My name is Aileen Buckley and I work in cartographic research and development at ESRI, but until recently I was on the faculty at the University of Oregon where I worked on the Atlas of Oregon with my co-authors.

I’ll be talking about the Atlas of Oregon which has been produced as a book, a CD-ROM and a Web site.

In our paper, we discuss each media presentation of the *Atlas of Oregon* and its unique characteristics as well as the integration of the atlas content and design between the various presentation media.

What I will focus on this this presentation are the things we can’t show you in the paper – for specific details, please refer to the paper that is distributed on the conference CD.
This paper examines modern techniques for atlas creation in each of three forms – book, CD-ROM and the Web.

The atlas design, compilation, and production methods used for each of these are examined, and challenges are discussed.

Although our paper focus on the experiences we encountered in the creation of a state atlas, the extrapolation of our experiences for Oregon to atlases for other extents may be possible.
The quality of the *Atlas of Oregon* in its various forms is widely recognized.

- The original *Atlas of Oregon* was printed in 1976. This book withstood the test of time and was recognized as an authoritative source of geographic information about the state for a quarter century. ✓ CLICK ✓
- The second edition of the Atlas was released 25 years to the day later in October 2001. The *Second Edition* immediately gained recognition for its cartographic and design excellence.
- The CD-ROM was released a year to the day after the second edition. Like the book, the CD was also awarded national recognition for its unique cartographic presentations. ✓ CLICK ✓
- A Web site has also been developed with educational materials that draw upon the book and CD versions of the atlas.

*At each step of the way, the products developed around the Atlas of Oregon have consistently maintained very high quality in cartographic presentation and information display. What contributed to the continued success of the Atlas of Oregon?*
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Before an atlas project should be undertaken, a compelling need must be presented for investing the immense amount of time, effort and money that an atlas requires.

Loy suggests that the reason is linked to a need to communicate through maps.

Even with a compelling reason, an atlas project will be doomed to fail if adequate resources are not made available, including

- funding
- dedicated cartographic editors
- talented and creative staff
- and materials, space and equipment.

All of these were in place for each of the Atlas of Oregon products before the projects were undertaken.
Cartographers well know that controls on map design should be identified before starting a project.

*In addition to technical controls on the atlas compilation, we also had to consider the more elemental “design” of the atlases.*

Every map, graph, image and other atlas element is influenced in large part by two design considerations in particular: what will be shown and how it will look.

These are called the *substantive* and *affective* objectives.
The maps and other graphics that make up the Second Edition were the building blocks of the book and they also became the building blocks for the CD-ROM and the Web products.

Because the content and design of the individual maps and graphics in many cases are identical among the three products, the substantive and affective objectives were similar for all three.
The guiding principle for the substantive objective was to include in the atlas “what most atlas users will open the book to find”.

The *Atlas of Oregon* was divided into four sections: Human Geography, Economic Systems, Natural Environment and a reference section, in that order.

This order is not consistent with that of most atlases. The authors elected to place the human-related subjects first and the natural environment topics later, arguing that “an atlas should start with what most users are likely to be opening the covers to find”.
Here is a look at a sample of the contents for each of these sections.
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Natural Environment Topics

- Landforms: Elevation
- Landforms: Shaded Relief
- Cross Sections
- Ice Age Glaciers
- Ice Age Lakes and Floods
- Volcanoes
- Earthquakes
- Landslides
- Geology
- Geologic Ages
- Geologic Evolution
- Soil Orders
- Soil Suborders
- Soil Interpretations
- Annual Precipitation
- Monthly Precipitation
- Monthly Temperature
- Climatic Indicators and Projections
- Rivers
- Stream Flow
- Lakes
- Drainage Basins
- Water Quality and Dams
- Protected Areas
- Ecoregions
- Threatened and Endangered Species
- Habitat
- Habitat Legend, Vegetation Intro
- Vegetation: NW, NE, SW, SE
- Vegetation Legend

Here is a look at a sample of the contents for each of these sections.
In terms of the affective objectives, the authors of both the original and second edition atlases adopted a somewhat conservative approach.

The books reflected the individual style of the cartographers involved, who were inclined toward “lean uncluttered designs that use pastel colors”, although in some places bolder approaches were taken, as you can see here.

