT to develop a least cost planning tool to help inform transportation decision making. The term "least cost" is defined by the Act (now Oregon Revised Statutes [ORS] 184.653) as: "a process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies or both, where the intent of the process is to identify the most cost effective mix of options."
User's Guide

Mosaic is designed to be used from beginning to end. Before any formal work can begin, preliminary work must be done to prepare the way.

Before you start:
- Outline
- Engaging Mosaic

Engaging mosaic, explaining:

- Step 1: Identify Bundles Of Actions
- Step 2: Establish The Framework
- Step 3: Weight Modal Indicators With Stakeholders
- Step 4: Populate The Tool
- Step 5: Interpret The Results
- Step 6: Use The Results To Make Decisions
Categories & Indicators

Click on the icons below to learn more about each Mosaic Category and its General and Specific Indicators.

ACCESSIBILITY  ECONOMIC VITALITY  ENVIRONMENTAL STEWARDSHIP

EQUITY  FUNDING THE TRANSPORTATION SYSTEM/FINANCE  LAND USE AND GROWTH MANAGEMENT

MOBILITY  QUALITY OF LIFE AND LIVABILITY  SAFETY AND SECURITY
Quality of Life and Livability

Does the “bundle of actions” improve the quality of living and working environments, and the experience for people in communities across Oregon?
QUALITY OF LIFE AND LIVABILITY

Physical Activity

Transportation systems can influence the amount of physical activity residents of a community get by the presence or absence of active mode infrastructure. Active modes are generally considered to include non-motorized modes, such as biking and walking, and transit (which must often be accessed by foot or bike). Increased levels of physical activity have been shown to increase both physical and mental health, which enhances overall quality of life.
Progr\(^2\)ms Guide

What is the Programs Guide?

The Mosaic Programs Guide includes transportation actions that can help meet the goals of the nine Mosaic Categories of transportation system performance, but that would not typically be included in a capital improvement plan. These are the “soft side” approaches that address travel demand and complement more traditional approaches to managing travel supply and capacity. The Guide includes programs designed to enhance access, equity, mobility, quality of life, safety, environmental quality, and economic vitality through means other than direct public investment in physical infrastructure.

What's included in the Programs Guide?

The Guide includes a variety of programs within eight subject areas:

- Bicycle and Pedestrian
- Equity
- Land Use and Built Environment
- Operations/ Intelligent Transportation System (ITS)
- Pricing
- Public Transportation
- Safety
- Transportation Demand Management

Each program is described in a cut-sheet that describes the program and its benefits, how it relates to the Mosaic Categories of transportation system performance and General Indicators, what is known about its effectiveness, examples of best practices, and implementation resources. These are designed to be easy-to-use reference guides to aid users in identifying and implementing the mix of programs best suited to their communities.

How does it work with Mosaic?

How to use the Programs Guide

These are the “soft side” approaches that address travel demand and complement more traditional approaches to managing travel supply and capacity. When one or more of the programs are included in a bundle of transportation actions, this information is used to inform the Mosaic output summary tables.
Bicycle and Pedestrian Programs

Below are the Bicycle and Pedestrian Programs. You can download the PDFs.

- Bike Sharing Program (PDF, 490KB)
- Complete Streets Program (PDF, KB)
- Safe Routes to School (PDF, KB)

Bike Sharing

What is it?

Bike sharing programs typically include a fleet of bicycles strategically placed throughout a city that are available for short-term rental. Programs usually involve distinctive and recognizable bicycles; docking stations; and an information technology (IT) system to facilitate reservations, pick-up and drop-off, and location tracking. Membership fees and usage fees are typically modest and available in various time increments (e.g., daily, weekly, or annually). Many bike share programs also offer members brief rental periods for free (e.g., 30 minutes), after which they are charged a usage fee based on the length of the rental.

What are the benefits?
Mosaic Tool Overview
The Mosaic tool is an Excel workbook

**SPECIFY OPTIONS FOR ANALYSIS**
1.a Specify study area and period of analysis
1.b Name and describe bundles
1.c Select valuation and weighting options

**ENTER COST AND SCHEDULE DATA**
2.a Enter life-cycle investment cost data
2.b Enter revenue estimates and other financial data
2.c Specify roll-out and ramp-up assumptions

**LOAD TRIP TABLES AND/OR ENTER TRAVEL DATA**
3.a Select and load O-D trip tables, or
3.b Enter aggregated travel data
3.c Instruct MOSAIC to read and process data

**LOAD AND/OR ENTER GEOGRAPHIC DATA**
4.a Select and load relevant data files, or
4.b Enter aggregated geographic data
4.c Instruct MOSAIC to read and process data

**CALCULATE SCORES AND DETERMINE WEIGHTS**
5.a Enter additional data and calculate scores
5.b Determine weights at the category level first
5.c Determine weights directly at the indicator level

**SPECIFY VALUATION AND OTHER ASSUMPTIONS**
6.a Review and edit model parameters
6.b Review time-varying assumptions
6.c Review supporting data and references

**RUN THE ANALYSIS AND PRODUCE RESULTS**
7.a Select option for treatment of uncertainty (sensitivity analysis, risk analysis)
7.b Run simulations and produce results

