DEFINING THE NOTION OF CONCEPT MAPS 3.0

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Web based concept maps can be viewed as reflections of generations of web technology. Thus we define the following generations of concept maps:

Concept maps 1.0
- Can be authored directly in HTML (Hyper Text Markup Language), and can be used in web browsers.
- Can be shared through email or social media.
- Can be embedded in web pages.

Concept maps 2.0
- Can be created using dedicated online or web based tools (Cmap Tools).
- Can be saved in standard formats (CXL).
- Can be shared through email or social media.
- Can be embedded in web pages.

Concept maps 3.0
- Can be created using dedicated online or web based tools (Group Cloud).
- Can be saved in standard formats (CXL).
- Can be shared through email or social media.
- Can be embedded in web pages.
- Can be exposed as web data.

Based on the Web Data Principles above, we propose five requirements for concept maps 3.0 as data sets:

1. Concept maps should be accessible, that is, available on persistent URI, to enable query and other forms of processing (Johnson, L. & Jensen, J., 2016).

2. Concept map metadata should be represented in formats that can be processed by machines, for example, RDF (Resource Description Framework). The representation should be such that it can be linked to other data on the web, so that concept maps can be linked to other data and data can be linked to concept maps (Johnson, L. & Jensen, J., 2016).

3. Concept maps should be understandable, that is, accessible to all users, including those who cannot see the visual representation of the concept map (Johnson, L. & Jensen, J., 2016).

4. Concept maps should be linkable, that is, accessible through persistent or stable identifiers, so that they can be linked to other data on the web (Johnson, L. & Jensen, J., 2016).

5. Concept maps should be usable, that is, accessible to all users, including those who cannot see the visual representation of the concept map (Johnson, L. & Jensen, J., 2016).

These five requirements are based on the following Web Data Principles (Wilde, E., 2016, http://dret.github.io/webdata/), which outline five recommendations for exposing data on the Web of Data / Semantic Web.

- Usable data is data that can be consumed by any software, and thus discoverable and conductive to processing (Johnson, L. & Jensen, J., 2016).
- Parseable data is data that can be consumed by any software, and thus discoverable and conductive to processing (Johnson, L. & Jensen, J., 2016).
- Understandable data is data that can be consumed by any software, and thus discoverable and conductive to processing (Johnson, L. & Jensen, J., 2016).
- Linkable data is data that can be consumed by any software, and thus discoverable and conductive to processing (Johnson, L. & Jensen, J., 2016).
- Accessible data is data that can be consumed by any software, and thus discoverable and conductive to processing (Johnson, L. & Jensen, J., 2016).

These recommendations state that Web Data should be:
- Usable
- Parseable
- Understandable
- Linkable
- Accessible

A simple example of how a concept map 3.0 can be annotated and exposed as web data using the schema.org vocabulary and the format JSON-LD

This particular example includes a snippet of code specifying metadata for a history concept map about the American general George Armstrong Custer