



**Washington State
Department of Transportation**



What is a Web API (AKA BrM Web Services)?
(Application Programming Interface)

URNS THIS....



Solution1

SQLQuery1.sql - H...SDOT\EvansPa (87)*

SQLQuery1.sql - HQOLYMBRGSQLO2T.BrM60 (WSDOT\EvansPa (87))*

108 %

Results Messages

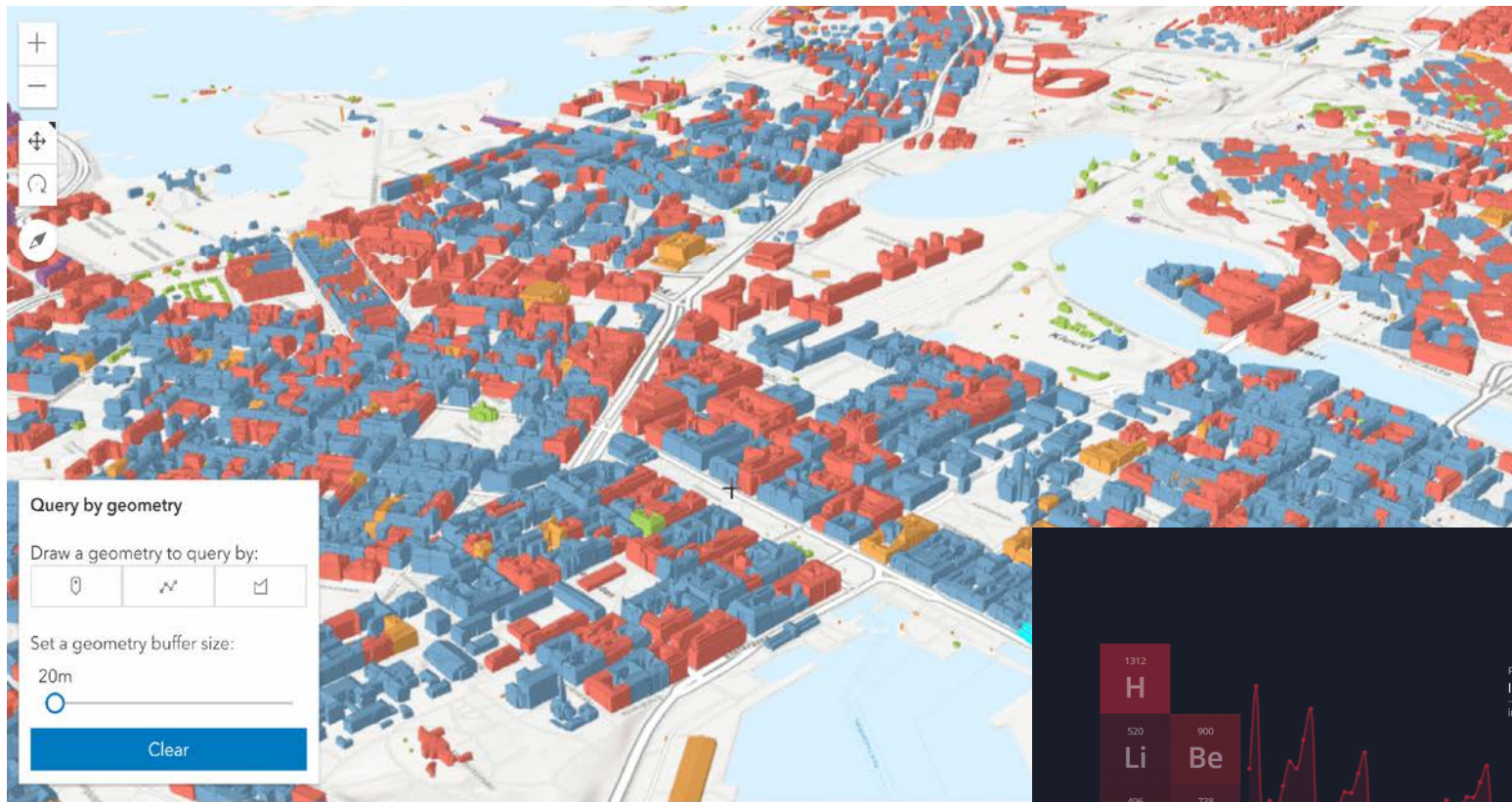
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Query executed successfully.

