

Practical Data Visualization with JavaScript Talk Handout

Use the Workflow Methodology to Compare Options

Name	Type	Data sources	Data transformers	Data visualizers	End-to-end Workflow Support			
					General	Data Exploration	Integration	Scripting Language
Google Maps API	API	Yes	No	Yes	No	No	Manual	Yes
Google Maps Geocoding API	API	Yes	No	No	No	No	Manual	Yes
Library Cloud	API	Yes	Yes	No	No	No	Manual	N/A
Excel	Application	Yes	Yes	Yes	Yes	Yes	Automatic	Yes
Google Sheets	Application	Yes	Yes	Yes	Yes	Yes	Automatic	Yes
Jupyter	Application	Yes	Yes	Yes	Yes	Yes	Automatic	Yes
OpenRefine	Application	Yes	Yes	No	No	No	Manual	Yes
Plot.ly	Application	Yes	Yes	Yes	Yes	Yes	Automatic	Yes
R	Application	Yes	Yes	Yes	Yes	Yes	Automatic	Yes
Tableau	Application	Yes	Yes	Yes	Yes	Yes	Automatic	Yes
Google Charts	Application, Library, API	Yes	Yes	Yes	Yes	Yes	Manual	Yes
MySQL	Application/Database	Yes	Yes	No	No	No	Manual	Yes
OCLC Datasets	Data repository	Yes	No	No	No	No	Manual	N/A
Dataverse	Data repository, API	Yes	Yes	No	No	No	Manual	Yes
HathiTrust Data & API	Data repository, API	Yes	Yes	No	No	No	Manual	N/A
MS-Access	Database	Yes	Yes	No	No	No	Manual	Yes
Processing.org	Development Environment	No	No	Yes	No	No	Manual	Yes
Chart.js	JavaScript Library	No	No	Yes	No	No	Manual	N/A
D3.js	JavaScript Library	No	Yes	Yes	No	No	Manual	N/A
DataTables.js	JavaScript Library	Yes	Yes	No	No	No	Manual	N/A
Dygraphs.js	JavaScript Library	No	No	Yes	No	No	Manual	N/A
jqPlot.js	JavaScript Library	No	No	Yes	No	No	Manual	N/A
Processing.js	JavaScript Library	No	No	Yes	No	No	Manual	N/A
vis.js	JavaScript Library	Yes	Yes	Yes	No	No	Manual	N/A

Summary of Workflow Implementation Considerations (examples)

Category	Data sources	Data transformers	Data visualizers	Workflow
Legal & Ethical	Restrictions on access/use Sensitive content	Restrictions on use Ethical concerns about transformation of data Restrictions on transformation of data	Restrictions on use Ethical concerns about presentation of data Restrictions on presentation of data	Licensing of application, plugins, and/or components Content-based restrictions on sharing presentation and/or results Access/use restrictions on sharing presentation and/or results
Technical	API limits Data quantity Data complexity Data format Tied to use within system Has standalone option	Relevant APIs Impact upon data quality Tied to use within system Standalone option available Compatible with dataset size Compatible with data type	Compatible with dataset size Compatible with data type Tied to use within system Standalone option available Support for viewing on multiple devices, in multiple environments	Application may require plugins Constraints on sharing results of workflow with others Format of data outputs must align with expected input format for transformers or visualizers Workflow is scalable for large quantities of data (e.g. bandwidth, compute resources)
Usability	Useful as-is Ability to select subsets Requires complementary datasets Requires special skills/knowledge to use	Requires special skills/knowledge Supports desired functionality (e.g. selecting subsets; exporting data)	Accessibility standards Visuals support user engagement to the degree required	Requires special skills/knowledge to implement entire workflow
Sustainability	Time limit on access/use Data timeliness Vendor support commitment Active user community	Time limit on access/use Requires special skills Uses recognized standards to implement transformation Vendor support commitment Active user community Support for saving/reusing transformed data Support for, restrictions on exporting data	Time limit on access/use Requires special skills Uses recognized standards for implementation Vendor support commitment Active user community	Workflow save/export/reuse support Results save/export/reuse support Restrictions on save/export/reuse of workflow and/or results Vendor support commitment Active user community

Aesthetic	N/A	N/A	Configuration and styling support Visuals support the story/report Visuals are engaging/compelling	N/A
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Summary of JavaScript Workflow Considerations

