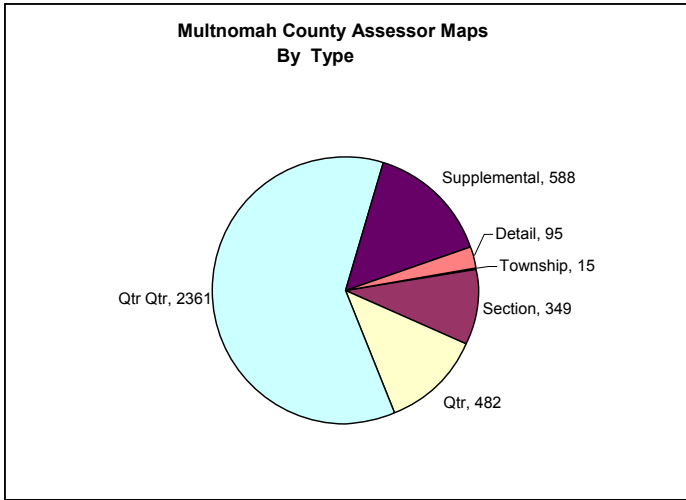


Multnomah County ORMAP Strategy

Last Updated: February 2004

County Overview

Multnomah County has spent 10 years and 10 million dollars to convert and maintain over 3890 Assessor maps representing over 240,000 taxlots into COGO quality digital CAD form. As shown in the chart below, the large majority of the maps are dense 1"=100' quarter-quarter maps and condominium maps on supplemental sheets.



Multnomah County is in a unique position. We have the most taxlots of any county in the state. The geography represents dense urban areas, mixed with farm and forestlands. We have many unique condominium issues that may not occur in any other county in Oregon.

The assessor maps are 100% digital and created from millions of plats, deeds and other records. We were the first DOR Intergraph conversion project and therefore have some unique CAD data issues. When Multnomah County was converted by DOR, survey control was used, but detailed records were not kept. Over time, the data has been projected and edited by many Cartographers. Although the data appears to have a high level of positional accuracy, evaluating the accuracy to meet ORMAP Goal 4 standards will be challenging.

The maps are in CAD format and are stored as files with levels of information within a specific map rather than as seamless GIS style themes over the entire county. Without editing and manipulation, the linework does not consistently generate closed polygons from the taxlot levels. There is no centroid to identify the polygons. Linework that is suppose to be identical at the edges of files, is not maintained consistently, and may overlap or gap somewhat at file edges. On paper, Multnomah County has extremely high quality maps. As GIS data, however, creating taxlot polygons or other polygons from the CAD files requires much effort.

Without ORMAP funds, Multnomah County does not have the budget to convert, but even more crucially, to maintain this data to meet the GIS specifications for ORMAP Goals 2-4. To accurately and effectively create and maintain 240,000 taxlots with the volume of changes that we experience, we believe A&T Cartography must have the tools to not only maintain Assessor maps but also the taxlots polygons within the maintenance process. A strategy that provides development of polygons outside the A&T Cartography process will always be out of date and without methods to measure quality.

Our strategy gradually moves Cartography from a CAD maintenance environment into a GIS-based maintenance environment, moving from maintaining thousands of map files to maintaining a single, seamless intelligent integrated GIS database.

R-MAP Region Overview

Our region, R-MAP, includes Clackamas, Washington, and Multnomah counties as well as METRO. METRO has been consolidating the GIS data for the tri-county area (and some of Clark County in Washington state as well) for many years. Metro sells subscriptions to a CD product containing GIS data for the region called Regional Land Information System (RLIS). Because each of the counties have specific GIS programs already in place, our region has agreed that all three R-MAP counties can generate proposals for their own formula Regional Fund allocations.

Multnomah County is the only county in the region that does not maintain its own taxlot layer for inclusion in the RLIS data set. The existing data in RLIS is created by efforts at the City of Portland and at Metro. Consistently and continually, there are errors and problems that are reported to A&T and GIS that result from bad data in the RLIS data taxlot data. Until Multnomah County maintains the taxlot layer, this situation will not improve. The product for ORMAP goals 2-4 is very similar to the product needed for the RLIS taxlot layer. As data is produced for ORMAP, it will be provided to Metro for inclusion in the RLIS CD and will be of great benefit to the region.

