

MDOT's Roads & Highways Implementation

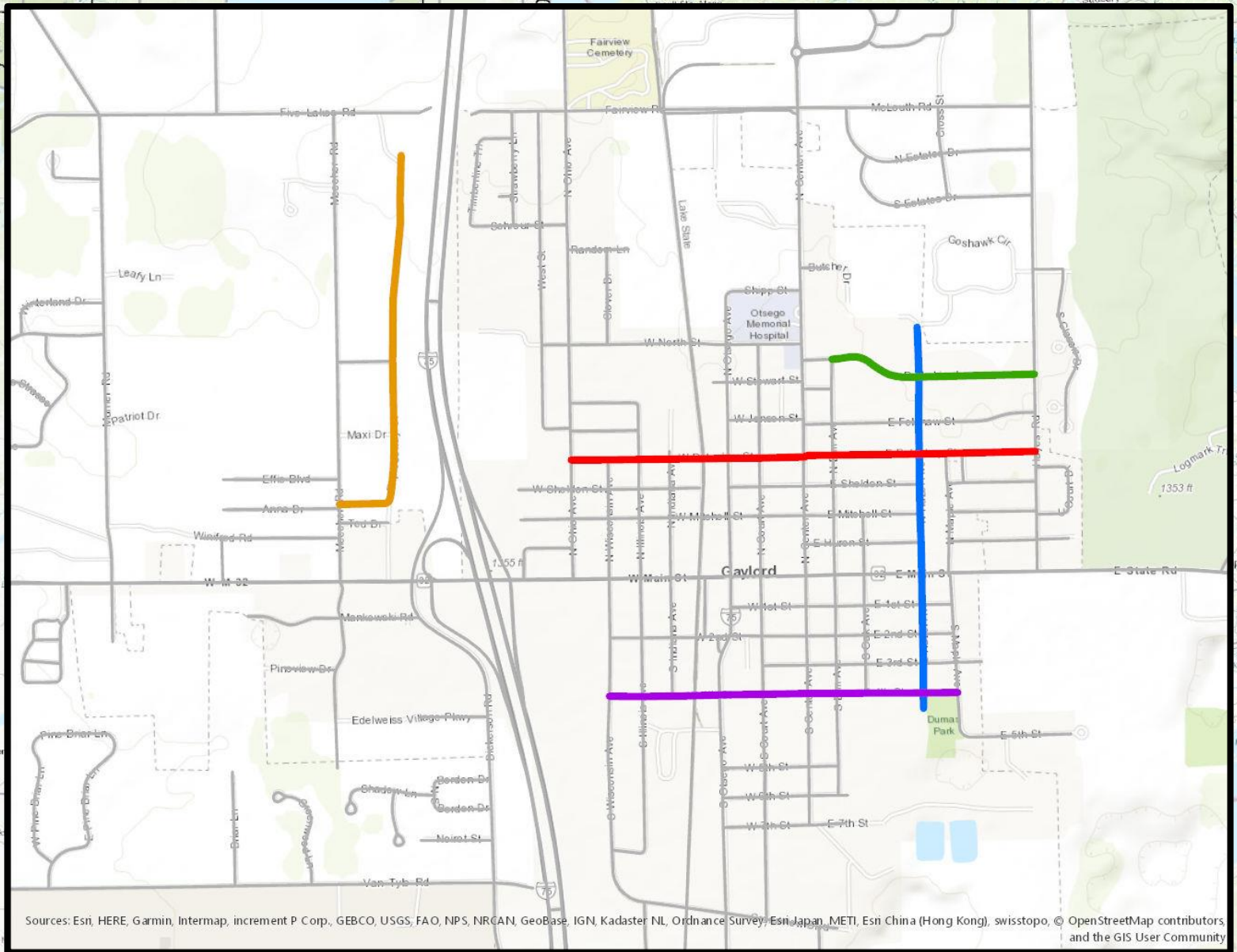
A Journey

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Michigan's Road Network

- MDOT has 120,000 route miles of public road, with 9700 route miles under state jurisdiction
- MDOT's LRS includes three LRMs
 - PR network – seven random digits (unique) for relative small road segments for all roads in the state
 - No concurrencies, no gaps, no non-zero starts
 - Includes some private roads
 - Includes most rails and some trails
 - All data registered to this LRM
 - CS Network
 - Legacy network for the State Trunkline, limited to the trunkline
 - County based
 - Route network
 - Signed state trunkline routes
 - Only LRM with concurrencies