The authors resisted quote “overfilling the page, creating busy designs, taxing the reader with complex legends, and using too many strong colors”.
To increase variation within and between pages, the authors encouraged flexibility in symbolization by employing a mixture of map types throughout the book including:

- **proportional symbol maps**
- **dot maps**
- **flow diagrams**
- **dasymetric maps**
- **choropleth maps**

Time series graphs were included to give historical perspective, and tables provided data that did not easily lend itself to being mapped.
Innovative or non-standard mapping approaches, such as volumetric symbols and perspective views, were used sparingly.

Also, most of the maps were shown for the state of Oregon, but exceptions were made when the theme clearly involved a larger area – in those cases, the larger extent was shown.

Here, for example, the tectonic plates offshore are shown by extending the map to include the entire Pacific seaboard.
And in this map, we can see that earthquakes on the west coast of the United States do not usually occur in Oregon. Instead they follow the edge of the tectonic plates offshore.

This would have been difficult to understand if the map of earthquakes had focused only on Oregon.
Many of the design constraints for the atlases were carefully examined prior to compilation and production.

*These included the page layout, total number of pages (or size of files, as in the case of the CD), color specifications, and more.*

The size and shape of the original atlas was selected to best conform to the landscape orientation of Oregon so that the state could fit easily on one full page.

In the second edition of the atlas, a portrait layout was used instead. *For some themes, a view of the entire state at the smallest scale would require spanning the gutter to cover two pages.*

This smaller format had two primary advantages:

1) The books fit much more easily on a shelf, and
2) The more standard layout cost less to print.
The format of the atlas page was standardized, specifying the placement of titles and page numbers.

*The essentially random order of maps, graphics and text on the orderly page layouts created a feeling of harmony.*

Each page was mocked up to reflect both the substantive and affective objectives.
The near-final outcome was therefore determined in advance.

This included the number of words on a page which proved to be invaluable when providing instructions to the many text writers.

*Note that in this version of the Elevations layout, the copy is simply place-holding text. In the next example, you will see the colors shift slightly and the text is in final form.*
The final version is very similar, with only a few minor adjustments for color, and the final copy is included.

Having identified many of the compilation and production constraints early in the process, design problems could better be avoided, such as production of too many pages or use of colors that could not be reproduced by the printer.

Another advantage was the ability to see the entire content of the atlas even before compilation began in earnest. In only a few cases did the atlas content change radically from the mock ups.
The CD ROM layout was, of course, designed for a computer screen.

Pages were laid out with primary emphasis on maps and graphics, while the text was restricted to pop-up windows with summaries of the original text that emphasized major information about a theme.
As with the book, the format of the CD screen was standardized, specifying the placement of titles and navigation bars.

Again, each page was mocked up to reflect both what would be displayed and the how it would be displayed.  

The mockups for the CD also involved identification of the tools and functions for the user to interact with the display.

The mockups were then translated into the final screen layout, which as organized to maximize the viewing area by using popup menus and a limited number of icons.

All this was then translated into the final product using Macromedia Flash software.
Now let’s look at some examples of the variations in a single theme through each of the atlases, starting with precipitation. CLICK

In the original atlas, this theme was shown by displaying the state’s climatological stations along with isolines of annual precipitation.

The background, which shows elevation, was created by hand drawing the hillshading.

Remember that a quarter century ago, maps such as those in the Atlas of Oregon were produced by hand or photomechanically using scribing, rub on lettering, peelcoats and the like!
In the Second Edition, elevation is again shown as backdrop hillshading, this time created using digital elevation models or DEMs.

The *lines of equal precipitation or* isohyets are much higher resolution. And layer tinting was added to shade areas between the isohyets.
On the CD, the same map was shown with the added ability to zoom in on any area as well as pan the display.

You could also choose to switch to the other map that was also shown on the page pair in the original book atlas which is a snowfall map.
The Web site has graphics that were made available for teachers to download and use in slide presentations, on overheads, on handouts or in any other format for teaching that they desired.

*Because the Web atlas was developed to provide supplemental resources for educational use,* the graphics on the site illustrate various topics for the ten teaching modules that we created around the atlas.