Multnomah County is in a different starting position than the other counties in our region. Clackamas and Washington counties are still in the initial conversion stage from paper to digital. Multnomah County is in a digital-to-digital conversion process, as well as a CAD to GIS conversion process. Therefore, the 3 county strategies and plans are somewhat different, but we all strive towards the same goals and share common projects, such as the boundary and aerial photos efforts when possible. METRO's ongoing production of RLIS (Regional Land Information System) GIS CD shows that the data can be consolidated and shared for mutual benefits.

Project Design

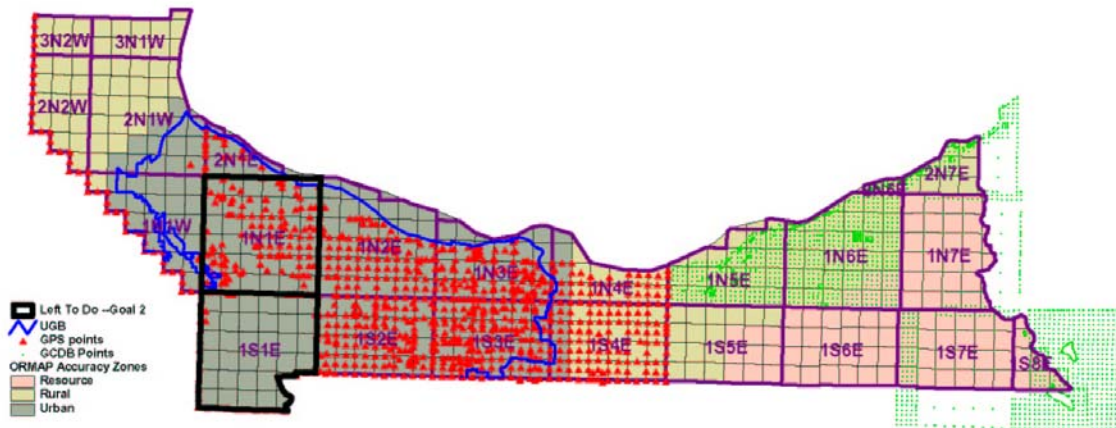
While we had completed some preliminary pilot projects, before committing to a particular conversion strategy, we felt very strongly that we needed the advice of a professional consultant to recommend an overall strategy. With ORMAP funding, we hired PlanGraphics to provide recommendations about an overall strategy. The consultant surveyed users of currently released GIS software products and determined the most productive tools within the constraints of a small staff and budget.

The basic recommendations are:

1. Clean Existing CAD Data within CAD environment.
2. Provide GIS Education to staff, starting with leads.
3. Recommended Intergraph's GeoMedia Pro and GeoMedia Parcel software products.
4. Design and Implement a long-term Relational Geodatabase to support seamless GIS data model.
5. Develop automated maintenance routines to assure consistent processing.
6. Conduct a Countywide GIS Needs Assessment

Control Inventory

During the conversion process, we also wanted to examine the spatial accuracy of our data. When Multnomah County was converted by DOR, survey control was used, but detailed records were not kept. Since that time, better measurement tools (GPS) have become part of the surveying protocol.



Our County Surveyor is, over the next several years, generating highly accurate Government Corner data using GPS technology. The County Surveyor plans to collect data, moving by whole townships in north/south strips from Range 4E to the west and then back to cover the east end of the county. Current work is in Range 1E. The rest of the western part of the county, and especially the urban areas, should be complete by the date for Goal 4, October 2008. We are hoping either Survey GPS points or BLM GCDB work will fill in 1S5E and 1S6E.

