**SIG HLBR Overview Section – 1.3 In scope sub section**

**Original Text:  The in-scope items to be included are:**

1. The  Interpretations Generator must maintain at least the current functionalities with programming bugs evident in the current software addressed and the minimum requirement for an enhanced interpretation generator is to supporting the following functions:

* Generation of National, State, and Local Interpretation ratings using either the Official Soils Data (public-facing database) or the transactional database (NASIS), including the ability to deliver the interpretation ratings on the public-facing database prior to the yearly refresh date. Official data is defined by the National Soil Survey Handbook 644.02a. The official source of soil information is the Web Soil Survey, a part of the National Soil Information System. This system provides for the collection, storage, manipulation, and dissemination of detailed and general soil survey information. The system includes certified tabular and spatial data at various scales.
* The Interpretations Generator must have an easy to use graphical interface that walks the user through the process of developing interpretations, running them, and obtaining the output.  – “Everyone is a beginner”
* The system must allow integration of the laboratory data into the interpretive process and use Pedon data to generate a zonal statistics interpretation map.
* The system has to allow users to use attributes from spatial layers such as PRISM data, LIDAR, proximity to other features like wells and surface water, streams and rivers, in order to provide spatially explicit data for interpretation. It should be able to use the most authoritative data available and be able to use outside tabular data efficiently in terms of processor speed.
* The system must allow forms-based input of data into the interpretive system to allow generation of Interpretation ratings “on the fly” using national criteria on locally collected site specific information, allowing measured and point data to be inserted into the system, such as slope, depth to bedrock, ksat, CEC, and dynamic soil properties from desktop or mobile applications.
* Option to choose what sort of modelling system will process the input data, such as a fuzzy logic system or neural networks.
* Create documentation to fully document the rules, evaluations, and properties used to generate a particular interpretation, using a content management system so that graphics as well as text can be used to explain the assumptions and document the methods for the child rules and parent rules and allow storage of notes related to each part of the interpretation.
* The system must have the ability to allow the user to have the option to see what value of each soil attribute was fed into the evaluation system so as to be clear what numbers are being used to derive the ratings. For example, “Depth to Bedrock 46 cm”.
* Allow users to store interpretive model components and allow access to interpretation rules created and managed by other internal and external users in order to share and to use the interpretations effectively.
* Interpretation model components must be searchable by keywords to allow effective sharing and reduce redundancy across the system.
* Have functionality to facilitate troubleshooting of interpretive criteria.
* To facilitate report writing, the interpretations generator should store interpretive results in a temporary table, which can be queried, while the report scripts and interpretation are executing.

1. Although the interpretations have to be consistent at any given point in time, the ability to update interpretations based upon new knowledge must be maintained.
2. The interpretations have to be delivered in several forms in different applications. The Interpretation Generator should support the following types of data distribution, as described in detail below:
   * Hard copy reports (Print Capability) for both internal use and external distribution.
   * Direct query and on-screen viewing of maps and tables.
   * Electronic transfer of interpretation results to other applications such as APEX and Toolkit.
   * Continued distribution to other products, such as Web Soil Survey, Soil Data Viewer Microsoft Access databases and downloads of gSSURGO.
   * Integrated with the Soil Data Access application/Web Soil Survey.
   * The interpretations generator must give the user the ability to parse out the reasons for a given interpretation and show them graphically on a map. As an example, providing the “very limited” rating along with its reason of ‘flooding’, ‘shrink-swell’, ‘depth to bedrock’, and/or ‘slope’ having the capability to map the collective ‘rating and reasons’ for a given interpretation.
3. The Interpretation Generator has to allow users to preview results using data from the transactional NASIS. The system needs to have a go between NASIS and the SSURGO database. It needs to restrict outside users from accessing the transactional database but still allow internal people to test it against newly developed data. There should be safeguards from allowing external users from accessing the transactional data.
4. There needs to be a way of storing interpretive results for the short term to compare them to additional interpretive results using slightly different criteria. The system needs a way to store previous version of the interpretation without changing the name of the interpretation.
5. The system needs to accommodate the current Web Soil Survey user demand without slowing the system down.
6. The system needs to allow calibration via real data and parameters (e.g. interpretation weights) optimization. This would allow the interpretation model to be fine-tuned. The interpretation would run over and over (e.g. 1000 times) using different scenarios from the real data and then fine tuning the interpretation. The system would also Integrate point data for model development.
7. The System should allow the users to distribute the interpretive results in many different formats and access the interpretation from many different ways with parameters to allow formatting of thematic requests. (Ex - json, geojson, html, REST, SOAP)
   * The Interpretations Generator must have an easy to use graphical interface that walks the user through the process of developing interpretations, running them, and obtaining the output.
   * The Interpretations Generator must have the capability to support more complex interpretations by interfacing with external applications that already contain logic to perform part of the interpretation.
   * The Interpretations Generator must have the ability to support both maps generated on the web as well as the ability to supply data to stand alone GIS systems and statistical analysis systems.

