

## Mathematical Component Archives

The KMR group at CID has started to experiment with different design principles for the creation of mathematical component archives that support distributed contributions and use. Olle Sundblad<sup>1</sup> has created a tcl/tk-program called **dirlister**, which creates opportunities for different ways of interacting with such an archive. Our test-archive is available at <http://www.nada.kth.se/cgi-bin/osu/dirlister?math>.

This archive can be updated dynamically and the components are viewable under both Netscape and Explorer. Presently there is only graphics (and no text) on the html pages, but soon we will be putting in textual descriptions as well as formulas. We are presently investigating techniques to handle web presentation of mathematical formulas using MathML<sup>2</sup>. Traditionally this presents a well-known problem, which is usually solved by painful workarounds like e.g. screen dumps in the form of gif-images and the like.

### General goals of the MCA project

To apply general design principles for knowledge components to a concrete mathematics course should lead to results that are of value for mathematical didactics as well as for improving the design of efficient knowledge components in general. The dirlister-based MCA can be seen as the first step towards the following general goals:

1. To develop design principles and tools for the creation of archives of mathematical components that can be used by students in order to support their own assimilation of mathematical concepts and ideas, as well as by teachers as a resource for the composition and adaptation of learning modules to students with special needs, caused by e.g. lack of prerequisite knowledge or extreme cognitive profiles, as e.g. dyslexia or different kinds of visual or auditive impairments.<sup>3</sup>
2. To create a generic structure for multi-media based knowledge components that can be filled with any kind of specific content, and which are designed in accordance with evolving international standards, such as IMS<sup>4</sup>, RDF<sup>5</sup>, etc. Such a component-based content- and presentation structure - where the different components can cooperate through standardized interfaces - constitutes the basis of a new and rapidly emerging architecture for the organization and presentation of learning material which will form the backbone of the web-based education environments of the future.

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<sup>1</sup> A doctoral student at CID who specializes in virtual reality and network programming.

<sup>2</sup> An emerging markup standard for mathematical formulas on the web. (See [www.w3.org/Math](http://www.w3.org/Math).)

<sup>3</sup> The KMR group at CID is presently engaged in a modeling project with HI ([www.hi.se](http://www.hi.se)) and SIH ([www.sih.se](http://www.sih.se)), where we are designing a Conzilla supported knowledge patch devoted to accessibility issues and cognitive profiling with a special focus on international standardization work within this field.

<sup>4</sup> See [www.imsproject.org](http://www.imsproject.org).

<sup>5</sup> See [www.w3.org/TR/REC-rdf-syntax](http://www.w3.org/TR/REC-rdf-syntax).