

TOWARDS CONCEPT MAPS 3.0: VISUAL LEARNING DESIGNS AS WEB DATA

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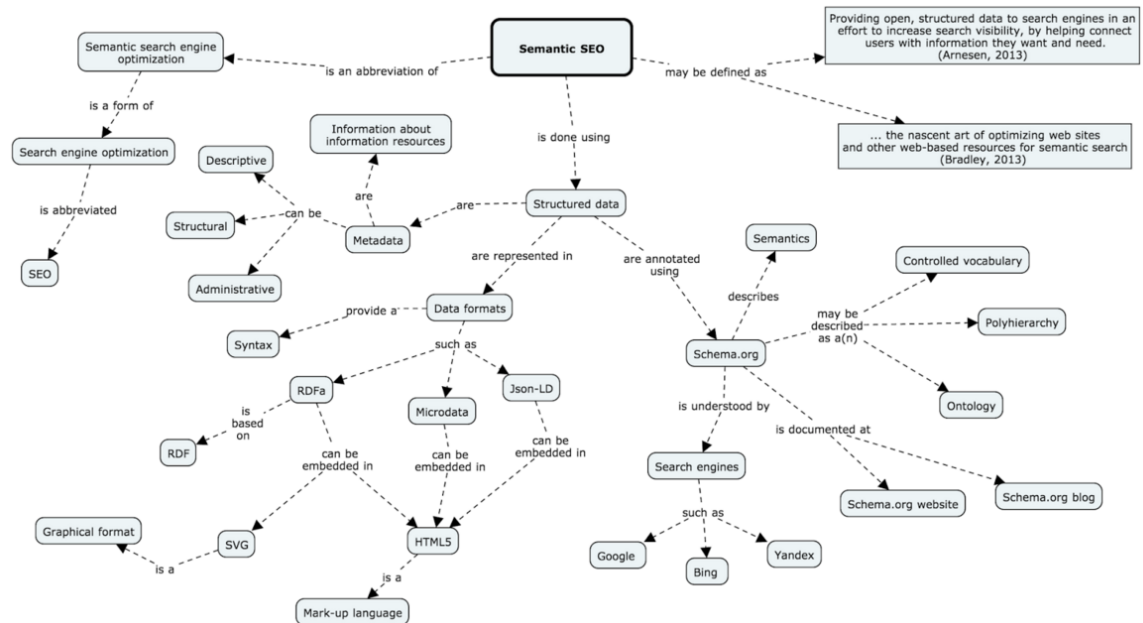
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CONCEPT MAPS

- Visual representation of knowledge of a topic.
- Focus question.
- Concepts & linking phrases.
- No restrictions on words, phrases, visual signals (shapes, color, etc.).
- Some software facilitates multimodality.

Is often used

- As teaching material.
- For evaluation of student understanding of a specific topic.
- For supporting collaborative learning.

