

Software Migration in King County, WA: Planning and Early Implementation

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King County, Washington



- Microsoft
- Boeing
- Amazon.Com
- Starbucks
- Port of Seattle
- Weyerhaeuser
- Nordstrom
- Paccar
- Univ. of Washington

Population (2000): 1,737,000 (12th largest US County)

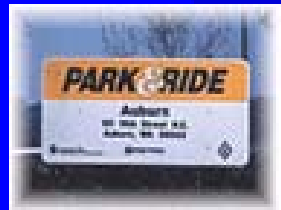
Area: 2130 square miles (Sea level to 8,000')

39 Incorporated Cities

Viable agricultural and private forestry regions

Remote wilderness & watershed

GIS in King County



park & ride



How is GIS used for County Business

- Mapping
- Public information delivery
- Growth management & planning
- Property assessment
- Land development permitting
- Site selection
- Simulating environmental conditions
- Emergency response planning
- Crime analysis
- Transportation planning
- Bus & van routing
- Road maintenance management
- Public health service delivery
- E911 operations
- Airport sound abatement
- Boundary management (legislative districts, voter precincts, tax unit boundaries, etc.)

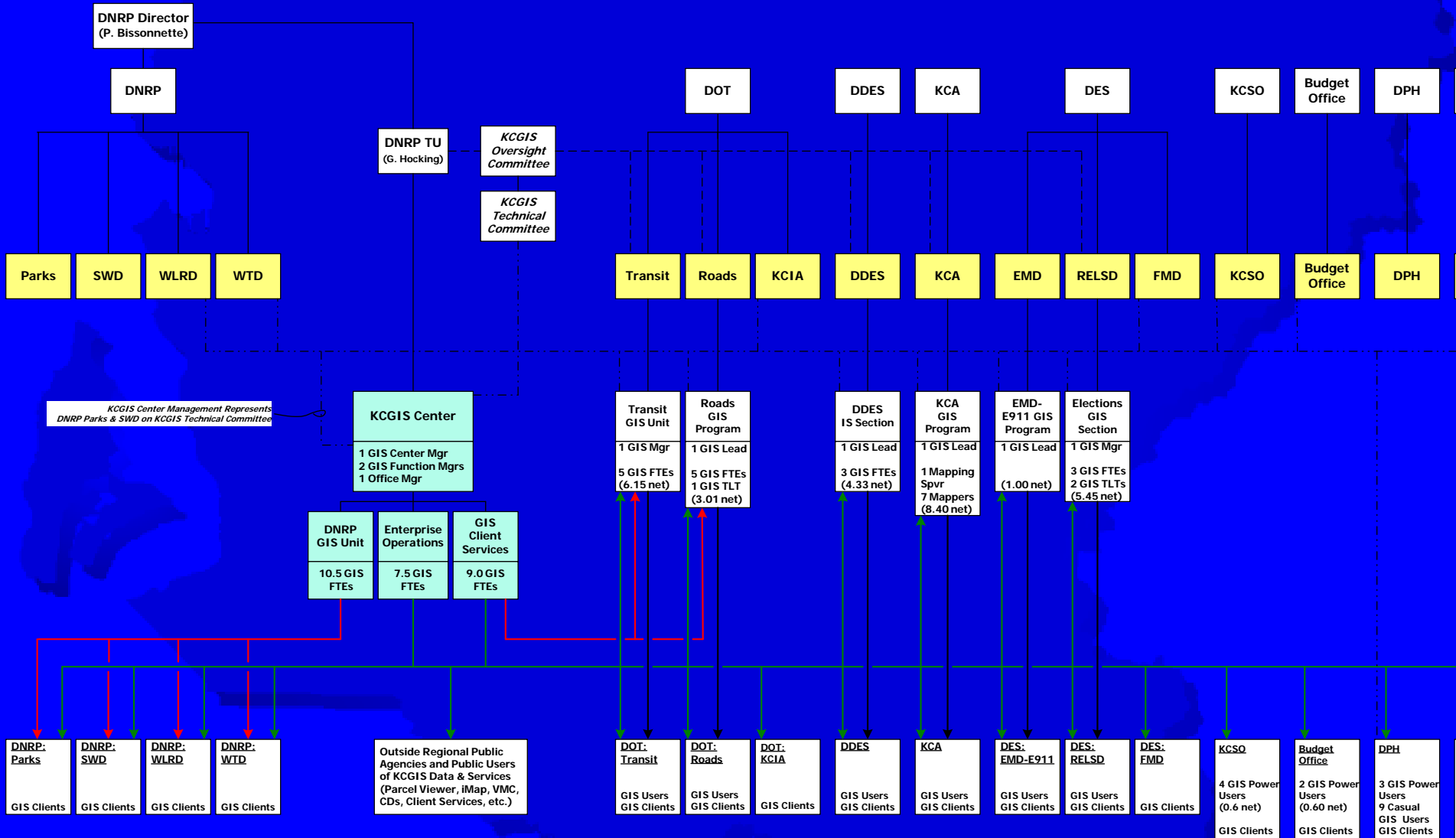
KC Department GIS Units

- **Maintain unique GIS data, applications, and services needed to support agency specific business**
- **Maintain core KCGIS data needed to meet enterprise GIS business needs**
- **Work with KCGIS Center to integrate department data into KCGIS Data Warehouse**
- **Work with KCGIS Center and KCGIS Technical Committee to develop Countywide GIS operations & maintenance plan and annual KCGIS work plan**
- **Comply with Countywide GIS standards and procedures**

KCGIS Center

- Provide the enterprise GIS environment and operational services KC department customers require
- Manage KCGIS architectural development
- Manage KCGIS Data Warehouse infrastructure
- Provide enterprise support services
- Provide end-user client services
- Manage DNRP GIS services

