

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

Cooperative Agreement Number: 04HQAG0194,

Project Title: WA-Trans Puget Sound Pilot Phase I
www.wsdot.wa.gov/mapsdata/transframework/default.htm

Start Date: September 1, 2004,
End Date: December 29, 2006,

Lead Project Organization: Washington State Department of Transportation (WSDOT),
P.O. Box 47300
Olympia, WA 98504-7300
www.wsdot.wa.gov

Project Lead: Tami F. Griffin,
Geographic Services Office
P.O. Box 47384
Olympia, WA 98504-7384
GriffiT@wsdot.wa.gov

USGS Mapping State Liaison: Sam Bardelson,

Collaborating Organizations: *King County Metro,*
Michael J. Berman, *contact;*
201 South Jackson Street
Seattle, WA 98104-3856
www.metrokc.gov

Pierce County GIS,
Chuck Buzzard, GISP, *contact;*
905 Fawcett Ave., Suite 300
Tacoma, WA 98402
www.co.pierce.wa.us/pc/abtus/ourorg/is/gis.htm

Puget Sound Regional Council,
P. Andrew Norton, *contact;*
1011 Western Ave., Suite 500
Seattle, WA 98104- 1035
www.psrc.org

Data Themes: Transportation.

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

Project Summary:

Part A

The WA-Trans project goal is the implementation of a statewide transportation layer for Washington State. This is a collaborative project that relies on data provided by local agencies, tribal nations, and state agencies, where appropriate. The data will include street centerlines with addresses, railroads, ferry routes, non-motorized transportation, airports and eventually water ports. A route/milepost-based linear-referencing system will be developed for WA-Trans data over time. WA-Trans will house and integrate the data and be a data source. Software is being developed to support the functions of data translation, portals for data providers and data users, data integration, quality assurance and quality control, and linear-referencing integration.

The pilot project funded through this Cooperative Agreement is limited to data covering King and Pierce Counties. The WA-Trans Project recognized that using automation to facilitate participation and maintenance are critical success factors. Thus through out WA-Trans' pilots development of software tools are core goals. The development of the translator software, in the scope of the Puget Sound Pilot, is considered a critical success factor for WA-Trans and for WA-Trans' ability to provide data to The National Map (TNM) over time. The translation process allows data providers and WA -Trans to maintain their own data structures to meet their individual needs, the enterprise business needs of Washington State and still provide data to TNM. Thus, developing this translator is a key early step in the completion of the pilot project and ultimately to providing TNM with the transportation layer from Washington State.

After an RFP a couple of computer off the shelf (COTS) translator tools were purchased and tested. It was determined that both would work for WA-Trans purposes. They serve the function of "extract, transform and load" or ETL for GIS data. Successful translators were developed to bring both Pierce and King County data into WA-Trans. A two-stage translation process from data provider format into the WA-Trans format was developed and documented. The two-stage process allows for data providers to cross-walk their data into the WA-Trans format without having expertise in the data structure of WA-Trans particularly in terms of dates and identifiers unique to WA-Trans. Having provider data in a consistent format will eventually allow for automated QA/QC processes to be performed on the initially translated data before putting it into WA-Trans. A translator to The National Map has been developed and is in process of being used to provide the two-county data set to TNM. The development of individual translators is a labor intensive process. This has implications for WA-Trans vision of providing translators back to local governments in their own format. However, the Puget Sound Pilot did validate the belief that translation is a key element to maintaining WA-Trans. Once these translators are in place, except for changes in data structure, they will save considerable time in maintenance of WA-Trans. They will also provide a consistency of processing that will be beneficial for the final dataset.

An additional goal of the Puget Sound Pilot was the effort to develop processes for facilitating the long-term integration of transportation data across borders. A concept developed by Ken Dueker, PhD. in a previous report funded by the USGS called "agreement points", was tested and implemented during this pilot. **An agreement is established between two parties, who**

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

possess overlapping data sets, and who share data boundaries, over the location of shared map features. The points facilitate connectivity and are maintained as an agreement. In other words, King and Pierce County agreed together, for each road crossing the border between the two counties, where they would each locate the end points of their respective road segments. As a result the segment end points from each counties side would match at the border, saving WA-Trans the complexity of moving the local government data and keeping control of the data in the hands of the providers. The providers agree in perpetuity to maintain these points and renegotiate if there is a need to change them. A more detailed report of this process is available from the WA-Trans Project. The pilot effort has determined that standards need to be developed and maintained for the provision of agreement points. The back-end processing of agreement point data in WA-Trans has been a complex process initially, but much has been learned and where local governments enter into the agreement point process there is significant benefit to be gained. Just establishing and maintaining the dialog between all participants has value in and of itself.

