

From Augmentation Media to Meme Media: Towards a New Knowledge Media Architecture

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Today's personal computers are considered as augmentation media that provide us with various tools to augment our individual capabilities. Some of them are expanding their target of augmentation from individuals to groups, or further to organizations. They are called respectively groupwares and enterprise integration systems. The IntelligentPad system developed at Hokkaido University since 1987 further expands the target of augmentation from groups and organizations to communities or to societies. While people in a group or in an organization share a definite common goal such as making a decision, designing a system, or solving a problem, people in a society share their achievements and reuse them to produce new achievements. They share a pile of their achievements, namely their culture. This paper reviews the IntelligentPad system from the view points of its motivation, its design philosophy, its system architecture, its applications, and its current state of the art. Media for the externalization of people's knowledge enable us to extrasomatically record and archive them, and to distribute them in their community. This encourages people to reuse the archived knowledge fragments to edit new ones, which are again accumulated upon the shared pile of knowledge. This pile is what we call a culture. Biological evolutions are based on genes. We require similar genetic media for the augmentation of societies to promote their cultural evolution. Such media with their contents should be able to replicate themselves, to recombine themselves, and to be naturally selected by their environment. They may be called meme media since they carry what R. Dawkins called "memes". Their environment is the society of their producers and consumers, namely, authors and users. M. Stefik also pointed out in 1986 the importance of understanding and developing an interactive knowledge medium that embodies the characteristics of memes. The accumulation of memes in a society will form a meme pool, which will work as a gene pool to bring a rapid evolution of knowledge resources shared by this society. This explosive increase of knowledge resources forms a sufficiently large meme pool to further increase the chance and the variety of their recombination. It is noteworthy that the two big pioneers of hypermedia systems respectively focused on these two types of media. D. Engelbart mainly focused on

media systems for personal, group, and organization augmentation in NLS and Augment. On the other hand, the world wide publishing repository that T.H.Nelson aimed at in Xanadu is nothing but a meme pool. In hypermedia systems as augmentation media are included a lot of systems and proposals. However, they have not sufficiently developed themselves to augment societies and their cultures. Hypermedia systems as meme media on the other hand have been focusing on documents and not on tools even in their most recent versions like WWW and Mosaic. These two types of hypermedia system technologies have not been well integrated yet. While personal computers have dramatically simplified the editing of multimedia documents, they can not yet allow us to easily edit existing tools to create new tools. The editing of documents and tools by end users is fundamental to the evolution of their meme pool. The IntelligentPad system architecture uniformly represents both documents and tools as pads, i.e., reactive media objects that look like paper sheets on the display screen. Pads work as meme media for the editing, the replication, and the natural selection of various types of documents and tools. A pad is a persistent object. Pads can represent multimedia documents including even videos and sounds, server programs such as database servers and various network servers, and also various application programs. Their environment is also represented as a pad on which any pads can be arranged. In an IntelligentPad system, you can easily compose any document or any tool by directly pasting some pads on top of another. Such a paste operation simultaneously defines both the layout of its components in the composed pad and the functional linkage among component pads. Composite pads are also simply referred to as pads. Pads can be easily replicated. Copies of the same pad inherit the same functional mechanism of the original, but change their state independently from each other. They can be easily edited by pasting some other pads on themselves, or by peeling their component pads off themselves. Besides, they can be easily transported from one system to another via networks or off-line media. The transportability of pads, however, is not sufficient for the distribution and exchange of pads. It alone will not form a meme pool. We need a marketplace where we can show, brows, sell, buy, and exchange various pads. Some off-line distribution media will be able to use conventional market systems such as book stores and catalog shopping services to form such a marketplace. Our project has already developed a world- wide open market system of pads. This system uses WWW and Mosaic to provide a world-wide pad repository and a hypermedia catalog of pads for the navigation of this repository. Once you find a desired pad, you can import this pad into your IntelligentPad system just by directly clicking an anchor button. This market is open to end-users so that they can freely open their own pad shop, and navigate through a world-wide network of pad shops just for browsing or for seeking specific pads.