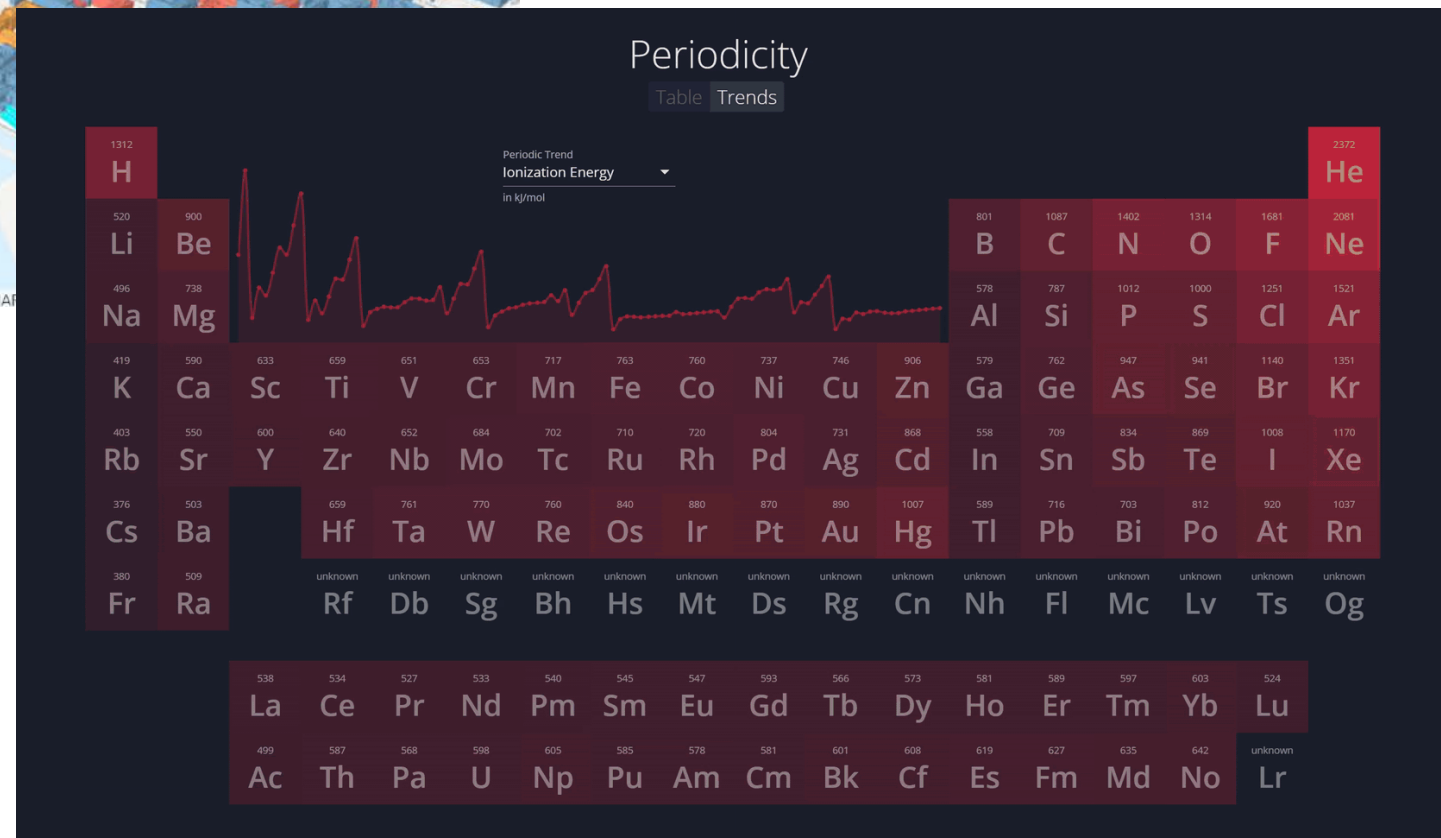
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INTO INTERFACES LIKE THIS....