Goal 2-4 Conversion and Control Strategy

- Initial Focus on Taxlot Polygons
Because GOAL 2 does not have accuracy requirements, and excellent control should be available by the October 2008 timeframe to support Goal 4, we are focusing initial efforts on generating taxlot polygons. We will propose a project to provide measurable and documented accuracy as more data becomes available throughout the county. We plan to examine and replace water boundaries since we will have complete aerial photo coverage for the county in 2003.

- Perform Clean Up within Microstation

Following the recommendations of the consultant, we will perform cleanup work with known tools in Microstation. We have purchased MRF CLEAN software to fix small gaps and to flag larger problems that will cause polygons not to close for manual fixes.

- Start with rural areas and finish with urban

To meet GOAL 2 by October 2004, our conversion plan uses townships as the base. We developed an order for processing townships, working from rural areas to dense urban areas (see Table 1).

As a first step, the Assessor maps are still maintained in Microstation. At this stage, the polygons are created in GeoMedia and stored by township. For delivery to ORMAP or for our own use, all taxlot polygons can be merged into a single file.

- GOALS 3-4 and long-term maintenance

Evaluate options for maintenance and data base environments.

Develop maintenance routines and work into seamless maintenance environment in a relational database. Adjust data to documented control.

We recognized that the Microstation environment becomes less and less viable as we move into urban areas. Every time a file is updated with changes that affect taxlots, we need to reprocess the file and regenerate the taxlots. This will happen much more frequently in the urban areas. The previous work will not be lost, but we will need to recreate either all or selected polygons within the file.

Long term, Geo Media Pro along with GeoMedia Parcel have the necessary tools for maintenance within a GIS environment. Oracle was already purchased by Cartography and is a very viable database solution, because of internal support of spatial data and the ability to manage large data stores. Support from the larger Multnomah County IT organization, especially Oracle DBAs, is available. GeoMedia Transaction Manager provides the organizational control over the database to allowing tracking of work and multiple users in edit mode. The migration to these products with a small staff and the need to maintain the current workload will be gradual, timed to correspond to ORMAP funding cycles and Cartography work cycles.

Conversion Plan and Progress to Date

We calculated the number of maps and taxlots for each township (and have not adjusted the numbers since the initial calculations). The first chart summarizes our current status (as of 2/26/04). Note that in detailed Table 1, two remaining townships (the core Portland area) hold approximately 40% of the maps and taxlots.

GOAL 2 Progress 2/26/04	Townships	% Townships	Maps	% Maps	Master Taxlots	%Master Taxlots
Completed	21	91%	2,316	60.8%	136,779	56%
To Do	2	9%	1,494	39.2%	106,921	44%
Total	23	100%	3,810	100.00%	243,700	100%

	Township	Number Maps	Total Maps in Area	% Maps	Master Taxlots	Sub-Addl Accounts	Total Master Accts in Area	Total Accts %	Comments	Polygons Created
1	1n4e	101		2.7%	943	3		0.4%	east county	Maintenance
2	1s4e	211		8.2%	2111	2		1.3%		Maintenance
3	1n5e	38		9.2%	455	25		1.4%		Maintenance
4	1s5e	33		10.1%	347	1		1.6%		Maintenance
5	2n6e	15		10.4%	179	1		1.7%		Maintenance
6	1n6e	11		10.7%	117	1		1.7%		Maintenance
7	1s6e	1		10.8%	29	0		1.7%		Maintenance
8	2n7e	8		11.0%	53	1		1.7%		Maintenance
9	1n7e	1		11.0%	31	0		1.8%		Maintenance
10	1s7e	1		11.0%	24	0		1.8%		Maintenance
11	1s8e	1	421	11.0%	9	0	4298	1.8%	end of east county	Maintenance
12	3n2w	20		11.6%	197	31		1.8%	nw county	Maintenance
13	2n2w	55		13.0%	581	99		2.1%		Maintenance
14	3n1w	19	94	13.5%	90	0	868	2.1%	end nw county	Maintenance
15	1n3e	213		19.1%	11699	107		6.9%	Gresham	Maintenance
16	1s3e	399	612	29.6%	25032	78	36731	17.2%		Maintenance
17	1s2e	427		40.8%	47462	184		36.7%		Maintenance
18	2n1w	108		43.6%	1412	101		37.2%		Maintenance
19	2n1e	38		44.6%	894	32		37.6%		Maintenance
20	1n1w	203		49.9%	8232	37		41.0%		Maintenance
21	1n2e	413		60.8%	36882	295		56.1%		Maintenance
22	1n1e	743		80.3%	55108	434		78.7%	core downtown	In Progress
23	1s1e	751	2683	100.0%	51813	307	201803	100.0%		TODO
		3810	3810		243700	1739	243700			

