Evidence Integration

At the EPA’s National Center for Environmental Assessment (NCEA), we work closely with programs throughout the EPA to integrate web-based and desktop computer tools into the assessment process, facilitating evidence integration for science assessment products. By incorporating in-house and third-party tools, both open source and commercial, activities such as the Integrated Risk Information System (IRIS) and the Integrated Science Assessments (ISA) seek to use the best tools for the job, while remaining flexible enough to improve the evidence integration process.

Current Tools

- Health and Environmental Research Online (HERO): Literature search, categorization, acquisition, archiving. Interoperable with HAWC, Distiller, and SWIFT.
- Health Assessment Workplace Collaborative (HAWC): Study evaluation, data extraction, visualization. Interoperable with HERO, BMDS, and Distiller.
- Benchmark Dose Software (BMDS): Dose-response modelling. Interoperable with HAWC.
- Evidence Partners DistillerSR: Literature screening, data extraction. Interoperable with HERO and HAWC.
- Scione SWIFT-Review and SWIFT-Active Screener: Literature screening, prioritization, categorization. Interoperable with HERO and HAWC.

New Tools

Evidence Profile Table

Part of HAWC, the Evidence Profile Table offers a summary explanation of evidence integration in a chemical risk assessment. This view creates greater transparency about the body of evidence by illuminating the rationale behind the assessment findings.

- Adaptation of GRADEPro Evidence Profiles
- Create multiple rows to cover multiple evidence streams
- Select studies and endpoints added to HAWC
- Streams break down into scenarios
- Endpoints are rated within scenarios
- Confidence judgements build from individual to across-stream
- Findings summaries add to confidence judgments

Evidence Profile Table, pictured

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Studies</th>
<th>Factors That Influence Confidence</th>
<th>Factors That Influence Confidence</th>
<th>Confidence</th>
<th>Confidence Summary and Findings for each Outcomes</th>
<th>HERO-Stream Confidence Judgment and Summary of Findings</th>
<th>Inference Across Streams</th>
<th>Across-Stream Confidence Judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study</td>
<td>Details</td>
<td>Reason for Selection</td>
<td>Reason for Selection</td>
<td></td>
<td>Reason for Selection</td>
<td>Reason for Selection</td>
<td>Reason for Selection</td>
<td>Reason for Selection</td>
</tr>
</tbody>
</table>

Evidence Mapping

Integrated with the Health and Environmental Research Online (HERO) database, the Evidence Mapping tool allows researchers to create heat maps to visualize and overlay characteristics (e.g., discipline, exposure, concentration, etc.) of the reviewed literature, making it easy to visualize the available evidence.

- In HERO, scientists use tags to categorize literature for possible use in chemical risk assessment projects
- Using the tool, scientists create crosstabs between sets of tags that code literature by characteristics
- The results are color-coded, creating heat maps for easy visualization of the intersection totals
- The result is a map showing the amount of possible evidence between characteristics, such as location and exposure
- Researchers can layer the characteristics into sets and subsets, adding visual organization
- Interoperable with Distiller

Evidence Inventory

The Evidence Inventory tool, hosted within HERO, facilitates data extraction and portrayal by providing researchers a template to collect and categorize data from the relevant literature and then create summary tables of the extracted information. The summary tables are then ready for export into assessment documents, allowing readers to review the evidence behind the chemical risk assessment.

- Producing a chemical risk assessment document requires extracting and reformating the data in cited studies into tables
- Previously, this was largely a manual task without required standardization
- This new tool uses spreadsheets formatted for different disciplines to help standardize data extraction
- Once the data is extracted, the spreadsheets are transformed into sets of tables useful in the document production process

Future Development

- Store data in HERO for repeated use in assessments
- Develop search and reporting capabilities for extracted data
- Through text and concept mining tools, automate the first pass at categorization and tagging
- Visualize the results of automated categorization in Evidence Maps
- Create tighter integration between HERO and HAWC
- Create, improve, and utilize web service APIs for HERO and HAWC to ease integration with third-party software
- Allow web-based data entry for Evidence Inventory
- Integrate Tableau visualization software with HAWC, Distiller, and Evidence Inventory tools
- Integrate Evidence Prime’s Pupil automated data extraction software with Distiller, HAWC, and Evidence Inventory tools
- Investigate possible standards for extracted data formats to ease data migrations
- Investigate and implement tools for automated table and graph data extraction
- Work on ontologies for data extraction to make the data more easily searchable
- Employ agile development processes to test and incorporate new and useful tools into the assessment process

Disclaimer: The views expressed in this poster are those of the authors and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency. Any mention of trade names, products, or services does not imply an endorsement by the U.S. Government or the U.S. Environmental Protection Agency (EPA). The EPA does not endorse any commercial products, services, or enterprises.