

INDOT 20-year Asset Plans

GIS Day

November 17, 2021

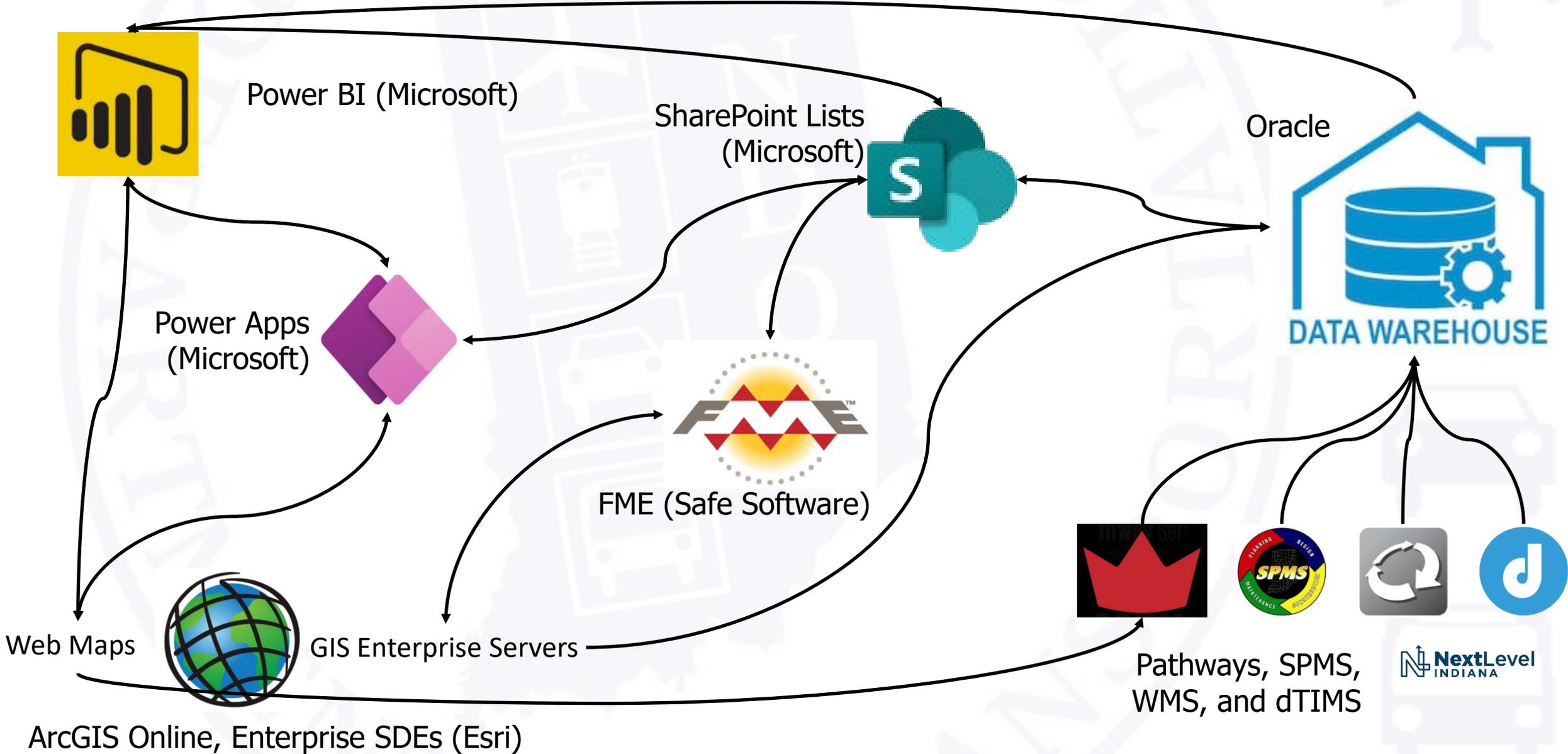