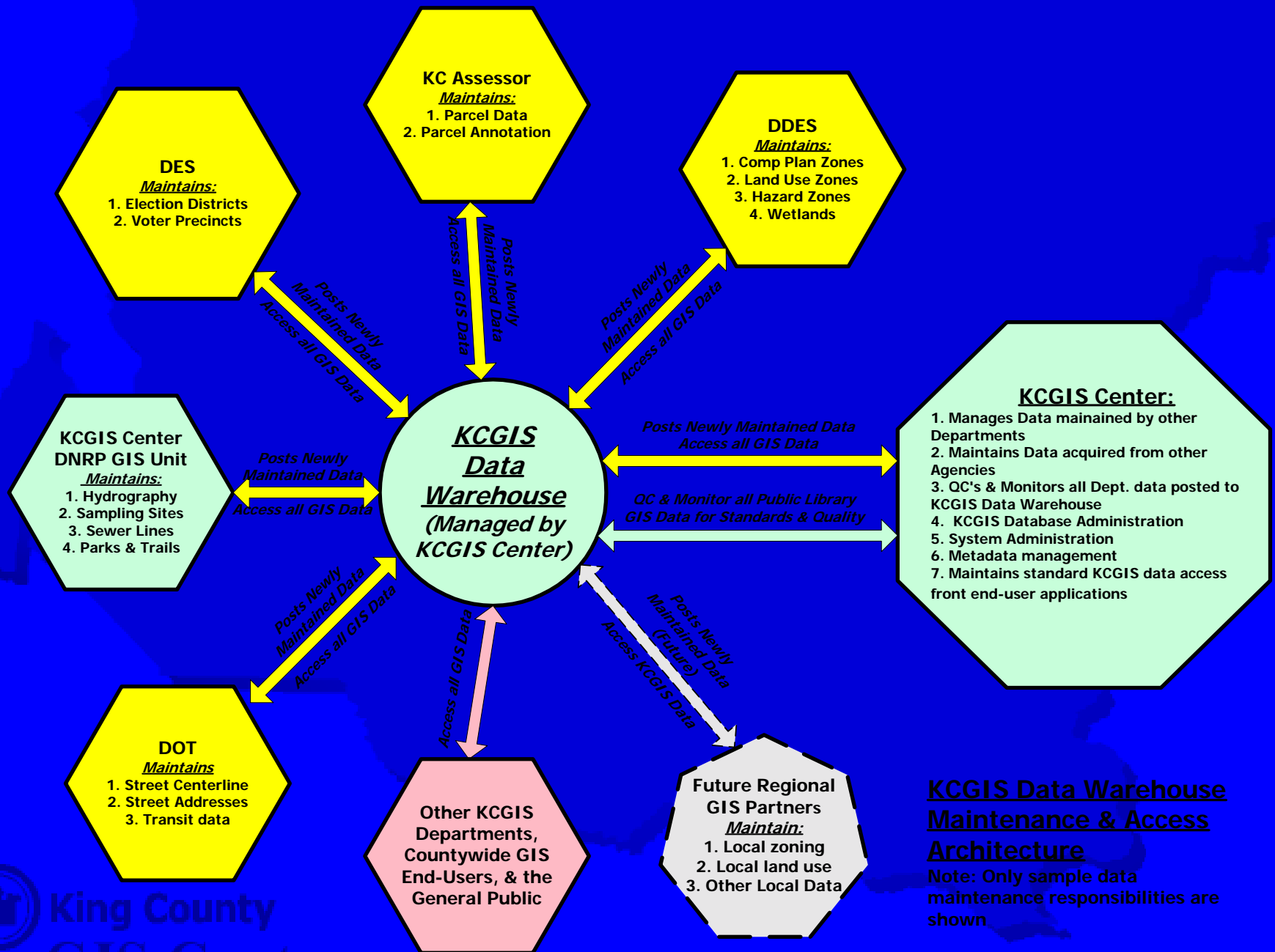
GIS in King County



Legend:

- Agencies that Fund KCGIS Center O&M (entitled to a seat on the KCGIS Technical Committee). These agencies provide business direction to GIS service providers.
- GIS Unit
- GIS Mgr
- GIS FTEs
- Business Reporting Relationship
- GIS Oversight Committee Membership (lines depict business units with 2004 membership) DNRP Technology Unit Manager (Gary Hocking) is permanent Chair
- GIS Technical Committee Membership (lines depict where member is drawn from each agency)
- ← GIS Service Delivery - via KCGIS Center Enterprise Operations and/or Client Services
- ↑ Direct GIS Service Delivery - via KCGIS Center Matrixed Staff

KCGIS Data Warehouse





The Migration

Migration Objectives

Current

- Primary data warehouse is coverages and shapefiles
- Data editing takes place in coverage environment

Goal

- Primary data warehouse is read-only SDE geodatabase.
 - (does not include the cadastral base – yet)
 - Shapefile library maintained for “legacy” ArcView users
- Data editing takes place in SDE geodatabase environment

Migration Objectives

Current

- Enterprise applications are in place to facilitate data access, management, and editing where necessary.
- Agency-specific applications exist.

Goal

- Enterprise applications are in place to facilitate data access, management, and editing where necessary.
- Agency-specific applications are migrated or their relevant functionality integrated into other business applications.

Migration Objectives

Current

- End users have a variety of desktop implementations, mostly ArcView 3.x.
- Training is not coordinated among agencies.

Goal

- End users have either migrated to ArcGIS, ArcIMS, or have been declared as a “legacy” ArcView 3.x users.