**Proposed changes to : The in-scope items to be included are:**

The New Soil Interpretations Generator must maintain the current functionalities present in the NASIS Interpretations Generator.  The current NASIS Interpretations Generator has these the following functions:

1. Generation of National, State, and Local Interpretation ratings using the transactional Soils Survey database (NASIS). Official data is defined by the National Soil Survey Handbook 644.02a.
2. Ability to deliver the interpretation ratings on the public-facing database with a yearly refresh .
3. The official source of soil information to the public is the Web Soil Survey, a part of the National Soil Information System. This system provides for the collection, storage, manipulation, and dissemination of detailed and general soil survey information. The system includes certified tabular and spatial data at various scales. The new SIG will not replace Web Soil Survey, but will deliver public facing data to the Web Soil Survey.
4. The Interpretations Generator has a graphical user interface.
5. Rule based fuzzy logic model is used for generating interpretations.
6. The system must have the ability to allow the user to have the option to see what value of each soil attribute was fed into the evaluation system so as to be clear what numbers are being used to derive the ratings. For example, “Depth to Bedrock 46 cm”.
7. Allow users to store interpretive model components and allow access to interpretation rules created and managed by other internal and external users in order to share and to use the interpretations effectively.
8. Interpretation model components must be searchable by keywords to allow effective sharing and reduce redundancy across the system.
9. Have functionality to facilitate troubleshooting of interpretive criteria.
10. Reports in text or html format of interpretive output appropriate for export to PDF or other formats.
11. Although the interpretations have to be consistent at any given point in time, the ability to update interpretations based upon new criteria (response curve,  examples?) must be maintained.
12. The interpretations are delivered in several forms in different applications. The Interpretation Generator support sthe following types of data distribution, as described in detail below:
    1. Hard copy reports (Print Capability) for both internal use and external distribution.
    2. Creation of maps using exported data from NASIS top MS Access.
    3. Electronic transfer of interpretation results to other applications such as APEX and Toolkit.
    4. Distribution process using exports to provide data to other applications, such as Web Soil Survey, Soil Data Viewer Microsoft Access databases and downloads of gridded SSURGO (raster based representation of the vector data).
13. The interpretations generator provides the user the ability to parse out the reasons for a given interpretation and show them graphically on a map. As an example, providing the “very limited” rating along with its reason of ‘flooding’, ‘shrink-swell’, ‘depth to bedrock’, and/or ‘slope’.
14. The Interpretation Generator has to allow users to preview results using data from the transactional NASIS.  Notes: not sure what this is asking for.  Is this for current system or is there new functionality being requested?
15. Allow internal users with authorization access the NASIS transactional database for generating interpretations and to test against newly developed data.
16. External users to not have access to the NASIS transactional data. External users will view and utilize only public facing data sources such as WSS and Soil Data Access (SDA).
17. Note:  are there any other features or functionality in the current NASIS system that need to be included in the new system?

The New Soil Interpretations Generator must also have these additional features:

