Visualizing the Evidence: Exploring and Explaining Your Data via Interactive Methods
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Data, Data, Everywhere...

Risk assessments begin with broad comprehensive literature searches which can produce tens of thousands of results that must be systematically screened and characterized. This also creates large databases of systematic review metadata (screening and tagging information, literature evaluation details) and relevant data extracted from the literature (exposure-response data, NMEAs and LOELs, uncertainty ranges) that can be difficult and time-consuming to visualize.

Data Visualization is ultimately one of the most useful methods risk assessors have in their toolboxes to address these areas of need at every step of the systematic review process and in two contexts:

- **Exploring data** – Helping risk assessors explore complicated datasets to identify hazards and make decisions.
- **Explaining data** – Increasing the transparency and clarity with which data and analyses are presented to risk managers and the general public.

Evidence maps are one type of data visualization that can address these needs, and they are being used more often in public reports to visually represent systematic review databases and communicate characteristics of integrated evidence.

We present here:

1. How adding an element of interactivity to data visualizations can improve their ability to explain and explore your data;
2. Examples of evidence maps created using published assessment data and three different tools with varying degrees of interactivity, and
3. Concepts to consider while developing these visualizations to maximize their effectiveness.

Exploring and Explaining Your Evidence

All data visualizations ultimately serve two purposes: exploring, explaining, or both!1

### Exploratory Visualizations

You’ve collected so much data, now you need to know:

- What patterns are emerging?
- What story are the data telling?
- Do you have what you need to make actionable decisions?
- What conclusions can you make?

How are you currently exploring your evidence?

Adding elements of interactivity to your data visualizations can enhance your examination of your dataset by:

- Amplifying your ability to ‘drill down’ into your data;
- Helping you easily view emerging patterns and compare groups, and
- Facilitating clear decision-making.

These evidence maps make it easy to discern:

- Emerging patterns – Chemicals and/or outcomes with the most supporting evidence
- Data storytelling – Gaps in the literature
- Possible conclusions – Number of studies examining exposures/outcomes under similar comparable conditions

Data visualization isn’t often the first approach that comes to mind to explore risk assessment datasets, but it is a very effective tool for risk assessors to use to delve into their data and gain insights that allow them to better make decisions based on those data.

Using visualizations like these throughout the literature evaluation and characterization and data extraction processes can inform decisions to revise the review protocol.

### Explanatory Visualizations

You’ve characterized and integrated your evidence, now you need to support your findings:

- Will your audience understand your presentation of the data supporting your decisions?
- Does your audience have specific priorities to consider?
- Does your audience have meaningful access to your underlying data?

How are you currently explaining your evidence?

Leveraging interactive visualizations can help you reach your audience by:

- Presenting summarized information in an intuitive and clear manner and
- Facilitating trust: the audience can interact with and discover the data for themselves to validate your conclusions.

Considering your audience’s needs and perspectives is crucial when crafting useful explanatory visualizations:

- **Expertise** – Are you presenting data to risk managers? Or justifying decisions to the general public? How much does your audience know about your assessment? About exposure-response data?
- **Priorities** – What’s important to your audience? Are they interested in data supporting an outcome or other outcome that could affect them? Will they have access to all the information important to them in your visualizations?

These evidence maps, compared to conventional summary tables, are an efficient means of presenting evidence because they provide audiences with meaningful access to the data used in the assessment, facilitating understanding and trust.

### Example Evidence Maps

Visualize Results

Created using Qlik Sense

This is an interactive visualization. Use the filters to ‘drill down’ into the details of the data, drill or browse evidence, and advance the solution.

Summary of toxicity outcome and exposure

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Data presented here has been edited to showcase example formatting, and does not reflect final assessment data.

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