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

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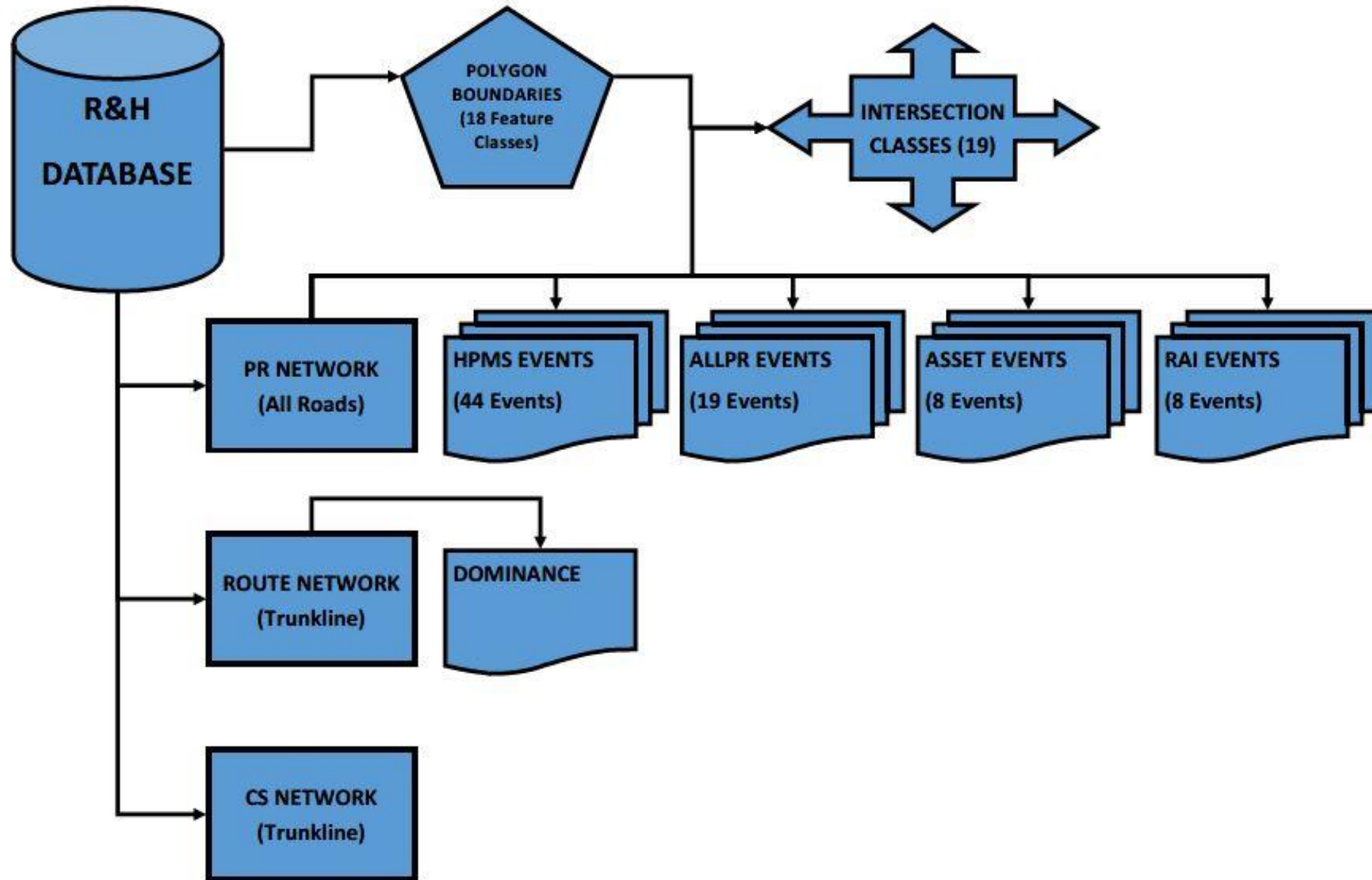
Where We Were