Table 1. GOAL 2 Taxlot Polygon Creation as of Feb 2004

Multi-Pass, Multi-Stage Plan

The first pass through the current CAD files focuses completely on creating taxlot polygons. Attention is focused on synchronizing the Assessor data file with the taxlot polygons so that the key field, MapTaxLot ID, matches. All polygons will have a real property assessor record and all real property assessor records will have a link to a taxlot polygon. We have developed a scheme to link sub-accounts and condos to a “master record” that is associated with a polygon. As we progress through the files, exceptions to the rule are noted and methods to support “exception” data will be made as needed. An example of an exception is a real property account for a billboard that is within a railroad ROW and therefore has no true taxlot polygon to be associated with.

Diagram 1 shows the current A&T system and Stage 1 Conversion to GIS. At this stage, Assessor Maps are still maintained and created with Microstation. The ORMAP GOAL 1 and GOAL 2 deliverables can be created from the Microstation files with additional processes. Maintenance of Assessor maps and data is complex web of many different software pieces and processes. Manual efforts link the processes.

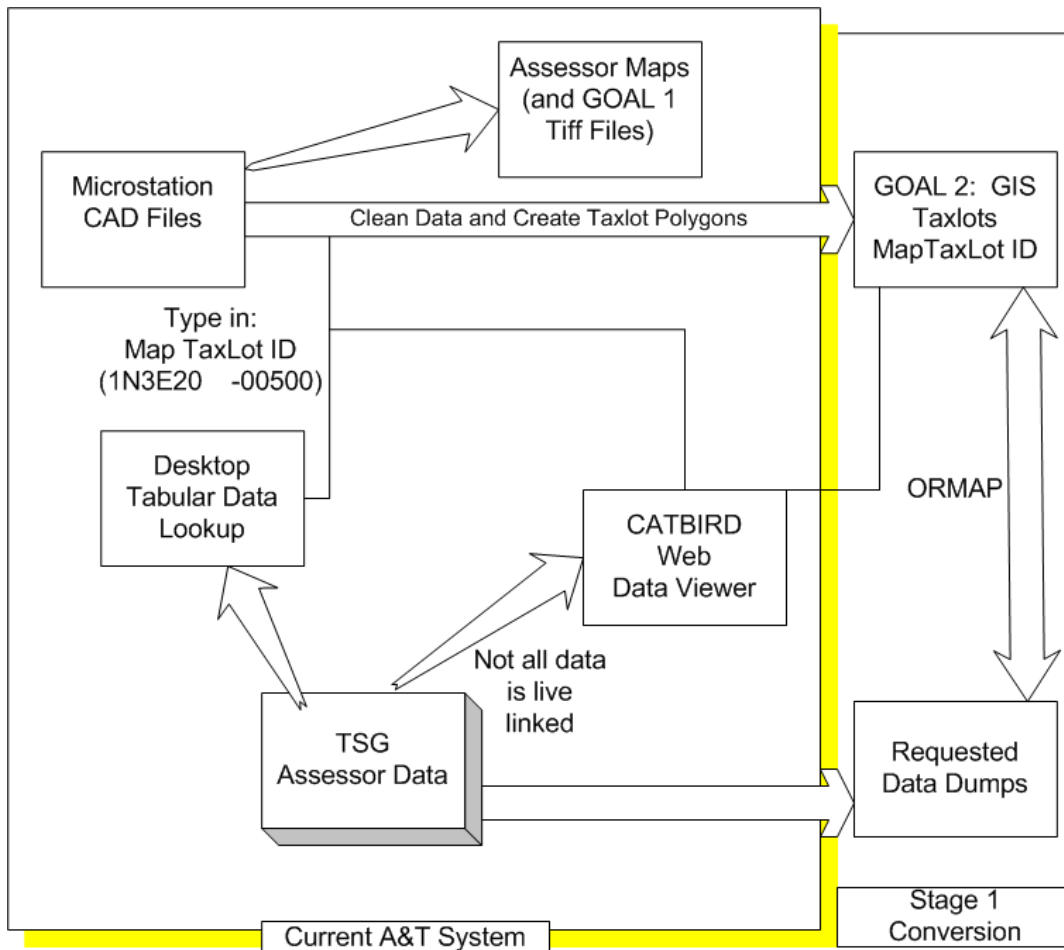


Diagram 1

Subsequent passes through the files will fix specific layers, such as water boundaries, or make adjustments for edge matching, spatial accuracy, etc. The data will improve over time. As we note data that needs to be upgraded, an efficient plan will be made to either isolate the change or group the change with other processes as our experience dictates. All changes to the data will be made by Cartography staff that is familiar with the data and specific mapping issues.

