DEFINING THE NOTION OF CONCEPT MAPS 3.0

Jasper Jensen & Lars Johnsen, University of Southern Denmark, Denmark
Email: jasperj@sdu.dk, larsjo@sdu.dk

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 created using desktop tools (CmapTools, VUE).
- Can be exchanged in web 1.0 formats (HTML, GIF).
- Can be embedded in web 1.0 documents (HTML).
- Can be adapted to web 1.0 standards (HTML, JVM).

Concept maps 2.0
- Can be created using distributed online / web based tools (CmapCloud).
- Can be linked to external web (web 2.0) technology for collaboration or publication.
- Are represented in open standards such as SVG (Scalable Vector Graphics).

Concept maps 3.0
- Can be linked to other resources such as external data or knowledge bases.
- Are represented in open formats (CXL).
- Are used to mark up concept maps as linked open data (LOD).
- Can be embedded in webpages.

Defining Five Fundamental Requirements for Concept Maps 3.0

We have adopted 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.

These recommendations state that Web Data should be:
- Linkable
- Parseable
- Linked
- Mindable
- Usable

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

1. Concept maps should be Linkable, that is, savable as persistent at stable identifiers. This obviously applies to the concept map as a whole but preferably also to its constituent parts. In this way, external resources become to specific entities or subjects in the concept map (Johnsen, L. & Jensen, J., 2016).

2. Concept maps should be represented in open formats that do not require proprietary software for processing and whose source code is open upon inspection (Johnsen, L. & Jensen, J., 2016). SVG can be used to fulfill this requirement of concept maps being graphically, as SVG is a W3C (World Wide Web Consortium) endorsed open format and standard, supported by browsers, can be embedded in HTML (Hypertext Markup Language), and can be rendered as part of larger web pages.

3. Concept maps should be annotated by metadata using "well known" and/or "well documented" vocabularies (Johnsen, L. & Jensen, J., 2016).

4. Concept maps should be Linkable to other resources to enhance their informative or learning value. Links should be typed if possible to signal their communicational purpose and/or the nature of their target and to make automatic processing possible (Johnsen, L. & Jensen, J., 2016).

5. Concept maps should be annotated with a license to signify who, where, how and why they may be used and under what circumstances (Johnsen, L. & Jensen, J., 2016).

This can be achieved by linking to a Creative Commons license, which will allow the concept maps in question to signal how they can be licensed to use concept maps 3.0, as well as for alternative visualization of both internal and external data.

References:

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.

```json
{
  "type": "CreativeWork",
  "name": "George Armstrong Custer",
  "description": "What was General George Armstrong Custer famous for?",
  "additionalType": "Person",
  "sameAs": "http://cmap.ihmc.us/xml/cmap"}
```