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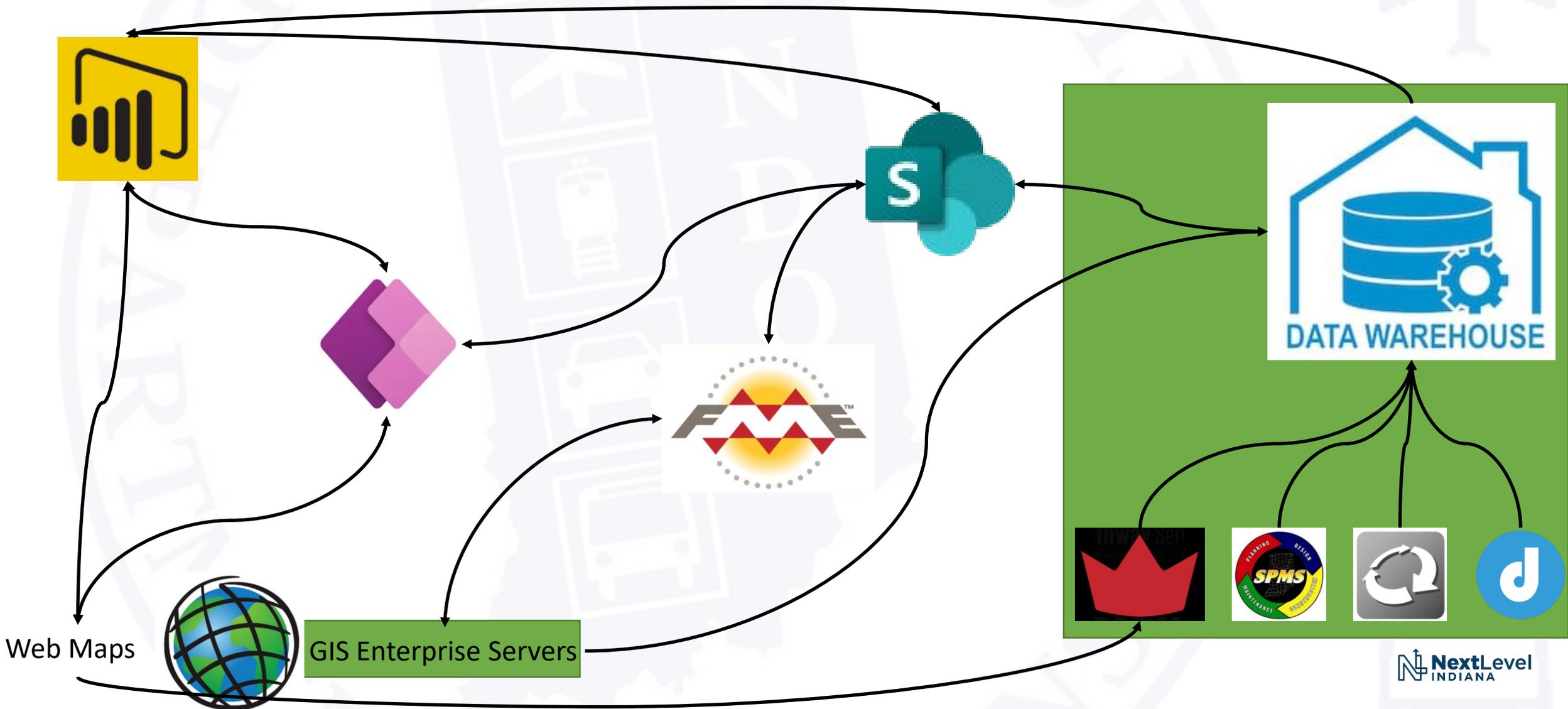
Purpose of the Plans