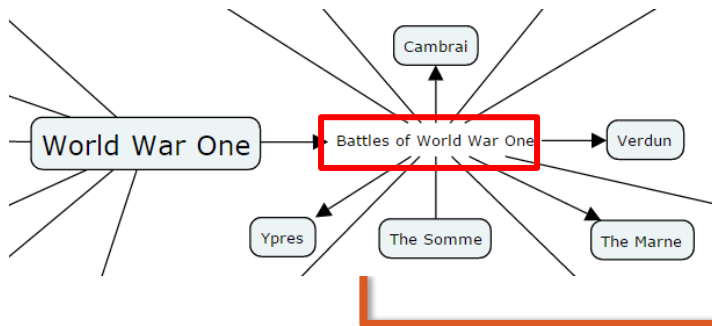
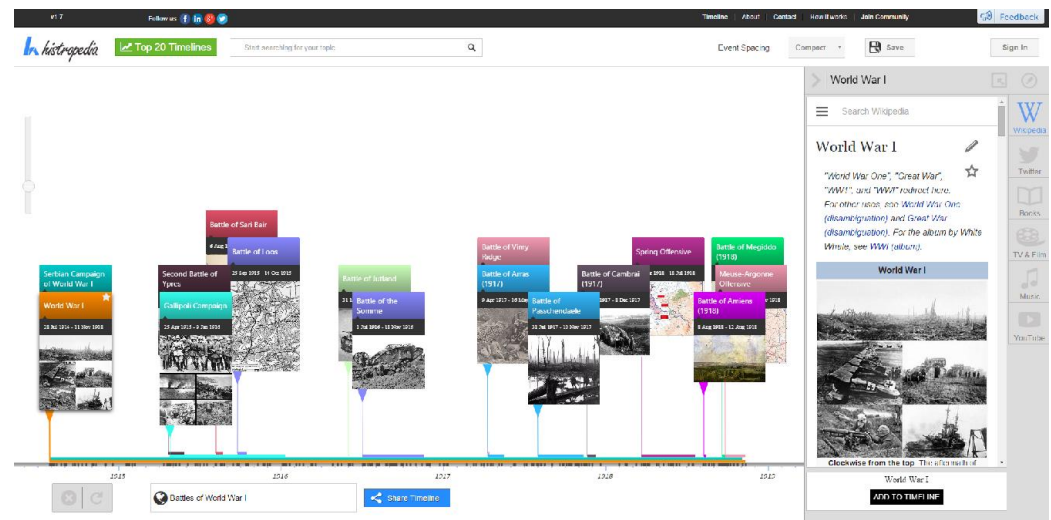


CONCEP MAPS 3.0

CM 1.0 – 3.0 as generations of concept maps corresponding to generations of web technology (web 1.0, 2.0 & 3.0)

CM 3.0

- Metadata
- Discoverable
- Dynamic
- Data integration
- Visualization



5 WEB DATA PRINCIPLES AS A BASIS FOR DEFINING CM 3.0

Web Data Principles (Wilde, E., 2016, <http://dret.github.io/webdata/>).

The Web Data Principles are defined as "a simple set of guidelines about how to make structured information more useful on the web".

Consist of five recommendations of what should characterize data sets on the web and their distributions:

- Linkable
- Parseable
- Understandable
- Linked
- Usable

MAKING CM 3.0 LINKABLE

Linkable concept maps require:

- Accessibility via persistent or stable identifiers.
 - Concept map as a whole
 - Constituent parts

Linkable concept maps will allow external resources to point to specific entities or objects in the structure.

- SVG (Scalable Vector Graphics)

```
<svg width="100" height="100">  
  <g id="globalwarming">  
    <desc>Concept</desc>  
    <circle cx="50" cy="50" r="40" stroke-width="4" fill="gray" />  
    <text fill="white" x="25" y="50">Global warming</text>  
  </g>  
</svg>
```

MAKING CM 3.0 PARSEABLE

Concept map distributions should be:

- represented in open formats
 - That do not require proprietary software for processing
 - Whose source code is open to inspection.

SVG is an open format, endorsed by W3C (World Wide Web Consortium)

- SVG is supported by browsers
- SVG can be directly embedded in HTML

MAKING CM 3.0 UNDERSTANDABLE

Understandable → discoverable

Concept maps should be:

- Described and annotated using a "well-documented" vocabulary.

Making concept maps understandable by using a mix of:

- CXL – for specifying CM structure.
 - Not “well-known” ☹️.
 - Not supported by non-CM software
- Schema.org – a general vocabulary for labeling things search engines care about.
 - Persons, places, products, events, creative works...
 - Allows inclusion of references to externally defined types.

MAKING CM 3.0 UNDERSTANDABLE

Adding schema.org/CXL metadata to SVG concept maps:

1. RDFa (Resource Description Framework in Attributes)

- Annotations directly embedded in the SVG code.
- Semantic metadata travel with the concept map.

```
<svg id="conceptmap" width="5000" height="5000" viewBox="0 0 5000 5000" vocab="http://schema.org/" typeof="CreativeWork">
```

```
<desc property="name">General Custer.vue</desc>
```

```
<desc property="genre">concept map</desc>
```