- Michigan was using a LRS editing solution that was custom developed for the State of Michigan
- The technology was old and the tool was not user friendly
- Output was a large denormalized flat file with a mix of LRS and business data
 - Delivered as an E00 output processed using AML's and FoxPro
- Opportunity arose to bring in Esri Roads & Highways technology under a larger MDOT asset management project (TAMS)
 - VueWorks – DTS
 - Roads & Highways implementation – TSS
 - Esri was brought in to model HPMS data items not in original project, and then later to help us with other implementation issues

Implementation

- We normalized all of our LRM's and most of our data.
- We created over 100 events
- We chose to use workflow manager to manage our editing environment
 - We started with 3 event editor instances (HPMS, Act 51, LRS)
 - Since implementation we have created an additional event editor for our traffic data collection where they manage their segmentation in conjunction with TDMS by MS2
- We started the project in Arc 10.3.1 and completed the project in 10.5.1.
 - Recently moving into 10.6.1
- Conflict prevention was chosen due to our decentralized editing business model

MDOT R&H Database Model



Implementation Continued

- We conducted a gap analysis half way through the project and found that we had additional needs. Our solution was the Esri Enterprise Advantage Program (EEAP) to obtain needed support.
- We created an AGOL tool to capture all of our backlog edits.
 - This tool allowed us and our partners to submit summary data, and attachments with an AOI so when we went live we could add the necessary edits to the system.
- We brought in a new LRS specialist

The “Finish” Line

- We went live into production on 10/10/18
- We completed nearly 500 LRS “Jobs” that each involved anywhere from a few edit operations to the more complex jobs that contained several dozen edit operations.
 - Many of these LRS edits required business data owners to make edits of their own in addition to their own backlog of attribute edits that did not require LRS changes.
- Paused LRS editing 12/14/18 to accommodate critical requirements such as HPMS and to process the data for migrating our legacy applications/data.
- Resumed editing on 3/4/19 and continue to edit today.
- We are currently in a period of ongoing learning and system integration, and still considering options for some of the challenges we face.

Lessons Learned

- R&H implementation took much longer than we expected.
 - Have contingency plans
- Business requirements changed as a result of the long implementation.
 - Have a well thought out communication plan with business owners and end users.
- Server architecture and security issues up front.
 - Be vigilant of the ever changing SOM IT infrastructure.
- Having a well thought out data model in place early is important
- Be ready to manage a backlog of needed edits while in transition
 - Have a well thought out plan.
- There will be inevitable personnel turnover (owner and consultant sides) – documentation is important
- Have a plan on how to handle integration with legacy applications that will not be directly tied into R&H
- If possible, do not have your project as a “side-car” to an even larger project.

The Continuing Journey

- Implementation of MS2 traffic software, which integrates with our R&H system.
- Working with other business areas such as pavement, bridge, rail, project management, etc. to leverage R&H data and functionality.
- Integrating MDOT LRS and event data from R&H with data from other state departments in partnership with DTMB-Center for Shared Solutions, Esri, and 1Spatial.
- Working with Esri on building and releasing a tool/widget called “PR Finder” that can be brought into AGO maps to identify a route and mile-point of all our LRS networks.
- Connecting R&H database (SQL Server) to in-house oracle IT applications and databases.
- Plan on having updated version 19 released this summer.