- Provide a shared long-term plan for INDOT assets
 - “Plan the work – work the plan”
 - Centralized and Authoritative
 - Assets
 - Currently Pavement and Bridge
 - Will extend to Large Culverts next, then Small Culverts
 - Eventually template could be extended to other assets like Traffic Signals
- Easily-accessible plans allow stakeholders to provide feedback and adjust their own plans
 - Scoping
 - Design
 - Construction
 - Maintenance

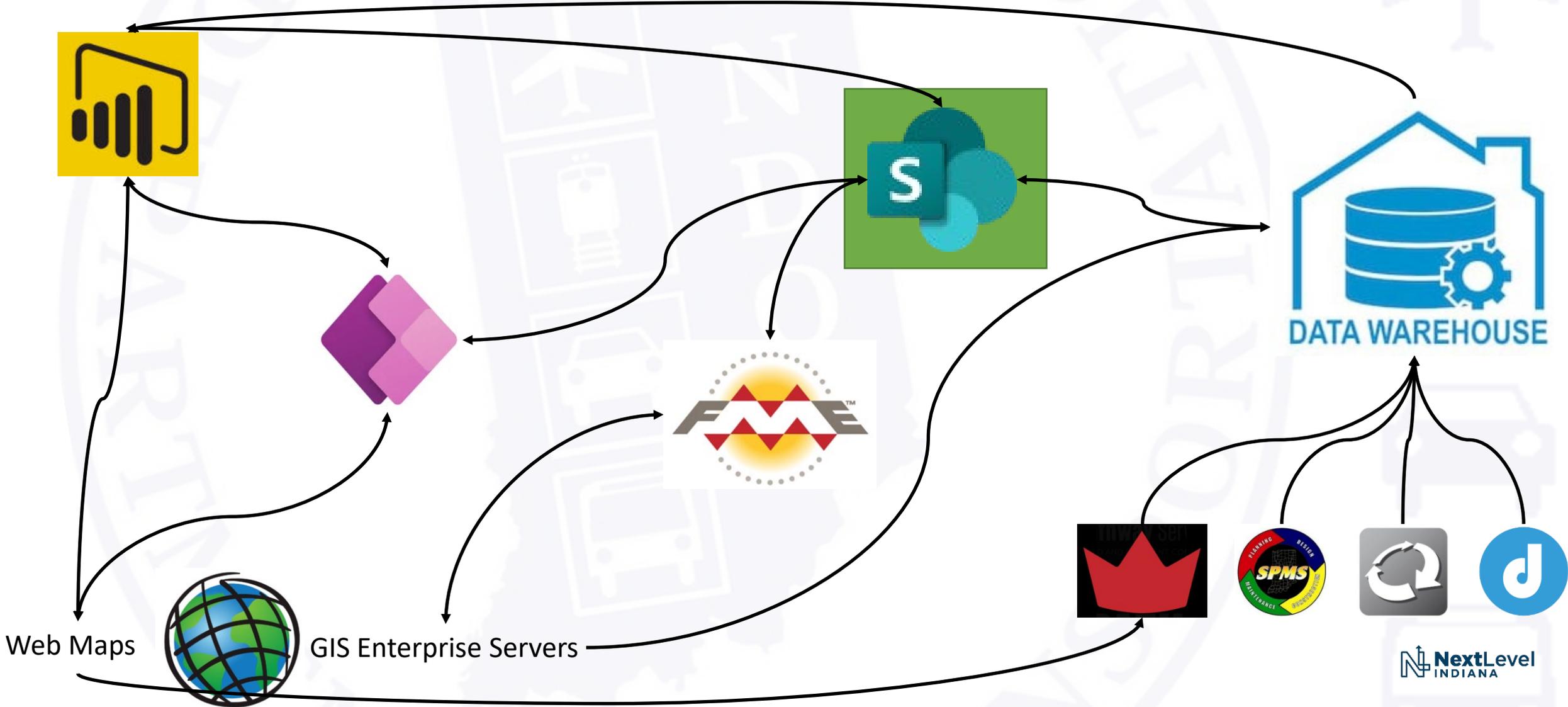
Workflow



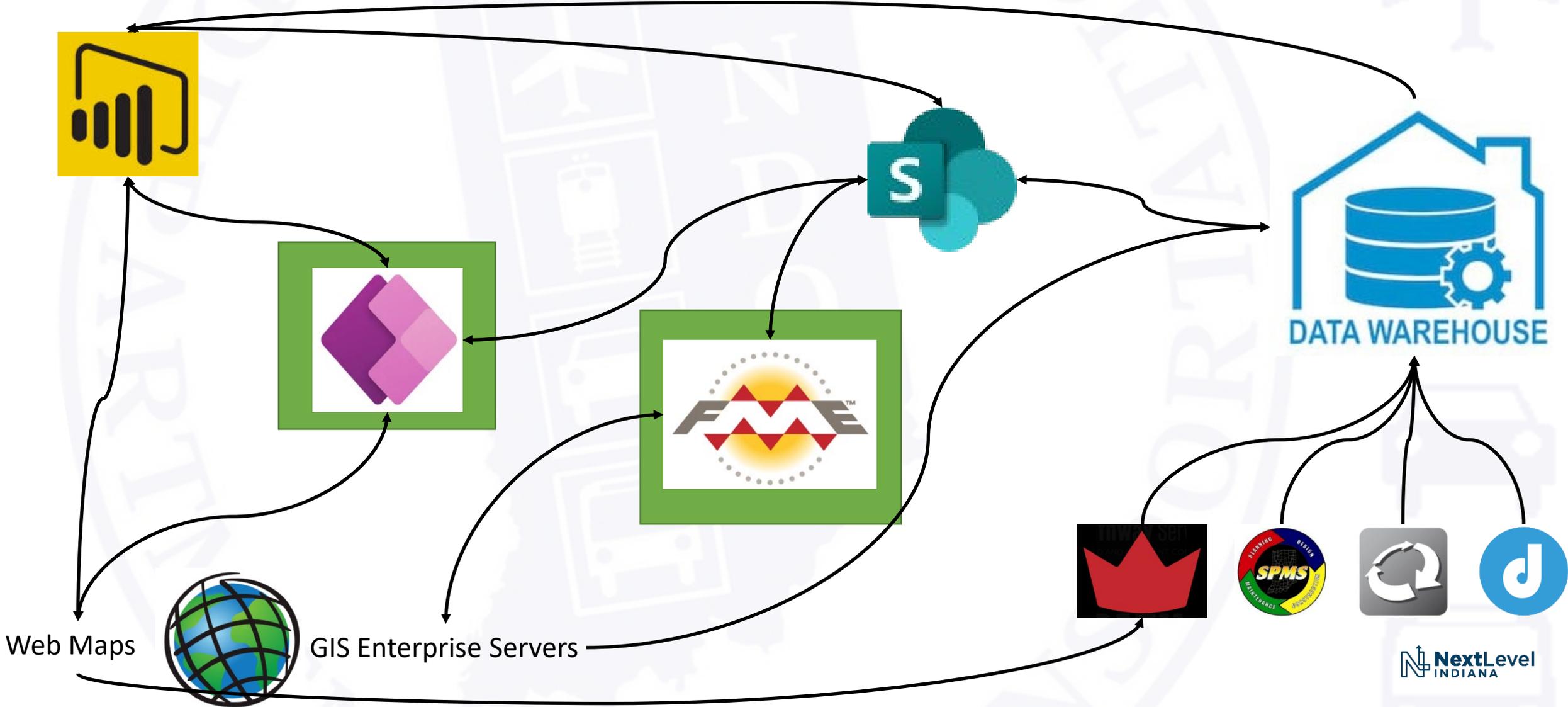
Authoritative Reference Sources



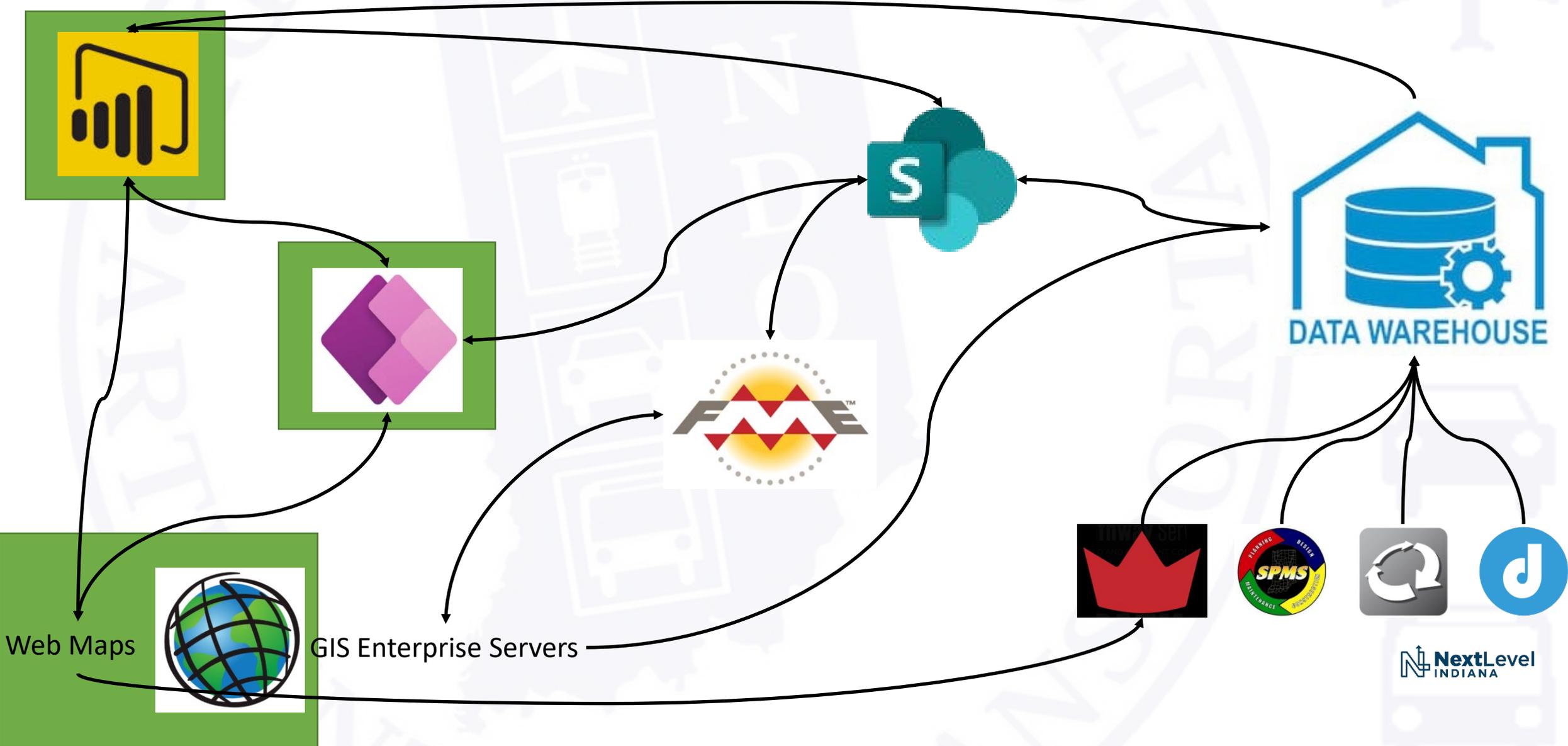
Plan Data Storage



Data Validation and Manipulation



Data Visualization and Analysis



GIS Components

- Roads & Highways
- Asset Inventory and 20-year Plan Web Maps
- FME (aka Feature Manipulation Engine)
- Driven Histories for Pavement Keys

Roads & Highways: Linear Referencing

- ESRI GIS Server and suite of tools primarily Linear Referencing
- Road network is the “Linear Referencing System Network”
- Assets and other data can be placed on the LRS as events with dates, routeIDs, and measures that define its geometry.
 - No independent geometry
 - Easier to maintain if network changes
 - Analysis can be easier in some ways
- Non-LRS data
 - Roadside (e.g., signs), perpendicular, or polygons
 - Can relate back to LRS, but not always easy/simple