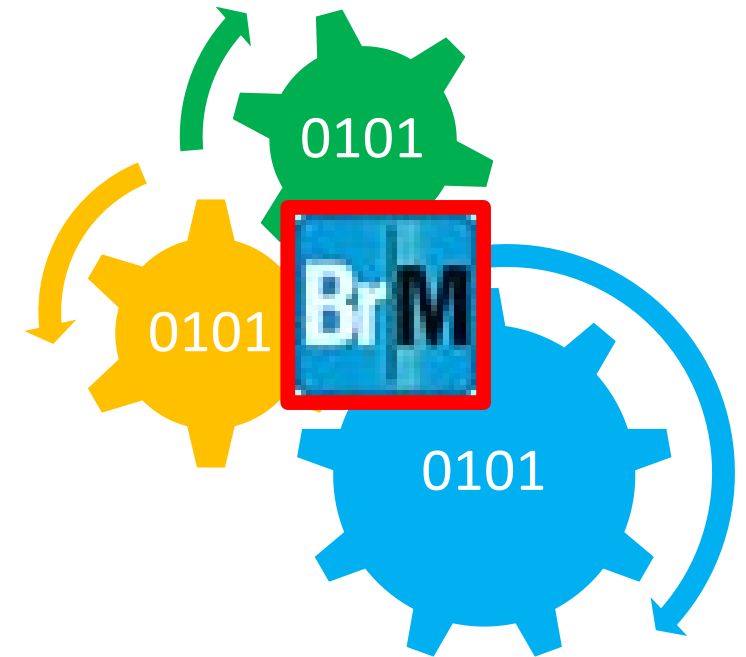
Esri, Intermap, NLS, NMA, USGS | National Land Survey of Finland, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS | Source: USGS, NGA, NASA, CGIA





Washington State
Department of Transportation

Paul Evans – Project Lead
Jason Parent -- Developer



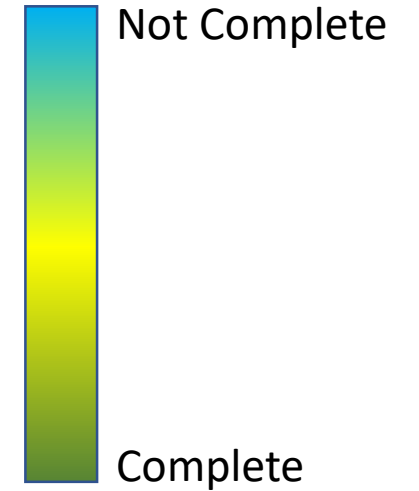
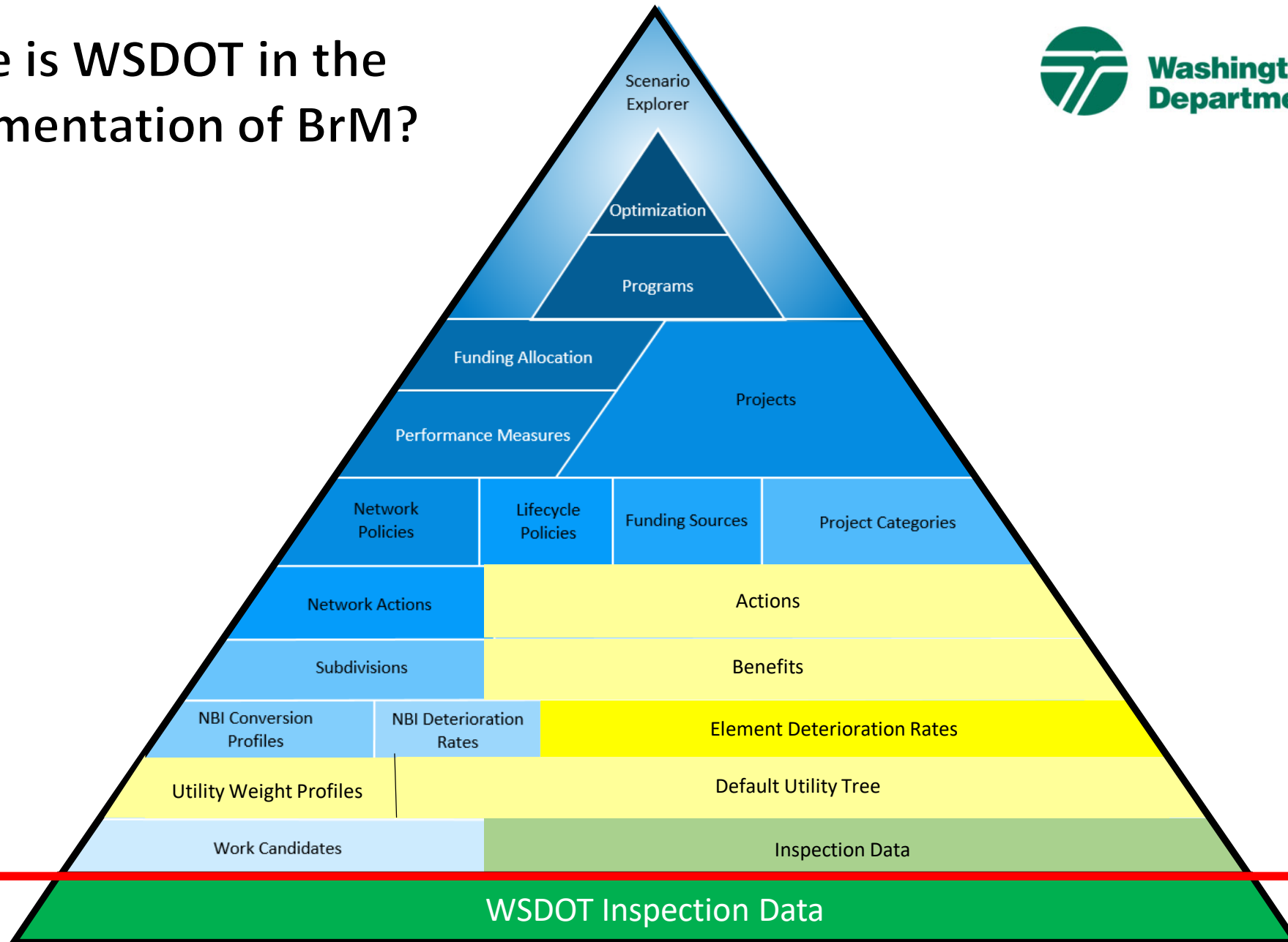
WSDOT Bridge Data & BrM Web Services