**REVIEW AND EXPORT RESULTS**
8.a Navigate across sheets to review charts and tables
8.b Conduct sensitivity testing with the control panel
With a set of linked spreadsheets

1. WELCOME
2. CONTENT
3. HELP
4. BUNDLES INFO
5. CONTROL PANEL
6. INDICATORS
7. COST & SCHEDULE
8. MODEL PARAMETERS
9. TIME-VARYING ASSUMPTIONS
10. O-D TRAVEL DATA
11. AGGREGATE TRAVEL DATA
12. OTHER INPUT DATA
13. WEIGHT CATEGORIES
14. WEIGHT INDICATORS
15. MOBILITY
16. ACCESSIBILITY
17. SAFETY & SECURITY
18. ENVIRONMENT
19. ECONOMIC VITALITY
20. FUNDING & FINANCE
21. LAND USE
22. QUALITY OF LIFE
23. EQUITY
24. NPV CALC
25. OUTPUT TABLES
26. OUTPUT CHARTS
27. OUTPUT SHEETS
28. PROGRAMS
29. PROGRAMS IMPACTS
30. ECONOMIC DATA
31. SUPPORTING DATA
32. SKETCH MODELS
33. REFERENCES
34. LISTS & LOOKUP
Example inputs - bundles

### TOTAL CAPITAL COSTS (INCLUDING DESIGN, ENGINEERING, PERMITTING, ROW, CONSTRUCTION, REPLACEMENT)

<table>
<thead>
<tr>
<th>BASE CASE</th>
<th>Do Minimum</th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>$0.0</td>
<td>$0.0</td>
<td>$20.0</td>
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<td>BUNDLE_5</td>
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<td>$1,135.8</td>
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### ANNUAL INCREMENTAL OPERATING & MAINTENANCE COSTS

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## Example inputs - indicators

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<th>CATEGORY</th>
<th>GENERAL INDICATORS</th>
<th>INDEX</th>
<th>SPECIFIC INDICATORS</th>
<th>USE IN MOSAIC?</th>
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<td>Travel Time</td>
<td>MO.1</td>
<td>Travel Time</td>
<td>QUALITATIVE SCORING</td>
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<td></td>
<td></td>
<td>MO.2</td>
<td>Hours of Congestion</td>
<td>REPORT ONLY</td>
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<td></td>
<td>Quality of Service</td>
<td>MO.3</td>
<td>Reliability – Recurring congestion</td>
<td>MONETIZED</td>
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<tr>
<td></td>
<td></td>
<td>MO.4</td>
<td>Reliability – Non-recurring congestion</td>
<td>MONETIZED</td>
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<tr>
<td></td>
<td>Out of Pocket Costs</td>
<td>MO.5</td>
<td>User Costs</td>
<td>MONETIZED</td>
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<td></td>
<td>Travel Characteristics</td>
<td>MO.6</td>
<td>Mode Split</td>
<td>QUANTITATIVE SCORING</td>
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<td></td>
<td></td>
<td>MO.7</td>
<td>VMT / Capita</td>
<td>REPORT ONLY</td>
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<tr>
<td>ACCESSIBILITY</td>
<td>Proximity</td>
<td>AC.1</td>
<td>Transportation Cost Index</td>
<td>QUANTITATIVE SCORING</td>
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<tr>
<td></td>
<td></td>
<td>AC.2</td>
<td>Population within X minutes between work and home</td>
<td>QUANTITATIVE SCORING</td>
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<td></td>
<td>Connectivity/Ease of Connections</td>
<td>AC.3</td>
<td>Location of industrial jobs in relation to the regional freight network</td>
<td>QUANTITATIVE SCORING</td>
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<tr>
<td></td>
<td>Modal Availability</td>
<td>AC.4</td>
<td>Population and employment within ¾ mile of a transit stop served by at least 30 vehicles per day</td>
<td>QUANTITATIVE SCORING</td>
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<td></td>
<td></td>
<td>AC.5</td>
<td>Amount of multi-use paths and bike boulevards</td>
<td>QUANTITATIVE SCORING</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AC.6</td>
<td>Sidewalk coverage</td>
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### Example inputs – parameters

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<th>GENERAL</th>
<th>ALL</th>
<th>Description</th>
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<th>Most Likely</th>
<th>Low</th>
<th>High</th>
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<tbody>
<tr>
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<td></td>
<td>Real Discount Rate, all Benefit and Cost Streams other than Carbon emissions</td>
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<td>3.0%</td>
<td>3.0%</td>
<td>7.0%</td>
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<tr>
<td></td>
<td>Air</td>
<td>Real Discount Rate, Carbon emissions only</td>
<td>3.0%</td>
<td>3.0%</td>
<td>1.4%</td>
<td>5.0%</td>
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<tr>
<td></td>
<td></td>
<td>Minimum and Maximum Scores</td>
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<td>0</td>
<td>10</td>
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<td></td>
<td></td>
<td>Value of time for PERSONAL trips, LOCAL travel</td>
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<td>$12.3</td>
<td>$8.6</td>
<td>$14.8</td>
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<td></td>
<td></td>
<td>Value of time for BUSINESS trips, LOCAL travel</td>
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<td>$24.1</td>
<td>$19.3</td>
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### Example inputs – weights

