



Meeting Federal Reporting Requirements with Roads and Highways

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Presentation



- Overview of Reporting Requirements
- Changes in WV data architecture and model
- Reporting challenges
- Data challenges
- Tools and methods for reporting assistance
- Remaining challenges

Reporting Requirements



- Highway Performance Monitoring System (HPMS)
 - 2014 HPMS Field Manual updates
 - 2010 Reassessment - 2013 impacts
- Fundamental Data Elements (FDE)
 - Portion of Model Inventory of Roadway Elements (MIRE)
 - Primarily intersections and ramps – others already in HPMS
- MAP-21 Legislation
 - Include all local roads in Federal reporting (ARNOLD/TFTN)
 - Performance measures (HSIP, NHPP, Asset Mgmt, NFN, CMAQ, etc.)
 - Changes still coming...

Reporting Requirements



- WVDOT Requirements
 - Internal safety group pushing for all MIRE attributes
 - Asset Management effort supporting a portion MIRE attributes. Need to integrate with Roads and Highways.
 - Interface to Deighton dTIMS data.
 - Interface to Transmetric traffic data.
 - Certified mileage for State of West Virginia.
 - Existing legacy systems with specific data format needs.

Changes in WV Data Architecture



- LRS and road inventory maintenance are currently in independent data systems and merged for analysis and reporting...moving to Esri R&H.
- External use of LRS for the WV Enterprise Resource Planning (ERP) project - wvOASIS.
 - AgileAssets for asset management
 - Assets maintained outside of core WVDOT GIS group
- Leveraging a County and Statewide route designation for all centerlines. Statewide LRM primary LRM of Asset Management project.

Changes in WV Data Modeling



- Normalized data/table structures.
 - Fewer attributes per table
 - Many more tables
- More lookup/domain tables to help with data quality.
- Fewer “keys” between multiple tables.
 - Depend more on spatial and linear relationships
 - Less confusion for data users/maintainers
- Migration pains from ArcGIS > Rome > R&H 10.2

Reporting Challenges



- New specifications for data elements.
 - FDE data elements
 - MIRE elements for safety
- Tools not readily available for reporting.
- New data model allowing for the MIRE attributes, but need to define data reports/views/exports to leverage the data.
- Bringing multiple business units' data together to facilitate reporting and analysis.

Data Challenges



- Not all needed data exists in the DOT.
- Much larger quantity and scope of data.
- Normalized data is easier to maintain, but more challenging to combine for reporting.
- DOT, MIRE, and HPMS data elements not all the same definition.
 - Functional class
 - Shoulder definitions
 - Surface types
 - and many more...

Meeting the Challenges



- Defining a scalable and extendable data model for new data as it comes available.
- Adjusting the data model to accommodate the added attribution.
- Defining good solid data and system architectures for the larger data quantities.

D_FUNCTIONAL_CLASS	
PK	D_FUNCTIONAL_CLASS_ID
	D_FUNCTIONAL_CLASS_DESC
	SYSTEM_CREATE_DATE
	SYSTEM_MOD_DATE
	SYSTEM_RETIRE_DATE
	USER_CREATE
	USER_MOD