WSDOT Data & BrM Web Services

- Where is **WSDOT** in the **BrM** Implementation?
- Our Data “Journey” and the Web API.
- Web Services(API) Development Challenges Encountered

Where is WSDOT in the implementation of BrM?



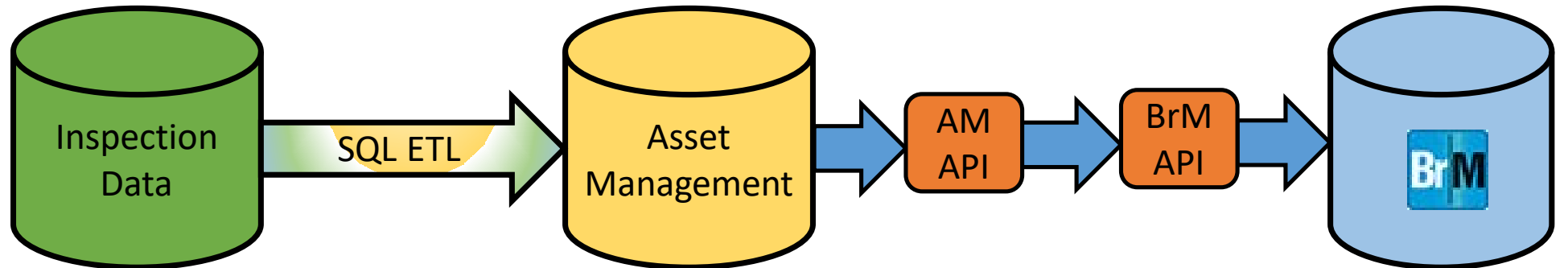
WSDOT Inspection Data

Data Journey Interlude.....





Iteration #3



Data Flow Diagram

TECH MANUAL

Appendix F Web Services API	
F.1 - Purpose	F-6
F.2 - API Requests	F-6
F.2.1 General	F-6
F.2.2 Security	F-7
F.2.3 Request	F-7
F.2.4 Response	F-7
F.3 REST	F-8
F.3.1 GET (verb)	F-8
F.3.2 POST (verb)	F-9
F.3.3 PUT (verb)	F-9
F.3.4 DELETE	F-9
F.3.5 Action Requests	F-10
F.4 REST Controllers	F-10

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Why the API?

- Moving development(Apps/Reporting) to the Web.
- It fits our current and future needs – Data CRUD.
- Provides Security, both front(token) and back end(SQL)
- Plug in any interface we choose.
- Don't have to make any changes to the BrM(Proprietary) database.

Data Transfer Web Page

WSDOT BrM Data Updates

File | O:\BrM\Tools\BrmDataUpdateWebApp\WebApp\UpdateTables.html

Apps WSDOT BrM Data... mssql - npm WSDOT - In The Ne...

You are using an unsupported command-line flag: --disable-web-security. Stability and security will suffer.