CreativeWork		0 FEJL 0 ADVARSLER ^
@type	CreativeWork	
name	General Custer.vue	
genre	concept map	
additionalType	https://www.wikidata.org/wiki/Q830115	
fileFormat	SVG	
license	https://creativecommons.org/licenses/by/2.0/	
about		
@type	Thing	
@id	https://www.wikidata.org/wiki/Q188205	
name	General George Armstrong Custer	
about		
@type	Thing	
@id	https://www.wikidata.org/wiki/Q205422	
name	The Battle of the Little Bighorn	

MAKING CM 3.0 UNDERSTANDABLE

2. JSON-LD (JavaScript Object Notation for Linked Data)

- Detaching metadata from the concept map.
- Annotation via reference rather than embedding.
- Advantages:
 - SVG is kept clean and easier to read.
 - Metadata can be added without writing rights.
 - Metadata can be stored in a separate file or as an integral part of an HTML document

MAKING CM 3.0 LINKED

Linked CM → Tantamount to:

- Enhancing the informational or learning value of concept maps (explorative learning / deeper learning)
 - through integration and visualization of external semantic web data.

Therefore, individual concepts should be linked to external resources to better determine their identity

- Wikidata.org
- <https://www.wikidata.org/wiki/Q703620> = Copenhagen Business School

Links should also be typed:

- To signal their communicational purpose and/or the nature of their target
- To enable automatic processing.

MAKING CM 3.0 LINKED

Web3map

```
graph TD; Custer[General George Armstrong Custer] -- "was educated at" --- Edu[ ]; Custer -- "was an officer in" --- Off[ ]; Custer -- "fought in" --- Wishita[The Battle of Wishita River]; Custer -- "was killed in" --- LittleBighorn[The Battle of the Little Bighorn]; Wishita -- "was a battle in" --- IndianWars[The American Indian Wars]; LittleBighorn -- "also known as" --- GreasyGrass[The Battle of the Greasy Grass]; LittleBighorn -- "is a memorial of" --- LastStand[Custer's Last Stand]; GreasyGrass -- "also known as" --- LastStand; LastStand -- "took place in" --- LittleBighorn; LastStand -- "is a fictionalized account of" --- LittleBighorn; LittleBighorn -- "depicts" --- Edu;
```

George Armstrong Custer

Engelsk: George Armstrong Custer

Wikidata-beskrivelse (engelsk):

United States Army cavalry commander in the American Civil War and the Indian Wars


Wikipedia-beskrivelse:

Oberstløjtnant George Armstrong Custer (5. december 1839 – 25. juni 1876) var en amerikansk kavaleriofficer, bedst kendt for sit nederlag i slaget ved Little Bighorn mod en koalition af indfødte amerikanske stammer anført af høvdingen Sitting Bull og strategen Crazy Horse. Han blev som 24-årig udnævnt til midlertidig (Brevet) general. Under den amerikanske borgerkrig udmærkede han sig ved en række dristige, men altid succesfulde kavaleriangreb, som gjorde ham til lidt af et idol hjemme i nordstaterne, hvor man kunne læse om hans bedrifter i aviserne. Han spillede desuden en stor rolle i krigens sidste dage, da hans tropper var med til at afskære sydstatshærens flugtrute. Efter borgerkrigen forsøgte han sig på de store sletter som den militære leder i kampen mod de indfødte amerikanere.

Links til Wikipedia

http://da.wikipedia.org/wiki/George_Armstrong_Custer

http://en.wikipedia.org/wiki/George_Armstrong_Custer



MAKING CM 3.0 USABLE

Concept maps should be:

- Labeled with a license to signify
 - when, where, how and by whom they may be put to use and under what circumstances.

<desc

property="license"><https://creativecommons.org/licenses/by/2.0/>

</desc>

ANOTHER SIMPLE CM 3.0 EXAMPLE

Semantic search

- Using schema.org types on SVG groups
 - `<g typeof="Person">`
 - `<g typeof="Place">`
 - `<g typeof="Event">`
- Google custom search engine
- Knowledge Graph API – Demo (Jason A. Clark)

Example: [CusterSearch.html](#)

THANK YOU FOR LISTENING!

QUESTIONS?