Complex Pick Reports

S-100 WG8

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NIPWG Task Group on Portrayal of Complex Pick Reports

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INTRODUCTION

- Following several discussions of structured pick reports, NIPWG established a task group on complex pick reports at NIPWG 10. The aim of this task group was to:
  - Identify use-cases where additional functionality for portrayal of pick-reports is needed.
  - Provide visual samples or descriptions to support development of complex portrayal.
  - Consider available short-term solutions and priorities
- Significant limiting factors in such portrayal are the technical aspects consisting of the absence of available functionality in S-100 to specify the construction of pick report content and structure.

PICK REPORTS IN CURRENT SPECIFICATIONS

- S-52 describes the pick-report functionality as information that should be displayed on deman including "*object description and associated attributes in human readable language".*
- S-98 version 1.0.0 05/2022 describes pick reports in S-98 “Main” clause 10.12 and “Annex C” clause C-15. S-98 “Main” clause 10.12 states that pick reports may be specified in the individual Product Specifications, and later reused within an Interoperability Catalogue. Clause C-15 in Annex C describes common principles for pick reports applying to all Product Specifications, and makes a start at defining common formats for some cases (e.g., tidal streams, which are expected to be common to S-101 and S-111).
- A future version of S-98 could define either:
  - General rules that that would work similarly for all Product Specifications.
  - A machine readable styling rule implementation, which can be customized by each Product Specifications. (= an Extension to Portrayal Catalogue functionality)
- S-98 recognizes the need for data organization to support navigation through complex structures. This navigation could include expandable tree controls or tabs.

CASES WITH “COMPLEX PICK REPORTS”

- ServiceHours (including scheduleByDayOfWeek)
- ContactDetails
- textContent (including information) and featureName
- Regulations (also Recommendations, Restrictions, Nautical Information)
- Applicability associations
- Features in other product specifications:
  - Applicability Time series of water level data (S-104)
  - Tidal stream panel (table of speed and direction)(S-101)
  - “Light characteristic strings” are also a case in point – a single-purpose solution dating from S-57.

EXAMPLE 1 – SCHEDULES (COMPLEX AND SIMPLIFIED LAYOUTS)

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Operations	Days	Times	Notes
(Table sub-header, from *featureName* if present - omit this row if *featureName* is not present) Links to other unusual attributes like source and graphic can be included here.			
Normal, Closed, Unmanned OR other: abcde[3] Attribute *categoryOfSchedule* From *ServiceHours* Date ranges *fixedDataRange*, *periodicDateRange*	(Day(s) of week) DoW (single day) OR DoW - DoW (if *dayOfWeekIsRange* = *true*) OR DoW, DoW (if *dayOfWeekIsRange* = false)	(Times of day) hh:mm–hh:mm hh:mm–hh:mm … *timeOfdayStart*, *timeOfDayEnd*	(Additional information) *complex attribute information*
(repeat *according to multiplicity of scheduleByDayOfWeek)*			
Exceptions *NonStandardWorking Day* associated to the above *ServiceHours*	(fixed and variable date(s) from *dateFixed* or *dateVariable*)		(Additional information) *complex attribute information*
(repeat both rows above, according to multiplicity of ServiceHours associated to the feature or information type)			

Since S-100 Edition 5.0.0 portrayal does not provide for specifying templates for text formatting, the implementation of tabular forms must be left to implementers for this edition. As a provisional alternative, information may be displayed in text form, with rows of Table 11.2 converted to phrases:

Normal operation: (date range) DoW-DoW, hh:mm-hh:mm, (additional information/link)
Exceptions: (fixed/variable dates), (additional information/link)

SOLUTION APPROACHES

- Options for solutions to the problem:
  - Additional static (HTML) support files are provided together with the dataset.
  - New Portrayal rules in XSLT or LUA to dynamically generate the pick-reports.
  - Templates (a combination of static templates and dynamic population by rules).
- Interim solution – define “system attributes” containing pre-generated formatted content:
  - Content to be generated from attribute values of the owning feature as well as related features/information types,
  - S-98 to require ECDIS to display this attribute as the (entire) pick report for the owning feature.
- The solution would ideally work, or at least be conceptually the same, for all three data formats described by S-100 – ISO 8211, GML, and HDF5.
- Many of the NIPWG Product Specifications include the options to add narrative text using *textContent* and *information* attributes, even this is not the recommended solution.