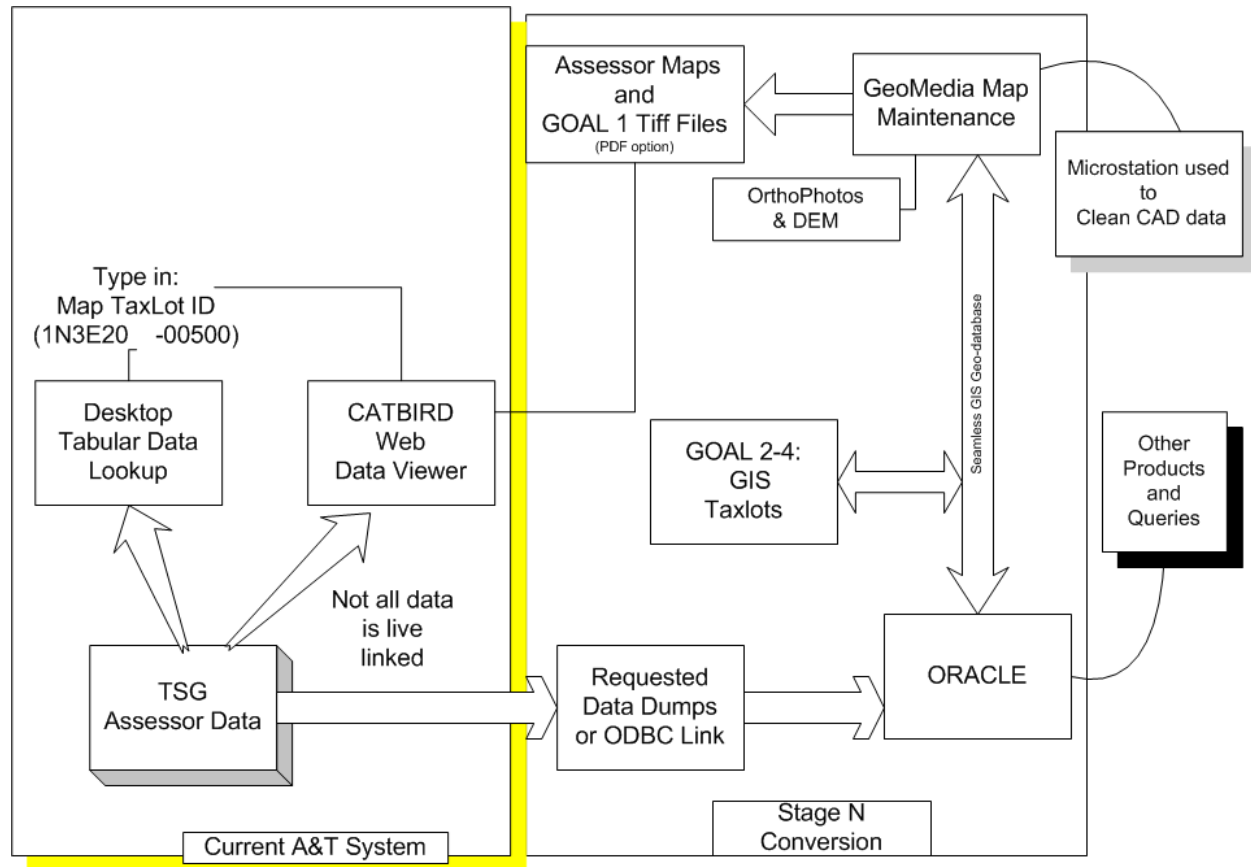


Diagram 2

Project Outline/Work Plan/Calendar/Costs

<i>PAST</i>	<p>2001</p> <ul style="list-style-type: none"> √ Obtain ORMAP funding for Strategic Plan for A&T GIS Ready Status: RFP process complete, selected PlanGraphics as consultant √ Obtain ORMAP funding for common Multnomah, Washington, Clackamas boundary Status: County Surveyor completed GPS work along common boundary Results compiled and delivered April 2002. <p>2002</p> <ul style="list-style-type: none"> √ January-March PlanGraphics consultant work Status: Complete but late—delivered June 2002 √ April - Metro Aerial Consortium RFP Status: Complete, released April 15th √ April May - Select vendor for Metro Aerial work — Status: Complete √ May - June -Determine Multnomah County strategy — Status: Complete, developed pilot and began polygon creation process √ June -December Purchase software and lead staff training, develop GOAL 2 maintenance processes, develop quality control processes. √ December Metro Aerial photos and DEM delivered — Status: complete but late <p>2003</p> <ul style="list-style-type: none"> √ Jan – June Develop GOAL 2 methodology.
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PRESENT

Develop and maintain GOAL 2 taxlot polygons

56% complete July 2002 – October 2004

Polygonization work is done by Multnomah County staff in addition to regular duties. We are on track to complete GOAL 2 by October 2004.

TO DO-- Format GOAL 2 ORMAP attributes for publication. Internal decisions about optional data items need to be made.

Estimated time: 20 hours

Design seamless GIS maintenance environment and test pilot area

June 2003 – October 2004

Develop Data Model for GeoMedia and Oracle

√ Consultant Hired, First on site visit completed 2/24/04