WSDOT BrM Update Databases

Select a BrM Database to Update

Select a Database

Update AssetManagement Tables

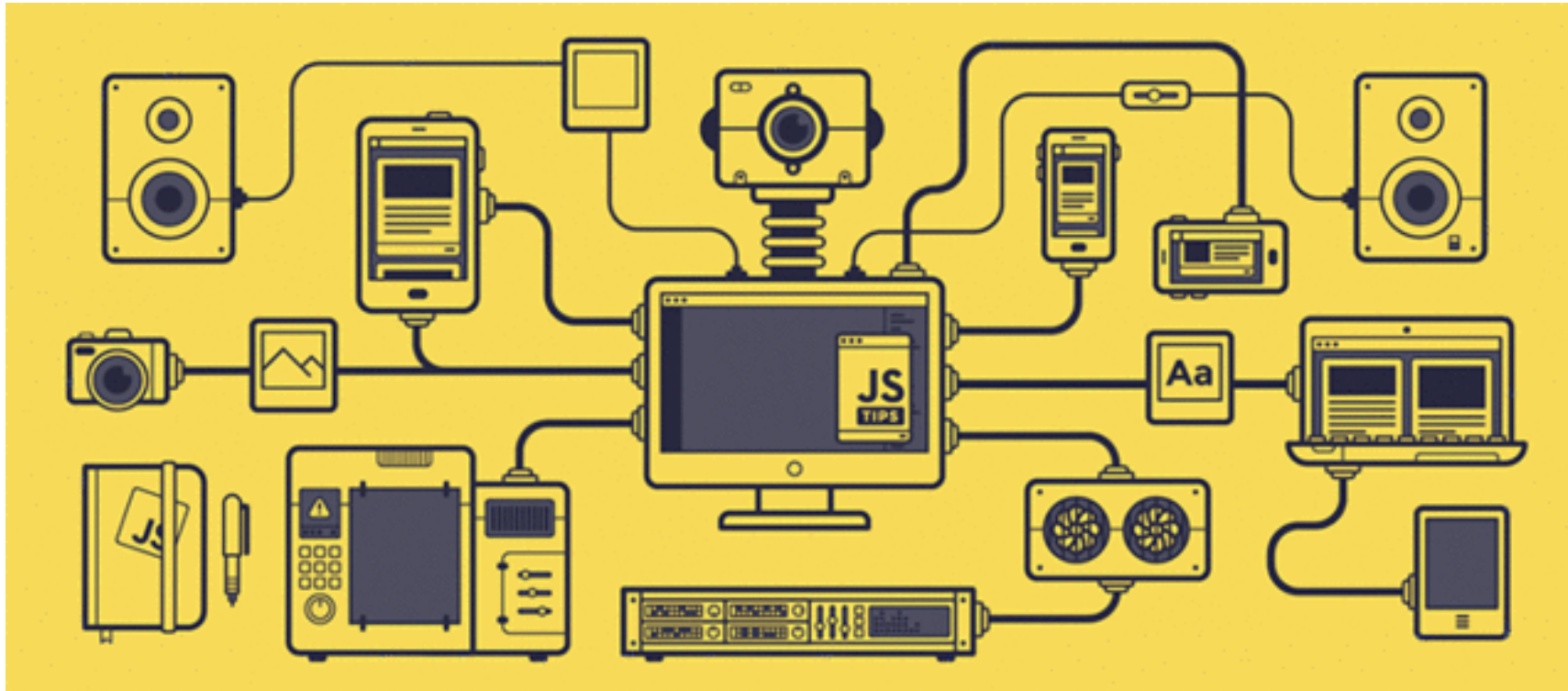
EACH

Select a Table to Update

Update Bridges Update Structure Unit Update Roadway Update Inspections Update Element Data

