



Novices and Experts in Geoinformatics: the Cognitive Gap.

M. Zhilin

Moscow Institute for Open Education, Chemistry, Russian Federation (zhila2000@mail.ru)

Modern geoinformatics is an extremely powerful tool for problem analysis and decision making in various fields. Currently general public uses geoinformatics predominantly for navigating (GPS) and sharing information about particular places (GoogleMaps, Wikimapia). Communities also use geoinformatics for particular purposes: fans of history use it to correspond historical and actual maps (www.retromap.ru), birdwatchers point places where they met birds (geobirds.com/rangemaps) etc. However the majority of stakeholders local authorities are not aware of advantages and possibilities of geoinformatics. The same problem is observed for students. At the same time many professional geoinformatic tools are developed, but sometimes the experts even can't explain their purpose to non-experts. So the question is how to shrink the gap between experts and non-experts in understanding and application of geoinformatics.

We think that this gap has a cognitive basis. According to modern cognitive theories (Shiffrin-Atkinson and descending) the information primary has to pass through the perceptual filter that cuts off the information that seems to be irrelevant. The mind estimates the relevance implicitly (unconsciously) basing on previous knowledge and judgments what is important. Then it comes to the working memory which is used (a) for proceeding and (b) for problem solving. The working memory has limited capacity and can operate only with about 7 objects simultaneously. Then information passes to the long-term memory that is of unlimited capacity. There it is stored as more or less complex structures with associative links. When necessary it is extracted into the working memory. If great amount of information is linked ("chunked") the working memory operates with it as one object of seven thus overcoming the limitations of the working memory capacity.

To adopt any information it should (a) pass through the perceptual filter, (b) not to overload the working memory and (c) to be structured in the long-term memory. Expert easily adopt domain-specific information because they (a) understand terminology and consider the information to be important thus passing it through the perceptual filter and (b) have a lot of complex domain-specific chunks that are processed by the working memory as a whole thus avoiding to overload it. Novices (students and general public) have neither understanding and feeling importance nor necessary chunks.

The following measures should be taken to bridge experts' and novices' understanding of geoinformatics. Expert community should popularize geoscientific problems developing understandable language and available tools for their solving. This requires close collaboration with educational system (especially second education). If students understand a problem, they can find and apply appropriate tool for it.

Geoscientific problems and models are extremely complex. In cognitive terms, they require hierarchy of chunks. This hierarchy should coherently develop beginning from simple ones later joining them to complex. It requires an appropriate sequence of learning tasks. There is no necessity in correct solutions – the students should understand how are they solved and realize limitations of models. We think that tasks of weather forecast, global climate modeling etc are suitable.

The first step on bridging experts and novices is the elaboration of a set and a sequence of learning tasks and its sequence as well as tools for their solution. The tools should be easy for everybody who understands the task and as versatile as possible – otherwise students will waste a lot of time mastering it. This development requires close collaboration between geoscientists and educators.