EIGHT CHALLENGES FOR DEVELOPERS

By **JONATHAN GRUDIN** Computer support has focused on organizations and individuals. Groups are different. Repeated, expensive groupware failures result from not meeting the challenges in design and evaluation that arise from these differences. • Many expensive failures in developing and marketing software that is designed to support groups are not due to technical problems. They result from not understanding the unique demands this class of software imposes on developers and users. This article briefly outlines the origins of groupware, describes eight specific problem areas, and finally examines groupware successes in search of better approaches to supporting work in group settings. • Desktop conferencing, videoconferencing, coauthoring features and applications, email and bulletin boards (b-boards), meeting support systems, voice applications, workflow systems, and group calendars are key examples of groupware. Labels vary: groupware, collaborative computing, workgroup computing, multiuser applications, computer-supported cooperative work (CSCW) applications. What is included? Not everyone agrees. Begin by asking, "Was this software designed to support groups? Is it being used to support groups?" • Email and b-boards are well known, but few other groupware prototypes and products have done as well despite considerable effort. Successes exist, but progress is slow and can lead in unanticipated directions.

Primarily Off-the-Shelf Products

The three rings of Figure 1 place groupware in the software universe somewhere between single-user applications and information systems that support organizations. Each software development area emerged independently and produced the research and development literature identified on the left.

Systems designed to support organizations achieved prominence first, because the expense of early computers required that they address major organizational goals. These include large mainframe (and, later, minicomputer) applications. "Organizational goals" are major goals typically defined by upper management. Such goals are not always fully agreed on, even among management. If they were, the course of internal systems development and acceptance would proceed more smoothly than it does. These research and development activities have variously been labeled data processing (DP), information systems (IS), management information systems (MIS), and information technology (IT).

By the early 1980s, the spread of interactive and personal computing created large markets for applications designed for individual users, such as spreadsheets and word processors. Research and development activities drew on existing human factors (HF) approaches to design and evaluation prior to the emergence in the early 1980s of conferences and journals under such banners as Computer and Human Interaction (CHI).

In the mid-1980s, the terms groupware and CSCW were coined and conference series and literature appeared. Conditions that emerged in workplaces to encourage this included (a) computation inexpensive enough to be available to all members of some groups; (b) a technological infrastructure supporting communication and coordination, notably networks and associated software; (c) a widening familiarity with computers, yielding groups willing to try the software; (d) maturing single-user application domains that pushed developers to seek new ways to enhance and differentiate products.

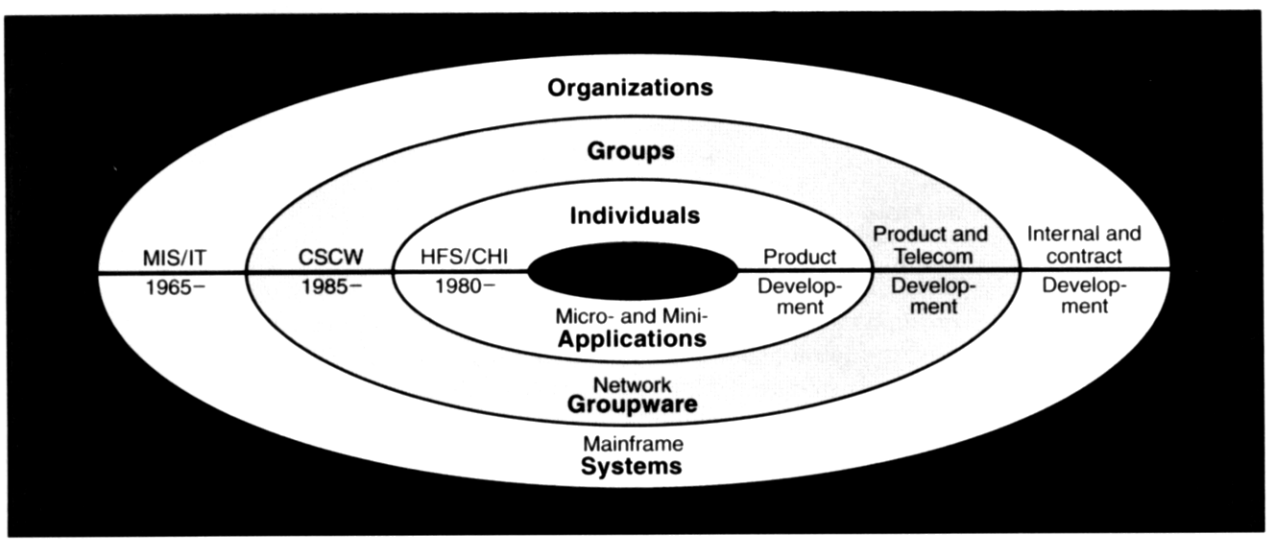

Figure 1. Development and research contexts

On the right in Figure 1 are the principal software development contexts involved in each area. Most systems addressing organizational goals are developed in-house or contracted out. Most single-user applications are commercial products, with development costs amortized over many customers. Groupware is largely a new market for product developers, along with telecommunications companies that have a focused interest in multiuser applications such as live video. Attendance at the first three CSCW conferences was primarily from software product development companies (approximately 40%) and universities (30%) with a steady telecommunications presence (5% to 10%).

To understand the problems encountered by groupware applications, it is essential to realize that most interest in groupware development is found among the developers and users of commercial off-the-shelf products who previously focused exclusively on single-user applications. The huge software markets created by standalone personal computers were once restricted to single-user applications, but as networks link the computers, groups represent large potential markets. As developers shift from supporting individual users to supporting groups, many encounter for the first time the challenges described in this article.

IS in Organizations: A Contrast to Product Development

The purchasers of a highly visible, expensive mainframe system or application anticipate a substantial benefit. They know organizational change is likely. Upper management is thus likely to commit to helping the system succeed, through (a) job redesign and creation (e.g., word processing skills are required of new secretaries and a database administrator