API CHALLENGES TO OVERCOME

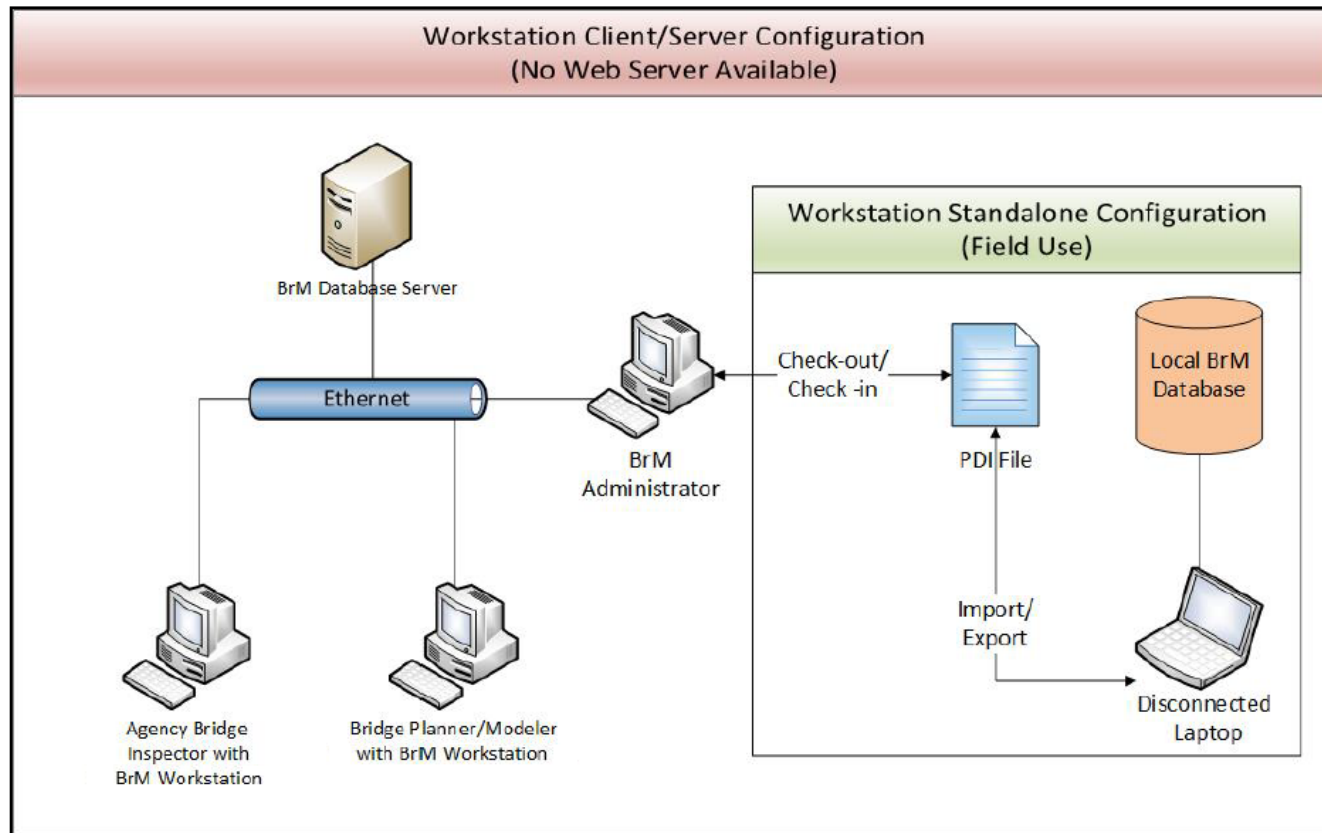
Javascript Language/Libraries



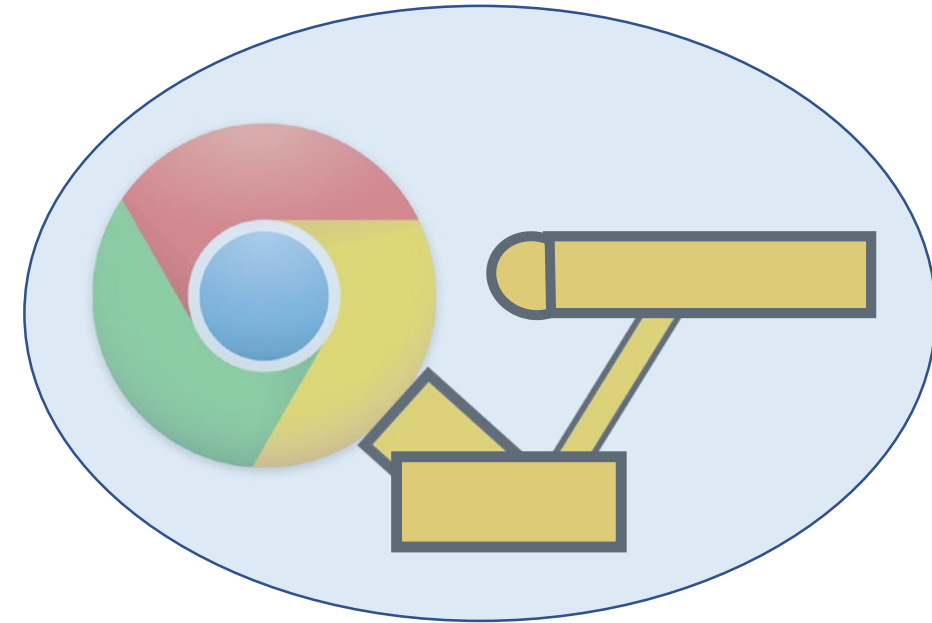
API CHALLENGES TO OVERCOME

Development Environment

Application Configuration



Web Browser