- Categorize all GIS users and develop a new training curriculum for each category of users.

A light blue map of King County, Washington, serves as the background for the slide. The map shows the county's irregular shape, including the western coastline and the eastern border with Snohomish County.

Creating the Plan

The Plan Itself

- **Budgeted 20 person-hours / week for 6 months.**
- **It took a year.**
 - More time than expected to do the “internal agency” survey.
 - More time than expected to do the “peer agency” survey.
 - General scope creep.
 - Eight weeks waiting for a contract to get past internal bureaucracy.

A light blue map of King County, Washington, is centered on a dark blue background. The map shows the county's irregular shape, including its coastline and major water bodies like Puget Sound and Lake Washington. The text "Core Concepts of the Plan" is overlaid in the center of the map.

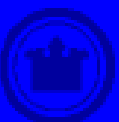
Core Concepts of the Plan

Version

- We are migrating to ArcGIS / SDE 8.3
- **WHY??**
 - Timing: 9.0 just shipped this spring.
 - Reliability: x.0 tend to be buggy.
 - More timing: by the time we get migrated, ArcGIS will be in 9.2 or later - stable

Phased Migration

- Agencies will migrate at different rates, depending on their business and technical needs, budget, number of users, and complexity of their internal data models.
- This will result in a mixed maintenance and access environment until all agencies have migrated.
- Goals and tasks for the migration are laid out in logical, time-oriented groups, with deadlines keyed to the adoption of the plan. Timelines are designed to be flexible enough to meet individual agency needs.



