

16 Concept Mapping

Concept mapping is a visual framework that allows designers to absorb new concepts into an existing understanding of a domain so that new meaning can be made.¹

A concept map is a sense-making tool that connects a large number of ideas, objects, and events as they relate to a certain domain. It provides a scaffolding that can help designers visualize the complexities of a system, and assists them as they make and break connections, study existing connections, and expand on what is already understood but possibly taken for granted within a particular system.

Concept maps consist of individual *concepts* (a well-understood idea, object, or event; usually a noun or noun cluster) connected by *linking words* (usually a verb). When linking words connect two or more concepts, a *proposition* is formed that creates a meaningful statement. As propositions emerge, some relationships may reflect knowledge that is already understood, but others will represent new knowledge.² The power of the concept map is that it brings new connections into focus within the context of already understood information. As new insights are formed, designers can study relationships between old and new concepts, revealing new meaning as it relates to the domain.

To construct a concept map, it is important to have a good understanding of the domain. If one's understanding of the concepts is limited, it will be difficult to make meaningful interconnections with linking words.³ Also, articulating the correct focus question is a key step that will provide context and structure to the map. "How do people share pictures" and "How do people want to share pictures" should lead to different maps: the former providing a listing of options, the latter, a more exploratory audit suggesting a range of opportunities.

After a focus question is generated, a list of fifteen to twenty-five concepts should be identified and ranked from general to very specific, as they relate to the focus question. Successful concept maps are organized hierarchically based on this ranking, even if it is just a loose organization at first. Once all of the concepts are ranked, the next step is to initiate the construction of a preliminary map using either paper-based or computer-based tools that make it easy to move concepts around. Ideally, the concepts can be moved around by trial and error until the best hierarchy is reached.

Once a strong map is in place, cross-links identify relationships between subdomains in the map, and linking words articulate individual concepts. This can be the most difficult step for the mapmaker.⁴ Finally, revise, reposition, and rewrite until a final map emerges that adequately answers the focus questions. Maps that meet the above criteria should help design teams gain new knowledge, and find new meanings in an information space.

1. While researching how children learn new concepts and information, David Ausubel determined that learning is more meaningful when new information is assimilated into existing frameworks that children already grasp. While seeking a better way to represent the learning process, what emerged was the idea of visually representing children's knowledge in the form of a concept map. See:

Ausubel, David P. *The Psychology of Meaningful Verbal Learning*. New York and London: Grune and Stratton, 1963.

2. Ausubel, David, Joseph D. Novak, and H. Hanesian. *Educational Psychology: A Cognitive View*, 2nd ed. New York: Holt, Rinehart & Winston, 1978.

3. See note 2 above.

4. See note 2 above

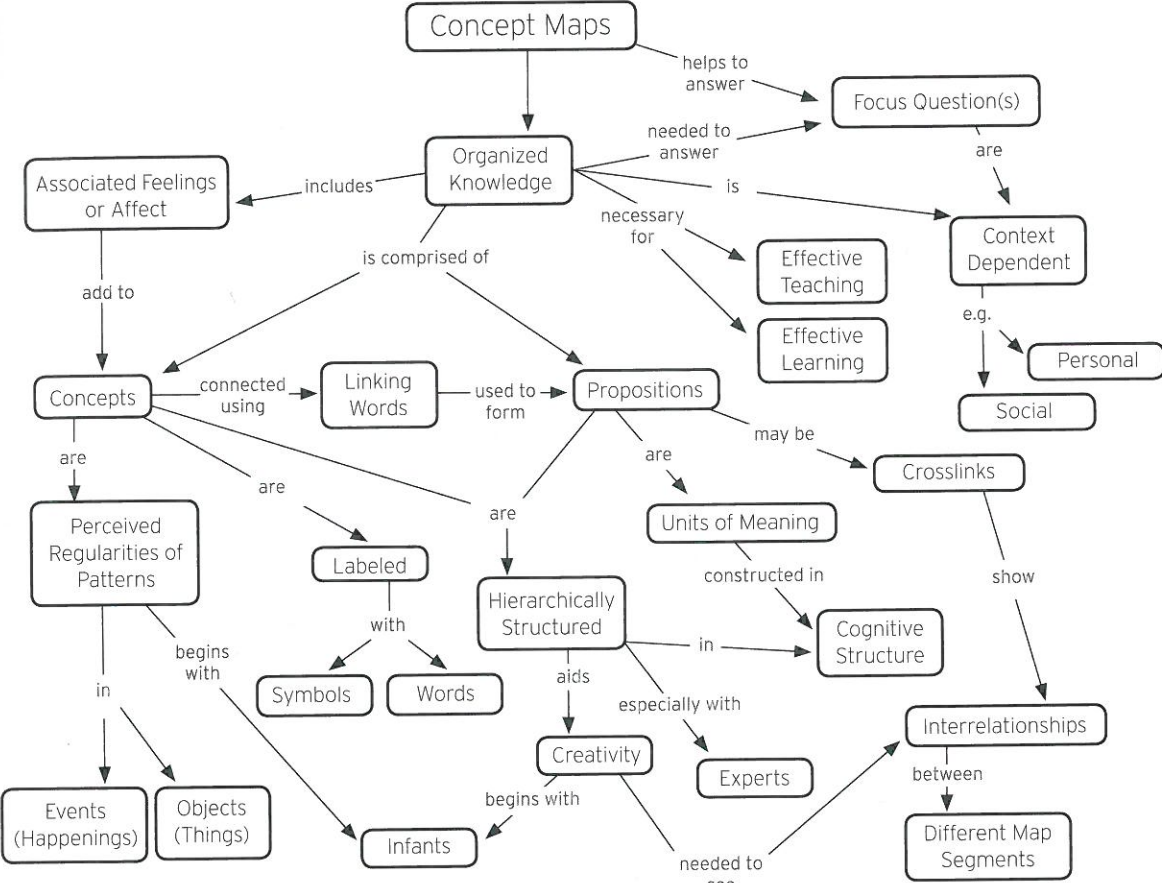
5. Novak, J. D., and A. J. Cañas. "The Theory Underlying Concept Maps and How to Construct and Use Them" in *Technical Report IHMC CmapTools 2006-01 Rev. 01-2008*, Florida Institute for Human and Machine Cognition, 2008, <http://cmap.iuhmc.us/Publications/ResearchPapers/TheoryUnderlyingConceptMaps.pdf>

CmapTools, a knowledge modeling kit that is designed to construct concept maps, is available online at cmap.iuhmc.us.

Further Reading

Novak, Joseph D., and D. Bob Gowin. *Learning How to Learn*. Cambridge: Cambridge University Press, 1984.

Preszler, R. W. "Cooperative Concept Mapping Improves Performance in Biology." *Journal of College Science Teaching* 33 (2004): 30-35.



Concept maps are organized in a downward hierarchy, with the focus question at the top of the map and the most general concepts below it.

Concepts are well-understood ideas, objects, or events, connected by *linking words*. When linking words connect two or more concepts, a *proposition* is formed that potentially challenges existing thinking or creates new meaning.⁵

Courtesy of Joseph D. Novak and Alberto J. Cañas, <http://cmap.iuhmc.us>

See also 08. Brainstorm Graphic Organizers • 12. Cognitive Mapping • 56. Mind Mapping

Behavioral Attitudinal	Quantitative Qualitative	Innovative Adapted Traditional	Exploratory Generative Evaluative	Participatory Observational Self reporting Expert review Design process
---------------------------	-----------------------------	--------------------------------------	---	---