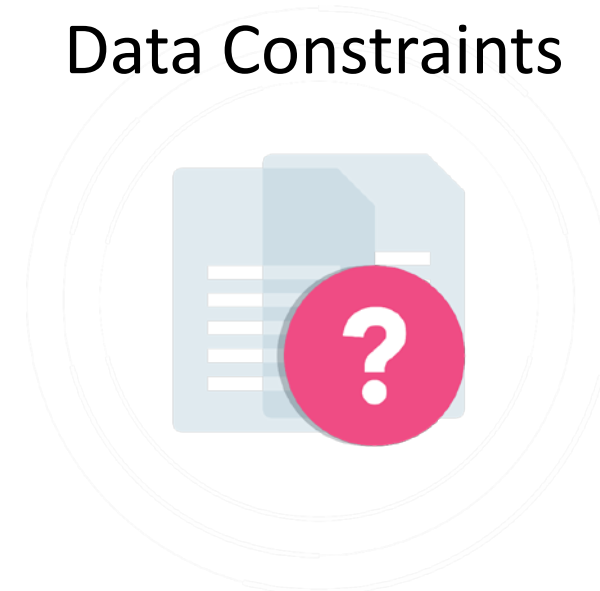


API CHALLENGES TO OVERCOME

Connecting to our db



Data Constraints



Express JS



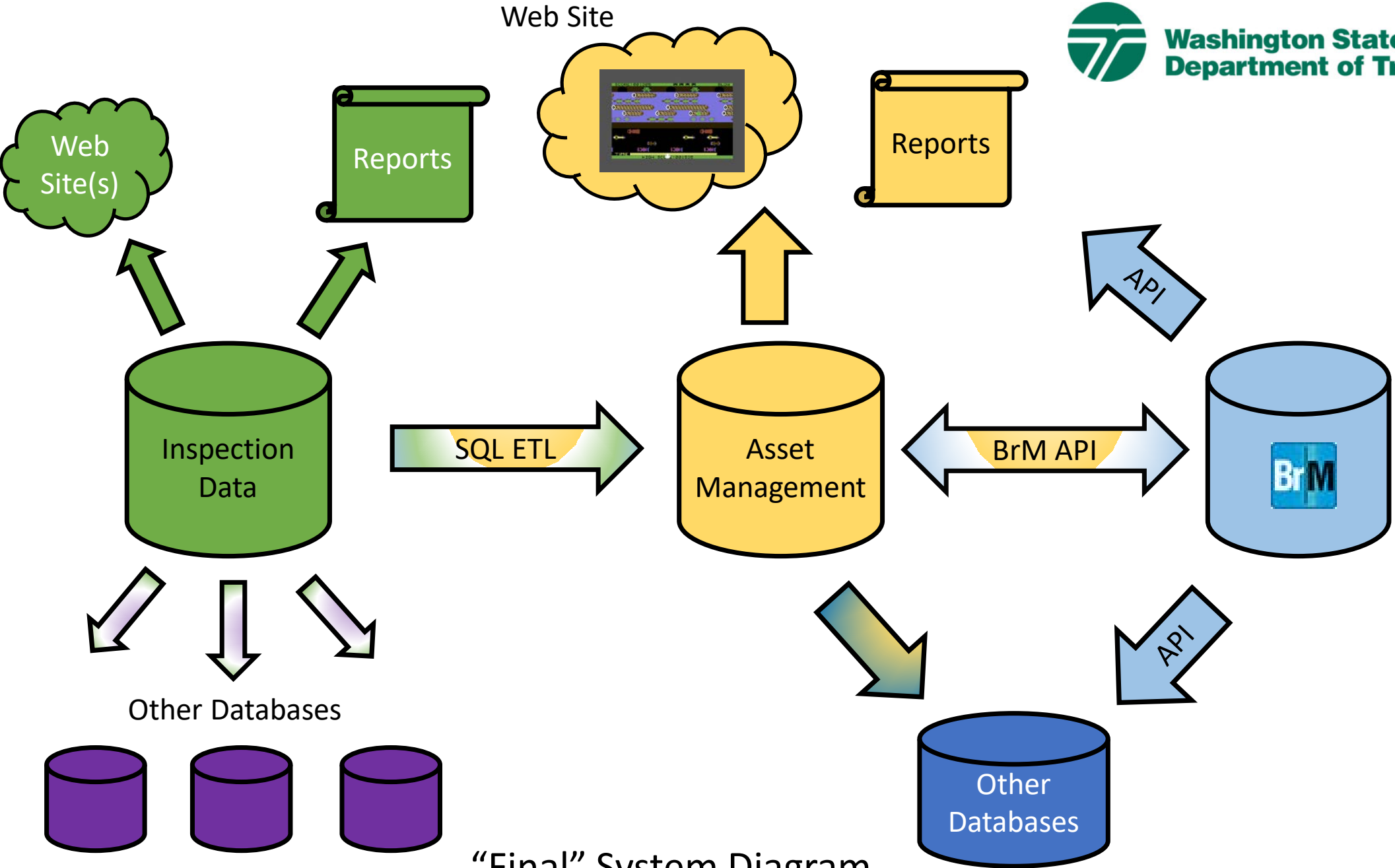
www.acodez.in

Example Shadow Constraint --

BrM -- 'yearrecon' must be of between 1800 and 2054."