Category	Data sources	Data transformers	Data visualizers	Workflow
Legal & Ethical	N/A	Libraries are often Open Source	Libraries are often Open Source	JavaScript and Node.js are free to use
Technical	Many data sources have JavaScript APIs or are accessible via Web services	JavaScript can be used to transform data in the browser or standalone (Node.js) JavaScript libraries support many types of data transformations Many JavaScript data import libraries Node.js can be to process large quantities of data outside the browser	Many JavaScript visualizers and graphics library options JavaScript libraries exist for WebGL and SVG	JavaScript skills are a common extension of Web skills JavaScript can be run in the browser, server, or as a console app One language can span the entire workflow
Usability	Many data sources support XML or JSON output which JavaScript handles well	JavaScript data structures are easy to manipulate and are human-readable Tools exist for easy-viewing of JSON files	JavaScript can support user interaction with UI elements and visual elements	Requires JavaScript skills to implement entire workflow
Sustainability	JavaScript ubiquity/popularity drives vendor commitment and user community	Many Open Source options Libraries often use recognized standards Vendor support commitment Active user community	Many Open Source options Vendor support commitment Active user community	Popular scripting language Downside: Limited workflow save/export/reuse support (other than GitHub) Vendor support commitment Active user communities
Aesthetic	N/A	N/A	Depends upon the library JavaScript support easy configuration through objects	N/A

Examples: Colonial North American Datasets Workflow Considerations

	Data source	Data transformers	Data visualizers	Workflow
Workflow Component	MS-Access, Excel	MS-Access TSV to JSON using Node.js	Bar chart: jqPlot.js Radar plot: Chart.js DataTables	Goal: Reporting
Legal & Ethical	Not all source data could be shared (review pending)	N/A	N/A	
Technical	Multiple data sources Medium sized dataset (5,000 data points) Mixed text, numerical, and categorical data Data is primarily textual, not numeric	Data subset using MS-Access Multiple data transformations from TSV to JSON for individual datasets Transformation from JSON to array data structures Requires custom transformations	Visualizers required arrays as input	Manual integration of components Management of multiple visualizers Workflow is entirely encapsulated in the application
Usability	Data source in easy-to-manipulate tabular format	Data format easy to manipulate with MS-Access and JavaScript	Visualizers supported easy configuration via JavaScript objects Size of datasets has impact on usability	Requires knowledge of HTML, CSS, and JavaScript
Sustainability	N/A	N/A		Project is ongoing so datasets will be updated frequently
Aesthetic	N/A	N/A	Size of datasets has impact on visual design	N/A

Examples: Towards a Collections and Content Development Strategic Plan Datasets Workflow Considerations

	Data source	Data transformers	Data visualizers	Workflow
Workflow Component	Email, Word, Excel (TSV)	TSV -> JSON using Node.js	Bar chart: jqPlot.js Bubble chart: jqPlot.js	Goal: Reporting
Legal & Ethical	Data contains names of original interview participants	Anonymize source data using transformer	N/A	N/A
Technical	Mixed text, numerical, and categorical data Data is primarily textual, not numeric	Multiple data transformations from TSV to JSON for individual datasets Transformation from JSON to array data structures Requires custom transformations	Visualizers required arrays as input	Manual integration of components Management of multiple visualizers Workflow is entirely encapsulated in the application
Usability	Data source in easy-to-manipulate tabular format	Data format easy to manipulate using JavaScript	Visualizers supported easy configuration via JavaScript Size of dataset has impact on usability	Requires knowledge of HTML, CSS, and JavaScript
Sustainability	Data source is closed, no new data	N/A	N/A	N/A
Aesthetic	N/A	N/A	Size of datasets has impact on visual design	N/A

Examples: OASIS Timeline Viewer Workflow Considerations

	Data source	Data transformers	Data visualizers	Workflow
Workflow Component	CSV	CSV -> JavaScript objects, arrays (in the browser)	Bar chart: jqPlot.js Timeline: vis.js DataTables.js	Goal: Data exploration
Legal & Ethical	N/A	N/A	N/A	N/A
Technical	Single data source Arbitrary dataset size (some very small, some very large)	Multiple visualizers required multiple data formats Complex data structures required Complex parsing of data required	Visualizers require configuration Visualizers use different data types	Manual integration of components Management of multiple visualizers Management of user interaction Workflow is entirely encapsulated in the application
Usability	Data source in easy-to-manipulate tabular format	Data format easy to manipulate using JavaScript	Visualizers supported easy configuration via JavaScript Size of dataset has impact on usability	Requires knowledge of HTML, CSS, and JavaScript
Sustainability	Data source will be retired eventually	N/A		N/A
Aesthetic	N/A	N/A	Size of dataset has impact on visual design	N/A