1. Generation of National, State, and Local Interpretation ratings using additional sources of data, not just NASIS transactional Soils Survey Data, including public-facing Web Soil Survey (WSS) data (WSS includes SSURGO).
2. Ability to deliver the interpretation ratings on the public-facing database prior to the yearly refresh date. Official data is defined by the National Soil Survey Handbook 644.02a. The official source of soil information is the Web Soil Survey, a part of the National Soil Information System. This system provides for the collection, storage, manipulation, and dissemination of detailed and general soil survey information. The system includes certified tabular and spatial data at various scales.
3. The system must allow integration of the laboratory data into the interpretive process.
4. Use Pedon data to generate a zonal statistics interpretation map.  NASIS aggregates Pedon soil analysis results for a county level.  SIG should allow use of Pedon for a single location rather than aggregated data.
5. The system shall allow use most authoritative data available for attributes from spatial layers  in order to provide spatially explicit data for interpretation.such as:
   1. PRISM data - The new system must be able to use PRISM spatial and tabular climate data.
   2. LIDAR data - topographic data.
   3. Hydrologic Layer - proximity to other features like wells and surface water, streams and rivers,
6. The new system should be more efficient and be able to process large volumes of data efficiently and quickly.
7. The system must allow forms-based input of data into the interpretive system to allow generation of Interpretation ratings “on the fly” using:
   1. national criteria on locally collected site specific information,
   2. allowing measured and point data to be inserted into the system, such as slope, depth to bedrock, Saturated Hydraulic Conductivity ksat, Cation Exchange Capacity (CEC), and dynamic soil properties from desktop or mobile applications.
8. Create documentation to fully document the rules, evaluations, and properties used to generate a particular interpretation.  Use a content management system so that graphics as well as text can be used to explain the assumptions and document the methods for the child rules and parent rules and allow storage of notes related to each part of the interpretation.
9. During an interpretation process, data  should exists temporarily for multiple soil component iterations which can be queried during the process, but is not retained after the interpretation has completed.
10. The delivery of interpretations to various different applications needs to be improved. The Interpretation Generator should support the following types of data distribution, as described in detail below:
    1. Improved reporting capability for interpretations results resulting in hard copy reports (Print Capability) for both internal use and external distribution.
    2. Mapping reports integrated with the application and allowing direct query and on-screen viewing of maps and tables.
    3. Automated integration to provide data from interpretation results to other applications such as APEX (note: define APEX), Conservation Desktop (CD) (replacement for CST), Soil Data Access application, and Web Soil Survey.
    4. Improved integration and distribution of data to other products, such as Web Soil Survey, Soil Data Viewer Microsoft Access databases and downloads of gSSURGO.  Simply the processes and automate where possible.
    5. The current interpretations generator provides the user the ability to parse out the reasons for a given interpretation and show them graphically on a map. As an example, providing the “very limited” rating along with its reason of ‘flooding’, ‘shrink-swell’, ‘depth to bedrock’, and/or ‘slope’.  Additional features need to provide the capability to map the collective ‘rating and reasons’ for a given interpretation.
11. In addition to fuzzy logic model the system should provide additional options to  process the input data, such as neural networks, and others to be determined.
12. Ability to run multiple versions of interpretations using the same data, but with different modeling criteria and/or different modeling techniques (fuzzy logic, neural networks, etc.).  Ability to compare tabular or mapping display of versions of related interpretive results using same data but different methodology. The current system will allow this, but the relationship between the version is not captured, it has to be defined manually by the user.
13. Ability to use previous criteria and modeling techniques with new set of updated data, create a new version, to compare with an older version.
14. The system utilization of Web Soil Survey data should not impact the performance, responsiveness, or user experience of WSS.
15. Interpretations are for determination of outcome for land use with soil types.  The system needs to allow optimization for a soil type for a land use in a specific interpretation, by calibrating and fine-tuning the model criteria.  Then finding the best fit of the model for the measured responses  (e.g. interpretation weights).  The current system runs the interpretation manually many times, with manual tweaking of criteria.  The new system should allow automated multiple runs with pre-determined inputs for alternative criteria.   for example:  a criteria defining a response curve might need to be tweaked using different scenarios.
16. The current system utilizes aggregated generalized data.  The new system would also allow option to integrate point data (specific location soil samples with characterization test results) for model development.
17. The System should allow external users to export the interpretive results, and/or WSS data for use within other systems or tools.
    1. Larger volumes of data for export will first allow the user to define the data to be exported using filter criteria, such as location, soil type, land use, etc.  The user will then select an export format or thematic map requests.  Format options currently are pipe delimited text or html.  Other formats are needed such as MS Access, SQL, XML, etc.
    2. Data for a single point, soil sample with soil characterization composition test results, could be exported to a mobile platform in a web service input formation such as json, geojson, html, REST, SOAP.  Note: need clarification from Dylan B. (graduate student at Davis working with Professor Bear, who is now and NRCS employee).  NRCS contracts with Davis to do this kind of mobile application.
18. The Interpretations Generator must have an easy to use graphical interface that walks the user through the process of developing interpretations, running them, and obtaining the output.
19. The Interpretations Generator must have the capability to support more complex interpretations by interfacing with external applications that already contain logic to perform part of the interpretation.
20. The Interpretations Generator must have the ability to support both maps generated on the web as well as the ability to supply data to stand alone GIS systems and statistical analysis systems.

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