--Or NULL.

WSDOT DB allows "0".



“Final” System Diagram



QUICK PROTOTYPE USING JAVASCRIPT AND BrM API

```
//Display Bar Chart for Bridges by District
async function showBarChart() {

  //Send GET request to collect Bridge Data
  const bridgeData = await brmGetRequest('bridges');

  //Set up containers for bar chart data
  let xData = ['District 1', 'District 2', 'District 3', 'District 4', 'District 5', 'District 6', 'Unknown'];
  let yData = [0,0,0,0,0,0,0]

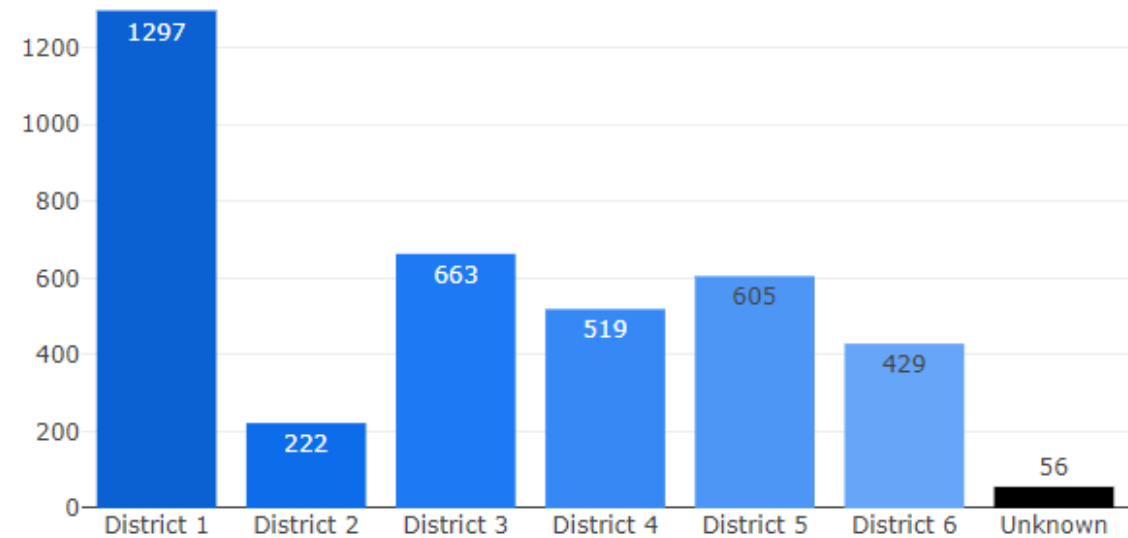
  //Count the number of Bridges by District and add to barChartData
  for (let row of bridgeData) {
    if (row.DISTRICT == '01') {
      yData[0] += 1
    } else if (row.DISTRICT == '02') {
      yData[1] += 1
    } else if (row.DISTRICT == '03') {
      yData[2] += 1
    } else if (row.DISTRICT == '04') {
      yData[3] += 1
    } else if (row.DISTRICT == '05') {
      yData[4] += 1
    } else if (row.DISTRICT == '06') {
      yData[5] += 1
    } else {
      yData[6] += 1
    }
  }

  //Set up rest of Chart Data
  let barChartData = [
    {
      x: xData,
      y: yData,
      type: 'bar',
      text: yData.map(String),
      textposition: 'auto',
      hoverinfo: 'none',
      marker:{
        color: ['rgba(11,97,210,1)', 'rgba(13,108,234,1)', 'rgba(30,122,243,1)', 'rgba(54,136,244,1)',
              'rgba(78,150,245,1)', 'rgba(102,165,247,1)']
      }
    }
  ];

  var barChartLayout = {
    title: 'Bridges By District'
  };

  Plotly.newPlot('barChart', barChartData, barChartLayout);
};
```

Bridges By District



Questions?



Washington State
Department of Transportation



England's 7-Circle Magic Roundabout