No User Left Behind

- **No attempt to migrate all end users to desktop ArcGIS.**
 - Many will use thin-client ArcIMS applications
 - Others will need to install and use ArcGIS
 - “Legacy” users will continue to use ArcView 3.x for the foreseeable future.

Training

- **Training is a key element!**
- **Training must be**
 - flexible
 - cost-effective
 - meet the needs of agencies and users

Data

- **Data modeling for the maintenance GDB is of critical importance.**
- **Implementation will require a high degree of cross-agency coordination, communication, knowledge of business needs, and technical expertise.**

Final data format

- Data maintenance will shift from coverage format to geodatabase format.
- The coverage library will eventually be rendered obsolete and subsequently abandoned.
- Shapefiles can and will be supported for the foreseeable future, as they will remain a primary data format for many end users for some time.

Communication!

- 17 GIS agencies
- KCGIS Center
- Technical Committee

A map of King County, Washington, showing the boundaries of various agencies. The map is color-coded: blue for the western and northern parts, green for the central and southern parts, and yellow for the eastern part. The text "The Agencies" is overlaid in the center in a large, bold, black font.

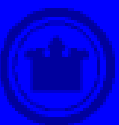
The Agencies

Distributed and Centralized

- **Distributed nature of GIS in King County**
 - Wide variety with respect to:
 - Business needs
 - Level of GIS use
 - GIS staffing
 - Number of users
 - User sophistication
 - Budget
- **KCGIS Center is the county's provider of designated enterprise GIS services**
 - Enterprise applications and database administration
 - KCGIS Center does not lay down the law
 - Agencies know their needs and business best

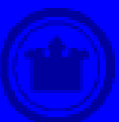
Agency Goals

- **Maintain access to shapefiles for a sufficient period of time to ensure that users can migrate according to their business needs.**
- **Minimize cost.**
- **Minimize disruption to users**
- **Ensure that business needs continue to be met during and after the migration.**
- **Streamline data maintenance procedures for shared data layers**
- **Investigate opportunities to leverage GIS to existing business RDBMS.**



Assessing Agency Needs

- Statement of agency business need for GIS
- License audit for current use of Arc/Info, ArcView 3.x and extensions
- Definition of the set of GIS users in the agency and how they use GIS to do their jobs
- Determine the nature of use of coverages and shapefiles;
- Determine issues that are barriers, impediments or merely concerns to a successful software migration at that particular agency
- Expected timeline for the various phases of migration, including a statement of accuracy.



Addressing Agency Issues

- **Make a list of issues:**
 - Training
 - Data modeling and design
 - Data conversion
 - Maintenance
 - Use
 - Other issues
 - coordination
 - dealing with inevitable surprises
 - impacts of integration
- **Make sure they all get dealt with**

A map of King County, Washington, with the word "Surveys" written in large, bold, blue letters in the center. The map shows the county's irregular shape, including the western coastline and the eastern border with Snohomish County.

Surveys

Survey of Internal Agencies

Themes:

- Hold off on migrating the end users
- Keep shapefiles around
- Phased migration is probably necessary
- Training?? AAAARRGH!!
- Communication is crucial
- Who pays for it????

Survey of Peer Agencies

Themes:

- SQL Server is cheaper and easier to maintain for SDE than Oracle
- Versioning is the Spawn of Hell.
- Training the right people at the right time is critical.
- Very few had implemented fully by 5/03

Survey of Peer Agencies

More themes:

- Personal GDB works well as an interim step to conversion
- ArcIMS is good for getting data to lots of casual users.
- Version 8.3 is the version of choice (this was mid-2003)
- Phased migration works well when there are lots of users.

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Fun with Licensing (*Jeopardy!* format)

The Answer is: A Whole Lot

The Question is:

“How much would it cost to upgrade all current ArcView licenses to version 8.x?”

The Answer is: A Big Fat Zero

The Question is:

“What are the chances that we will upgrade all current ArcView licenses to version 8.x?”

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The Users

User Categories

WHY?

- Can better determine server, hardware, budgetary needs
- Can recommend individual desktop setups and software installations based on use.
- Can develop more individualized training based on use and need.

What?