Roads and Highways: Data

- Referenced data
 - Asset Inventories
 - Bridge
 - Pavement
 - Pavement conditions
- Data being generated by this work
 - Dissolved Bridges and Pavement Keys
 - 1:1
 - Some joined data not inherent in the original RAH source
 - Time-enabled 20-year plan features
 - 1 feature for each active record in the 20-year plan, so >1 feature per asset

Web Maps

- Web Maps function as base for Web Apps and are also what is visible in Collector and Field Maps
- For this use case, web maps are often a launching point for viewing and editing Power Apps.
- Key novel web map/app functionality utilized for these tools:
 - Direct link to features in map from outside source based on attribute value (asset id)
 - Use of Arcade to generate fields (could also be used for symbology or labels)
 - Custom pop-ups, including generating URLs from attribute values

FME

- Why FME instead of Model Builder?
 - FME has straightforward interface that allows you to debug quickly and step through results easily
 - Don't need to be proficient with Python to generate efficient process
 - FME can accomplish in 1 or 2 steps what might take Model Builder many more
 - Especially true for cleaning up field names and calculating values
 - Can consume and export data in a variety of formats
- Where FME falls short
 - LRS functionality is available (GISTIC research in AZ does great work on this), but not as robust as tools available in Roads & Highways extension's suite of tools
 - Some issues writing directly back to SDE if the data is versioned or if a field has a domain applied
 - Bypass this by creating entire dataset and staging it in a geodatabase that we then have a very simple python script to get it over the finish line.
 - These run in sequence in Task Scheduler via a batch file, so timing is not an issue.

Next Steps

- Create 20-year plans for other assets, large culverts next in queue
- Determine relationships between assets using FME
 - Will run nightly
 - Useful for quickly answering questions
 - “Give me all the bridges that are carried on this route, but exclude the bridges over and on the ramps”
 - “How many pavement keys (sections) have work in 2028 where small culverts will be replaced”
 - Can relate the data in various interfaces (Power BI, Power Apps, ArcGIS)
- Expand suite of reports in Power BI

Reference Links for Functionality

- Web App links that query by attribute:
<https://doc.arcgis.com/en/web-appbuilder/manage-apps/app-url-parameters.htm>
- Esri Arcade Functions, Including Geometry:
https://developers.arcgis.com/arcade/function-reference/geometry_functions/
- Esri Web Map Custom Pop-up:
<https://www.esri.com/arcgis-blog/products/arcgis-online/mapping/configure-pop-ups-custom-attribute-display/>