

**Toward Empirically Derived Methodologies
and Tools for Human-Computer
Interface Development**

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1. Background: generations of UIMS

USER INTERFACE MANAGEMENT SYSTEMS—UIMS

This term, unknown only a few years ago, now conjures up images of icons and objects, windows and words that comprise the human-computer interface. A UIMS is an interactive system composed of high-level tools that support production and execution of human-computer interfaces. UIMS have become a major topic of both academic and trade journal articles, conference technical presentations, demonstrations, and special interest sessions. Many commercial software packages and research products even tangentially related to the area of human-computer interaction now claim to be UIMS. As young and exciting as the field is, there are already signs of promises unfulfilled, due to a lack of both functionality and usability—factors that can make the difference between whether UIMS are a passing fad or a viable tool. But what does the future hold for UIMS? All indications are that they are here to stay. We perceive a trend in UIMS evolution that we have divided into generations based primarily on common characteristics and only loosely on chronology:

First generation: façade and prototype builders, predecessors to real UIMS.

Second generation: UIMS with run time support, design time tools with limited functionality, increased emphasis on rapid prototyping, and often poor usability.

Third generation: UIMS with increased functionality and flexibility through such advances as object orientation, direct manipulation, asynchronous and complex graphical dialogue; still a usability gap.

Fourth generation: UIMS with improved usability for interface developers, allowing UIMS to be put more widely into practice; empirically-based improvements in both interface development methodologies and the UIMS themselves.

Future generations: UIMS supplemented by artificial intelligence, such as expert systems for aiding interface development and knowledge-based processing.

UIMS of the first two generations have established themselves in both research and commercial arenas. Although first generation UIMS were mostly façade generators and prototypers (e.g. IDS of Hanau & Lenorovitz, 1980; ACT/1 of Mason & Carey, 1981; FLAIR of Wong & Reid, 1982), several saw significant application in commercial development environments, participating in the development of real interactive software systems. Interfaces produced by these UIMS were