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<th>CATEGORIES</th>
<th>USER DEFINED TOP-DOWN</th>
<th>USER DEFINED BOTTOM-UP (in use)</th>
<th>WEIGHTS PROPORTIONAL TO THE NUMBER OF INDICATORS IN MODA</th>
<th>EQUAL WEIGHTING</th>
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<td>2 ACCESSIBILITY</td>
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<td>11.1</td>
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<td>0.0</td>
<td>11.1</td>
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<td>4 ENVIRONMENTAL STEWARDSHIP</td>
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<td>7.1</td>
<td>14.3</td>
<td>11.1</td>
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<tr>
<td>5 FUNDING / FINANCE</td>
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<td>7.1</td>
<td>9.5</td>
<td>11.1</td>
</tr>
<tr>
<td>6 SAFETY &amp; SECURITY</td>
<td>10.0</td>
<td>14.3</td>
<td>9.5</td>
<td>11.1</td>
</tr>
<tr>
<td>7 LAND USE &amp; GROWTH MANAGEMENT</td>
<td>20.0</td>
<td>28.6</td>
<td>9.5</td>
<td>11.1</td>
</tr>
<tr>
<td>8 QUALITY OF LIFE</td>
<td>5.0</td>
<td>0.0</td>
<td>0.0</td>
<td>11.1</td>
</tr>
<tr>
<td>9 EQUITY</td>
<td>10.0</td>
<td>14.3</td>
<td>19.0</td>
<td>11.1</td>
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<tr>
<td><strong>TOTAL POINTS</strong></td>
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<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
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**BOTTOM-UP (in use)**

- MOBILITY
- ACCESSIBILITY
- ECONOMIC VITALITY
- ENVIRONMENTAL STEWARDSHIP
- FUNDING / FINANCE
- SAFETY & SECURITY
- LAND USE & GROWTH MANAGEMENT
- QUALITY OF LIFE
- EQUITY
<table>
<thead>
<tr>
<th>SPECIFIC INDICATORS</th>
<th>USE IN MOSAIC</th>
<th>Highway Emphasis</th>
<th>Transit Emphasis</th>
<th>Rail &amp; Freight Emphasis</th>
<th>Transit Emphasis &amp; HOT</th>
<th>Multi-modal</th>
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</thead>
<tbody>
<tr>
<td>Travel time savings, millions of dollars*</td>
<td>MODA</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
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<td>Travel time savings, score</td>
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<td>2.0</td>
<td>4.0</td>
<td>6.0</td>
<td>6.0</td>
<td>8.0</td>
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<tr>
<td>Travel time savings, hours per day</td>
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<td>74,051</td>
<td>111,345</td>
<td>116,210</td>
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<td>Reliability – recurring congestion, millions of dollars</td>
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<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
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<tr>
<td>Reliability – recurring congestion, score</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Reliability – recurring congestion, minutes per trip</td>
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<td>0.8</td>
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<td>0.7</td>
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<tr>
<td>Reliability – non-recurring congestion, millions of dollars</td>
<td>BCA</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
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<td>$0.0</td>
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<tr>
<td>Reliability – non-recurring congestion, score</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Reliability – non-recurring congestion, minutes per trip</td>
<td></td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
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<td>User cost savings, millions of dollars*</td>
<td>BCA</td>
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<td>User cost savings, score</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Average user costs, dollars per trip</td>
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<td>$2.43</td>
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<tr>
<td>Mode split, score</td>
<td>MODA</td>
<td>8.1</td>
<td>2.9</td>
<td>9.4</td>
<td>9.4</td>
<td>9.4</td>
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<tr>
<td>Mode split, percent SOV in total travel</td>
<td></td>
<td>16.1%</td>
<td>15.3%</td>
<td>16.3%</td>
<td>16.3%</td>
<td>16.3%</td>
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<tr>
<td>VMT / capita</td>
<td>REPORT</td>
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<td>4.1</td>
<td>4.2</td>
<td>4.2</td>
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</table>
Example outputs - charts
Example outputs - charts

Bubble size proportional to discounted investment cost

Aggregate MODA Score

Benefit/Cost Ratio

Total Investment Cost

Multi-Objective Score

B/C Ratio
What if: costs go up?
What if: economic growth accelerates?
What if: people weight categories differently?
Phase 3 Goals

• Test the Mosaic process and tool
• Adjust the tool and User Guide as needed
• Allow other experts opportunity to review the Mosaic tool and how it works
• Provide opportunities for training
  – Training sessions
  – Webinars
Stage 3 Testing Goals

• Testing is to demonstrate that the Mosaic process and tool can work and provide information helpful to a planning process
  – Learn what works well or needs improvement
  – Learn what resources are needed to successfully employ Mosaic
  – Learn the most appropriate kinds of uses for current Mosaic tool
Questions and Discussion

Project Websites:
www.oregonmosaic.org