Model to be completed by April 30, 2004

The data model will be as complete as possible, but naturally, will evolve over time.

The current conversion strategy defers deriving any intelligence from text. We plan to support Condo and Detail Assessor Maps in Microstation until conversion of other data is completed. The data model for condo taxlot polygons will be included in the initial model, however. Condos are already completed that meet the GOAL 2 deliverable specifications.

The primary focus and priority is on converting linework and creating intelligent GIS polygons. Text and cartographic elements will be captured “as is”, tagged to record map origination, and included as “dumb” entities in a GIS environment.

Develop Interoperability Plan to use data directly from Oracle Spatial (internally) or provide data in various GIS vendor environments to external users.

Develop Data Conversion Plan, Test and Implement Procedures

Develop, implement, and test procedure to edgematch taxlots by file
Develop, implement, and test procedure to create aggregate polygons (levy codes, subdivision, etc.)
Develop, implement, and test procedure to import text and cartographic elements

Develop Strategy to Align County Boundaries
Develop Strategy to Adjust to GPS Control if needed

<i>FUTURE</i>	<p>Conversion from Microstation to GeoMedia maintenance environment October 2004 – December 2005</p> <ul style="list-style-type: none"> • Perform conversion using data model, procedures and strategies developed in the last six months • Develop Maintenance Tools • Develop Production Plotting Environment
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Milestones 2004-2008

October 2004 ORMAP GOAL 2 Delivery Date

October 2006 ORMAP GOAL 3 Delivery Date (50% of Goal 4)

October 2008 ORMAP GOAL 4 Delivery Date