Another deliverable of this pilot has been the WA-Trans database. The database is based upon work done during the Geospatial One-Stop for Transportation and by the Oregon DOT. It has been modified to meet Washington business needs. It is very flexible, allowing for multiple “descriptions” (road names) of segments representing linear transportation features as well as multiple geometric representations of transportation features. The Puget Sound Pilot has tested the WA-Trans database as a repository of statewide transportation data. It has been an on-going process, but the database works well for that purpose.

There have been significant challenges in the Puget Sound Pilot. It was an ambitious undertaking from the beginning. Meeting all goals of the pilot was more complex than originally thought. It was believed that local providers could be used as the main technical resource for the pilot. This proved, however, to be unrealistically optimistic. Each partner had demanding jobs and little extra time. Input to the agreement point process and the translation process used up all the time they planned to donate and more. There was not time left for software development and GIS analysis. Dedicated resources were required to make significant progress on the project. Finding funding and filling positions to handle the unexpected workload took extra time. Also the time required to develop translators and implement agreement points was quite a bit higher than anticipated, thus progress has been slow and a great deal within the original scope of the pilot remains to be done.

Another interesting, but concerning challenge arose during the development of agreement points. The use of high resolution boundary data was a critical part. The State of Washington can provide the official geographic reference layer for a county boundary that might meet county business needs as well as the needs for WA-Trans. These features, however, were developed at a very small scale making their utility limited alongside higher resolution data already in use by the counties. Further, county boundaries in Washington have not been surveyed for many years resulting in mismatches with data available from the county. For these reasons many counties have developed and maintained their own versions of their boundary. Pierce County has developed a boundary that is accurate enough to resolve both urban roads and rural roads. King County continues to use the State owned boundary layer. The boundary layers available from Pierce County and King County were close, but did not match exactly, especially along that

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

portion of the boundary defined by the center of the White River. Whether this was due to different development paths for the two boundary layers or the seasonal shifting of the river itself was immaterial. The result was an unwillingness to use the lower resolution State boundary data, and the inability to determine the “true” location of the boundary. An official survey of the shared boundary was not within the scope of WA-Trans. To meet the needs of the WA-Trans Project, a new King County boundary was specifically developed and compiled for use with this project using the King County boundary to the North, East, and West, and the northern portion of the Pierce County boundary. By doing this, a common boundary for the two Counties was immediately established. This boundary will be used in the maintenance of features at or near the boundary. However, even though we used the Pierce County boundary for this pilot, we anticipate this difficulty arising in other jurisdictions. The project is lobbying through state geographic information technology coordinating committees for the State to consider this as a barrier to moving forward with framework type projects in general. It is hoped that this attention might spur a change in priorities leading to renewed work on maintenance of an accurate high-resolution jurisdictional boundary layer.

In spite of the challenges and slow pace, a significant amount of progress and, ultimately, success has resulted from the Puget Sound Pilot. The pilot’s goals of determining the feasibility of translation software to manage bringing in local data without requiring the local provider to change their original data schema for WA-Trans has been proven. This will ultimately lead to lower barriers to data providers participating in WA-Trans as well as opportunities for them to easily integrate data from surrounding regions back into their own. Additionally, processes for handling the translation into WA-Trans has been developed, documented and tested.

The agreement point process has also been very successful. The Pierce-King boundary has been ideal as a pilot project for a number of reasons: (1) Both Pierce County and King County see the potential benefits of WA-Trans and are willing participants in the project. The individuals involved volunteered their time in addition to their regular jobs. (2) Both Pierce County and King County have extensive roadway data. (3) The number of roadways and road-related features offer many opportunities to “work out the kinks” in processes that will facilitate reconciling inter-jurisdictional roadway data throughout the state. Additionally, consideration has been given to how data integration is handled for those jurisdictions which choose not to enter into agreement points. Thus, while complex, the agreement point process had provided a lot of value-added experience and strategic value to the Puget Sound Pilot.

The Puget Sound Pilot has identified and tested several processes which remove or reduce impediments to participation in The National Map. The concept of using translation removes a couple of major road blocks:

- Data providers don’t want to change their original schema to provide data to The National Map or to WA-Trans or to any other combined data set.
- Data providers generally do not have enough resources to make their schema work with other schemas unless it is in their own business interests to do so.

The translation process allows each entity of government to focus on their own business needs and still provide data to each other with minimal additional time committed for maintenance and little or no changes to their own data schema. The use of translation allows the development of a collaborative effort which is focused on Washington enterprise-wide business needs. However,

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

with translation, data can be provided to TNM with only moderate effort and cost and this data can be maintained. This allows each level of government to act as independent entities and still coordinate and collaborate to share data and maximize the benefit to the taxpayers at all levels.

The agreement point process has also removed impediments to participation in that it supports local control over their own data, but facilitates maintenance of a connected, consistent and maintained data set, which will be of benefit to TNM.