OPTION 1 – SUPPORT FILES

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Support files instead of data-driven pick report or portrayal

The simplest solution is to encode the structured information in an HTML support file which has been previously created by the cartographer. This approach:-

- Cannot handle dynamic information.
- Will find it difficult to handle data products with short production cycles or streamed data, because of the extra time and/or custom programming needed to prepare the support file(s).
- Cannot be used for programmed queries (is not “machine readable”), at least not without defining a complex format and query API which would complicate matters significantly for both implementers and encoders (and require an extension to S-100).
- Relegates core information such as vessel types and dimensions for Applicability to a support file; since the concept for support files is “additional information”, retraining will be required so that mariners know when to look for significant information in support files instead of a pick report or on-screen. This will result in confusion about the roles and significance of support files – something to be avoided if at all possible.
- Requires an extension to S-100 portrayal as currently specified in order to replace pick-report display with support-file-based display for designated features.

OPTION 2 – GENERATION BY PORTRAYAL RULE

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Generation by portrayal rule

Another approach is to write portrayal rules (in the language used by the portrayal catalogue, which S-100 specifies as either XSLT or Lua) capable of generating the entire portrayal or pick report dynamically, that is, creating the display content for the specific features and information type instances, including all of the tabular, structured text, and or graphical components (data plots as well as pictures). Presumably this would produce a result in a well-known format or combination of formats, such as HTML for layout and text and SVG for graphical components. This approach:-

- Requires significantly complex programming logic to implement.
- Needs custom implementation for each such situation (combination of features/information types, i.e., one rule for schedules, another rule for Applicability, etc.).
- Requires an extension to S-100 portrayal to allow the generated file to take the place of the on-screen or pick-report display.
- Would be easier with XSLT rules than Lua rules (or any procedural language like C++, Java, or C#), but still requires that the subject features and information types be converted to a suitable input format. For GML formats, this would be easier if the original GML for feature/information type instances can be retrieved by a simple query, but this in turn would require implementations to include such a retrieval interface (or a conversion API, for non-GML formats).

OPTION 3 - TEMPLATES

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Templates

A third approach is to define templates describing the display structure, which are populated by portrayal rules when the feature/information type group is selected for a pick report or portrayal. This approach:-

- Also requires more programming logic to implement, though simpler than generating the entire pick report for the feature/information group as in the previous approach.
- Requires a custom template for each situation, i.e., one template for schedules, another for Applicability, etc.
- Requires an extension to S-100 portrayal to define the template language, provide for including template files in portrayal catalogues, and define the processing model for instantiating templates and displaying instantiated templates.
- Should be more compatible with Lua rules (or any other procedural language like C++, Java, or C#) than the previous approach.
- Should also be compatible with an XSLT based approach that is also convenient for programmers.

The templates would be defined as a part of the Portrayal Catalogue for the Product Specification and prepared during work on the portrayal catalogue.

INTERIM SOLUTION – “SYSTEM ATTRIBUTE”

- Many of the same considerations as support files.
- Given anticipated sizes of displays and current constraints on embedded text, the system attribute might end up becoming a specialized file reference to a support file.

CONCLUSIONS

1) S-100 application schemas are data-centric structures designed to facilitate machine-readability and support processing actions:
    1) Combination of data from multiple sources
    2) Relevance-based filtering and display, for example during route monitoring vs. route planning.
2) Information displays should be easy for users to comprehend and not necessarily in the same data-centric structures. The data structure and relationships may be complex but their presentation should not require end-user familiarity with, or analysis of, data models.
3) Common Pick Report guidelines and functionality remain to be specified.
4) Product Specifications should address the role of context parameters in the display of their data product.
5) Some information structures are reused by multiple products.

ACTIONS REQUESTED

- note this paper
- advise on specification and prototyping of complex portrayal
- advise on other use-cases for complex portrayal
- advise on technical feasibility of solution approaches paraphrased in the background section including the interim solution and document extensions needed in S-98
- ensure that the solution works for other data formats than Part 10b GML (specifically, ISO 8211 and HDF5 formats).

Recommend interim solution for now, follow-up with Option 3 (Templates)