- The Six "D's"

User Categories

- **Data User:** End-users. query, view and create hardcopy output. Do not create or modify data.
- **Data Analyst:** Same as Data User, but more technically-demanding and complex methods. Likely create and edit project-level data.
- **Data Maintainer (Steward):** Analysts who are also stewards of enterprise data. Deal with issues of conversion, quality assurance and control, and metadata.

User Categories

- **Developer:** responsible for the development of GIS scripts and applications.
- **Decision Maker:** supervisors or managers who have little or no GIS experience but must deal with GIS.
- **Database / Systems Admin:** may or may not be familiar with GIS concepts and software functionality, yet have a need to deal with GIS issues, especially the GDB and SDE.

User Survey: Theory

- **Web-based; seven questions**
- **Offer incentive in form of drawing for coffee**
- **Designed to let us categorize the users**
- **Place users in the most technically demanding category.**

User Survey: Reality

- Shooting for 90-100% response rate
- We got 60%
- We had resort to in-person hovering and the threat of removal of training opportunities to get the last holdouts.

Training

Training

- **Based first on individual need**
- **ArcGIS training must be timely**
 - too soon, users forget
 - too late is less effective (cost and time)
- **Migration will begin before Countywide Training Plan is in effect – but most core courses are already available.**
- **Must incorporate ramp-up time for users**

Curricula

- **Developing Curriculum Plans for User Categories:**
 - Should be recommendations rather than requirements
 - Need some flexibility for users
 - Development of curriculum plans must take place at inter-agency level

Training Options

- **ESRI Instructor-led training**
- **KCGIS Instructor-led training (Authorized Teaching Program)**
- **ESRI Online courses (Virtual Campus)**
- **KCGIS Custom courses**

ESRI Instructor-led

- **Costly (averages \$400 to \$475 per day per student)**
- **Limited number of free seats for County employees if offered at County facility**
- **On-site classes – flat fee.**

KCGIS Instructor-led

- On site
- Historically about \$300 per course per student
- Courses:
 - Migrating from ArcView 3.x to ArcView 8
 - Introduction to ArcGIS I

ESRI Online Courses

- **Costs range from free to about \$125 for ESRI-authored courses**
- **Subscription option saves money**
- **Wide range of courses, many good for migration.**
- **A good choice for motivated, self-directed student.**

KCGIS Custom Courses

- Developed and taught by KCGIS staff
- Designed to be low- or no-cost
- Modular: users choose what they need
- Can be combined for comprehensive survey
- Current examples:
 - Putting KC Data to Work
 - Using AVLib
 - Using iMAP
 - Using Parcel Tools
 - Using Assessor's Data



The Data

Migrating the Data

RUN!!



It's COMING!!!

it's the...

DATA REVIEW!!!

Migrating the Data

Data Review:

- Every layer. If it fails, it gets removed from the coverage/shapefile library *immediately*.
- Develop a template/guideline to determine fitness for continuation.
- Can deal with lingering metadata issues at the same time.

Implications

- **Once a layer is optimized for GDB, it can no longer be edited or posted as a coverage.**
- **(Why? Coverages are from Mars; GDB is from Venus.)**
- **Stewards need to be set up and trained to edit layers in GDB before data migration starts.**

What About the Coverage Library?

(shapefile library will not be affected)

- **Option One: dismantle piecemeal.**
- **Option Two: export from GDB on update**
- **Option Three: obsolete copy**

What About the Coverage Library?

Option One: dismantling piecemeal.

- Archive then delete each coverage from the DW as it is migrated
- all coverages except the cadastral base would eventually just go away.

- **Impacts:**

- None on shapefile users
- would be problematic for those whose apps and map projects rely on coverages.

What About the Coverage Library?

Option Two: export to cov library from GDB.

- Disallow maintenance of coverages as they are migrated to the geodatabase.
- Replaced old coverage version with an export of the new geodatabase layer.
- When every layer has been optimized, then the coverage warehouse can be discontinued.

- **Impacts:**

- all bad...

More Option 2

This option is really, really problematic.

- Possibility of renamed fields > 13 characters
- Poor rendering of GDB true curves results in corrupt data on export to coverage.
- Coverages must be cleaned – can have position creep.
- Other problems.

What About the Coverage Library?

Option Three: obsolete copy.

- Disallow maintenance of coverages as they are migrated to the geodatabase.
- The last version of the old coverage is kept in in the cov. library, but is *not updated* when the geodatabase version is changed.
- **Impacts:**
 - Allows ongoing access to some sort of coverage version, even if it is old
 - users would need to be strongly (and repeatedly) cautioned about obsolescence.