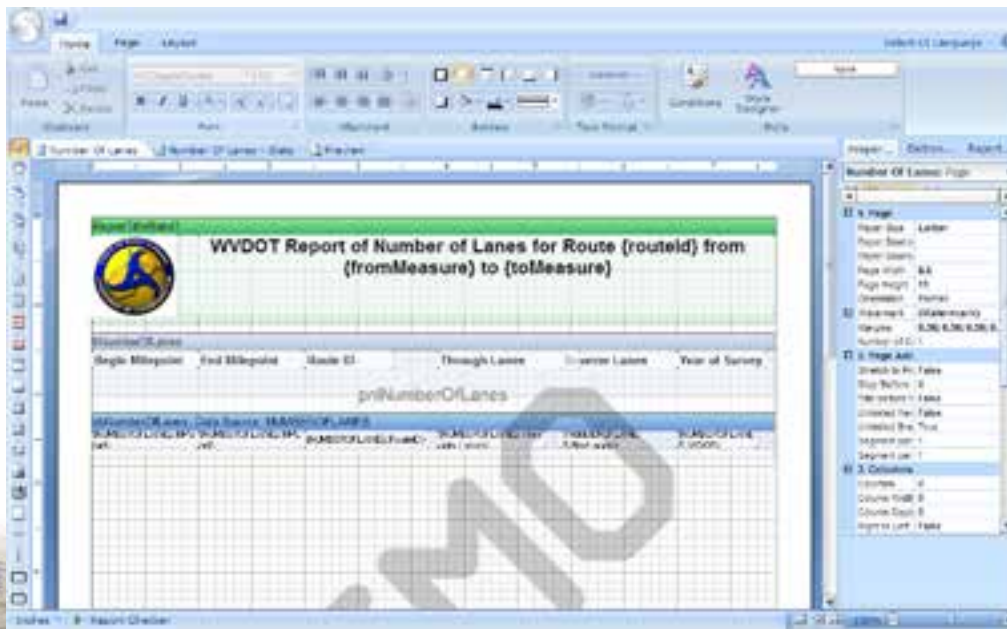
FUNCTIONAL_CLASS	
PK	FUNCTIONAL_CLASS_ID
	ROUTE_ID
	FROM_MEASURE
	TO_MEASURE
FK1	D_FUNCTIONAL_CLASS_ID
FK2	D_HPMS_FUNCTIONAL_CLASS_ID
	FIELD_ESTABLISH_DATE
	FIELD_RETIRE_DATE
	SYSTEM_CREATE_DATE
	SYSTEM_MOD_DATE
	SYSTEM_RETIRE_DATE
	USER_CREATE
	USER_MOD

D_HPMS_FUNCTIONAL_CLASS	
PK	D_HPMS_FUNCTIONAL_CLASS_ID
	D_HPMS_FUNCTIONAL_CLASS_DESC
	SYSTEM_CREATE_DATE
	SYSTEM_MOD_DATE
	SYSTEM_RETIRE_DATE
	USER_CREATE
	USER_MOD

Meeting the Challenges



- Locating or developing tools to facilitate the reporting of the data.
- Integrate reporting tools with the data environment.
- Identifying methods for deriving values from existing attributes and GIS (e.g. intersections).



Tools for Reporting



- Dynamic segmentation tools – provide more robust dyn seg query tools.

The screenshot displays the 'Segment Analyzer' software interface. At the top, there are three tabs: 'Basic Event Merge', 'Segment Query', and 'Advanced Event Merge'. The 'Segment Query' tab is active.

Route Filter: Date: 06/13/2014, Network: State Milepoint, Number of Returned Routes: 43. A 'Define Filter' button is present.

Query Builder: Network: State Milepoint, Event Table: Shoulder Width, Fields: Width (selected), ESTABLISHED_DATE, BORDER_PAVE. Below the fields are navigation arrows and logical operators: '!', '!', 'Like', 'Not', 'And', 'Or'. A 'Values' list contains 4, 5, and 6. A 'Select * From ... Where' section shows 'Shoulder Width'.

Dynamic Operator: INTERSECT (selected), UNION, DIFFERENCE, DELETE LAST.

Dynamic Segmentation Query: Functional Class: Func_Cls = 5 OR Func_Ch = 3; INTERSECT; [Number of Lanes: Lanes >= 2]; UNION; Lane Width: Width <= 11; INTERSECT; Pavement: P_Type = 6.

Output Network: State Milepoint.

Buttons at the bottom include CLEAR, VERIFY, ADD, CANCEL, and SUBMIT.

Tools for Reporting



- Statistical segmentation tools – generate “predominant” and “weighted average” values during dynamic segmentation.
- Route dominance tools – support database level reporting of shared route ownership and concurrent route names.
- Automated intersection data model population for FDE requirements.
 - Intersection leg configurations
 - Interchange contents (roads and intersections)

Reporting Data Architecture



- Publish views and “materialized views” for data analysis and reporting.
- Leverage data temporality in R&H to assist with integrating appropriate data.
- Leverage R&H REST services for syncing external business data with the LRS.
 - AgileAssets – LRS Export and Relocate Event services
 - Deighton dTIMS – Relocate Event services
 - Transmetric Traffic Server – Relocate Event services

Ongoing Challenges



- Aligning the DOT, HPMS, MIRE data definitions...or not.
 - Carry multiple fields for the different needs?
 - Determine if DOT fields can be deprecated over time.
 - Accommodating changes from Federal mandates.
- Aligning the needs of the ERP and Federal report requirements.
- Changing Federal requirements.
- Staffing and skills.

Many thanks...



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Questions??