The Puget Sound Pilot is not complete. Although we will shortly be providing the data set to TNM, there is still a lot of work to do:

- We plan to add WSDOT data for state routes. This involves conflation of local addresses and decisions about how to handle single representations of centerline and double line representations.
- We have to re-segment data provided into the structure defined by WA-Trans business rules.
- We also wish to test other modes of transportation.
- We need to spend significant time testing providing WA-Trans data back to data users.

Due to the experience the WA-Trans Project has gained through the Puget Sound Pilot, we can develop some specific recommendations for implementation and development of The National Map:

1. Creating an environment where the various data providers can maintain their own business systems, have control over their data and still share that data is key,
2. Defining maintenance processes as part of development or a first implementation leads to a product which has long-term viability,
3. Determining benefits at all levels of government so data providers have a motivation to participate is critical,
4. Providing relatively easy access to TNM schema and being flexible about how data is provided will allow more to share data,
5. Leveraging relationships between natural partners at different levels of government is also important. It is in the best interests of the states to have good relationships and share data with the local governments in their jurisdictions. Thus facilitating projects like WA-Trans to be successful with their local partners will ultimately lead to success for The National Map.

Part B

The WA-Trans Project is focused only on the transportation theme. Thus, this report can only focus on that theme. We are interested in publicly available data right now as it can be considered “low hanging fruit”. As a result, we anticipate no impediment to sharing all this data in WA-Trans. The business needs WA-Trans has identified require that eventually we determine a method for including private data in WA-Trans to meet some business needs. How that will be handled is undetermined at this time. But the use of translation software means data can still be shared with TNM and private data can be excluded.

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

We will be providing data to TNM as soon as we complete the translation. As part of that we will be providing metadata. We assume that the data will be registered with The National Map and Geospatial One-Stop at that time. We are not a web mapping service or a web feature service site but we intend to send updates as we get them complete. However, the project is not in a position to commit to an update cycle or process at this time. The successful completion of a translator will allow us to send data using that translator until TNM data schema changes (which we have been told is going to occur fairly soon). Our ability to respond to these changes is dependant upon the results of evaluating the changes required to the translator, and the impact of those on resources and the schedule at that time. It is also dependant upon interest from TNM.

Part C

WA-Trans can provide data to TNM and can use data from TNM. It must be noted that the changes in the goals of TNM regarding transportation data since the WA-Trans Project got the CAP grant has made WA-Trans less certain of whether there is interest in putting what we are producing in TNM. We understand TNM has decided to use TIGER data for the transportation layer. There is still a potential relationship since the U.S. Census Bureau has also expressed interest in WA-Trans as a data provider eventually so TIGER can continue to be updated. If this occurs then WA-Trans will still be a provider to TNM albeit indirectly.

Part D

WA-Trans has several significant challenges yet to overcome. While we have gotten more funding and are continuing with additional pilots, the project requires significant long-term funding. We have a statewide return on investment (ROI) which shows a very healthy benefit to implementation of WA-Trans. We hope to use that ROI and success with existing pilots to justify full funding. Even then there are a lot of inter-organizational and technical problems to solve. Work on the Puget Sound Pilot has created more confidence, along with more realism, about what it will take to have success.

The passage of time and changes to the goals of TNM has been an obvious challenge. When the grant began the USGS was looking at a blanket and quilt analogy of developing TNM. However, by the time we got ready to make arrangements to provide data, the path to doing so was murky. Eventually our USGS liaison was able to put us into contact with those who might want the data. We are excited to be providing TNM data and look forward to feedback about our work and the process we are using.

Part E

We have had a USGS liaison working on the WA-Trans Steering Committee from the beginning. The USGS has always had a presence on WA-Trans. Since we got the grant the USGS is undergoing a complete reorganization, which seems to have added confusion to their role and made them less available to us. However our liaison has continued to work with us. He retires this summer making the outlook in the future is less certain.

Washington Transportation Framework for GIS (WA-Trans) King and Pierce County Data Translation and Integration Pilot

We have not yet established formal agreements, and do not anticipate doing this until we have completed the project. Changes in the TNM and the USGS leave us uncertain about the long-term viability of continuing to provide data. Additionally, we have much work to do before we can guarantee a particular level of capability. We are setting up Memorandums of Understanding with our partners during the pilot and developing data sharing agreements later in the pilot process. We hope when we are ready there is still a desire for that data at TNM. We feel it has significant value added as it will be updated much more regularly and have much greater temporal accuracy than TIGER, which our business needs assessment demonstrates has great value.

Even with the uncertainty of changes to the USGS and TNM we feel this CAP Grant was of great value to us. It provided the project with the first funding it received and greater credibility. It gave us opportunities for more funding and to work with more groups which have led to many of the successes we have had. It provided the basis for much of the successful implementation and learning we have done to-date. We are glad we were the recipients and hope we can provide equal value back to the USGS and TNM.