*Of course, the CD atlas could be redeveloped for the Web, thereby increasing interactivity and providing animation.*

*But it may be possible that the future will bring a more fully developed Atlas of Oregon.*

*In addition to providing access to the maps and other atlas content,* the Web site could also provide many of the data sets used to compile the atlas. *This portal could be further developed as the interface to distributors of GIS data sets throughout the state of Oregon.*
Now let’s look at another example – elevation cross sections.

In the first edition, three cross sections running east-west across the state were shown. These straight line sections were hand drawn from topographic maps for the state.
In the second edition, three north-south cross sections were added.

The paths of the cross sections were modified so that they captured more of the topography of interest.

These were generated again using DEMS, resulting in much more accurate depictions of the state’s relief.
Let’s see a demonstration of the approach taken on the CD.

In the CD ROM, these long profiles were difficult to show on the smaller screen size, so the reader instead has the ability to select a cross section of interest, then move along the profile to see a close up of the detail. The location of the detail is displayed in the map above.

The second page of this theme affords an overall view as in the book.
Now let’s look at one last example – the U.S. Public Land Survey System or PLSS, which began in 1785 as a systematic scheme for surveying lands in the public domain.

*This scheme is also known as the Township and Range System and it was eventually applied to all land in the federal domain.*

In the original atlas, there is a map of the donation land claims or lands that were claimed by immigrants before the public land survey. These are shown as an area in western Oregon.

A portion of this area is shown in detail to highlight the differences between the regular and irregular shapes of the boundaries.

The progress of the PLSS was also shown in the map on the right.
In the Second Edition, the data came from digital sources resulting in much more accurate portrayal of the themes.

So, instead of simply showing the area with many donation land claims, each individual claim is drawn.

There are a series of maps showing the progress of the public land survey, and the detail shows what the two smaller maps in the previous edition depicted – the regular grid pattern of the PLSS and the irregular pattern of claims made before the survey.
Let’s see another demonstration.

On the CD, more interactivity was provided and animation was used to show the progress of the survey over time. A popup window for the detailed area saves screen space.
Finally, we can summarize the variations between the products. This table is described in the paper on the ICC CD, so I won’t go thru it in detail here.

.cbo Each media could be considered in terms of the unit used to compile the atlas.
.cbo Or it could be thought of in terms of the unit that the reader will either access or interpret.
.cbo With the CD and Web, it is also appropriate to think about navigation among the topics and among the graphics.
.cbo This increased navigation can lead to better abilities to make comparisons and connections between and within themes.

For each of these, we can examine the differences between
.cbo Books
.cbo CDs
.cbo a Web site such as ours for educational use
.cbo and a Web site that offers data and linkages to other sites and data repositories.
Parting thought...

“The content of the graphics must be kept paramount, the technical aspects are secondary”
-- Loy 1980

Though a quarter of a century old, Loy’s observation about the paramount importance of the graphics and the more trivial importance of the technology in atlas mapping, still holds today.

Computers cannot fully replace the cartographic knowledge and skill required to make good maps.

*So even with the increased capabilities of technology in the cartographer’s workplace,*

*It is still ultimately the cartographer who:*
• *is responsible for the beauty and accuracy of the map*
• *and who can take pride in a job well done.*
The *Atlas of Oregon* was created under the guidance of a small number of primary map editors and authors,

including my co-authors on this paper, Jim Meacham and Erik Steiner…
Acknowledgments

It is impossible to adequately acknowledge all of the people who helped create the atlas. Hundreds of individuals were involved as data contributors, researchers, cartographers, text writers, reviewers and proofreaders. Many people contributed generously to our small and dedicated staff. Innumerable hours were devoted to the project, and the hard work and dedication of our colleagues were essential to its success.

As such the atlas represents a very broad cooperative effort.
THANK YOU!

Book and CD atlases:
http://millrace.uoregon.edu/uopress/

Graphics from this presentation:
http://geography.uoregon.edu/infographics/
ICA_2003/index.htm

To learn more about the Atlas of Oregon, visit the UO Press Web site.

And to see graphics from this presentation, visit the Web site we created for you.