More Option 3

- **More effective for layers which:**
 - do not change on a regular basis
 - whose optimization for inclusion in the GDB would have minimal impact on the basic definition of the layer.
- **Frequently-updated layers would quickly become asynchronous with their coverage counterpart.**

Sigh....

None of these options is good.

Dealing with the Cadastral Base

- **It's huge and hairy and complex**
 - 600,000+ parcels
 - single framework cadastral layer holds *everything*
 - Relationships and data transfers w/City of Seattle

Dealing with the Cadastral Base

- **Can't just drop it into SDE GDB**
 - framework cadastral layer contains all arcs (plat, control, parcel, zoning, many others)
 - hierarchical arc types make pulling out specific layers difficult
 - all cadastral information stored in anno subclasses
 - (anno not spatially related)
- **Can't ignore it.**

Dealing with the Cadastral Base

- **Data design and prototype with smaller selection**
 - Test – loading
 - Test – topology rules
 - Test – editing
- **Make as much progress on other fronts as possible in the meantime**
 - non-cadastral related layers
 - applications, training, agency issues
- **Load and test the full-blown cadastral base**

Enterprise Applications

Old (current) Applications

- Data access, editing, stewardship, metadata, updating
- AML-driven

New Applications:

- **What do we need to migrate?**
 - Data access – yes.
 - Editing – evaluate need
 - Stewardship – yes
 - Metadata – Input: no / access: probably
- **ArcIMS apps for as many ArcView 3.x users as possible**
- **ArcObjects for data access / editing in ArcGIS**
- **?? for metadata**

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Practical Matters

Develop a Task List

- **Specific, goal-oriented tasks**
 - expected timelines
 - responsible parties
- **Group by theme**
- **Group by phase**
- **Set milestones**

Coordinate and Delegate!!!

Software Migration Workgroup

- Consists of technical staff from the “big player” agencies and the KCGIS Center
- Other technical staff are on the CC list and have input / responsibilities where needed / desired
- Meets twice a month
- Action oriented – task list items
- Create / dissolve sub-workgroups to deal with specific issues.

Delegate Tasks

Tech Committee responsibilities:

- Investigate and choose a licensing scenario
- Deal with budgeting
- Facilitate communication

Delegate Tasks

Agency responsibilities:

- **Ensure hardware standardization**
- **Developers, Data Stewards, Analysts (~80 total): Train and migrate software**
- **Allow Developers, Data Stewards, Analysts adequate ramp-up time to get used to software**
- **Everyone else: train and migrate**
- **Data: migrate data to GDB format**

Delegate Tasks

KCGIS Center responsibilities:

- Facilitate communication
- Implement GDB DW
- Implement production GDB
- Finalize training curriculum
- Assist agencies in software, hardware, data migration
- Migrate enterprise applications
- Support legacy applications

Delegate Tasks

Software Migration Workgroup responsibilities:

- **Make it all happen**

... preferably on time, under budget, and without strife



Early Implementation

Preliminary Tasks are Complete

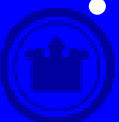
- Develop and enable communications protocols
- Classify GIS users
- Data Review

Other Goals / Tasks

- Implement read-only data warehouse: **done**
- Implement ArcIMS applications to replace ArcView 3.x: **well underway**
- Define agency needs: **started**
- Maintain shapefile library: **yes**
- Develop data loading procedures: **well underway**
- Implement maintenance GDB: **started**
- Data design for maintenance: **started**
- Develop training curriculum: **started**

Lessons Learned So Far:

- **EVERYTHING** takes longer than you think.
- If a contract (i.e., with ESRI) needs to go through “channels” to get signed on your end, get it on its way as early as possible.
- Delegate manageable tasks to very small groups.
- Document everything. Put it on the intranet, and spout the address every chance you get.
- Create a few relatively narrow, relatively easy-to-complete tasks at the beginning to gain momentum.
- **EVERYTHING** takes longer than you think.



Contact Information

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Want a Bit of Light Reading?

- All 150 Pages of GIS Software Migration Planning Fun can be found on the web at:

<http://www.metrokc.gov/gis/kb/Content/SoftMigration.htm>