

Design Summary
of the
NoteTaker-2 Personal Information System

collected by
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The *NoteTaker* is a research prototype of a personal information system which may be used anywhere by children and adults to collect, organize, simulate, and view comprehensive models defined by themselves and others with whom they work and play.

Though it will be self-contained and portable, it will also serve as a *portal* to a shared *Information Library* through which a *NoteTaker* owner will communicate with other people, with an associative information system, and with facilities for media conversion.

The central research question is:

How can a *real tool* for comprehensive information manipulation be built so that it is far more useful than a current day pocket calculator, and yet be as accessible, and as easy to operate?

Answers to this and related questions will be pursued by:

- (1) designing a methodology and a system that implements it which enhance amplification of human endeavor;
- (2) building a number of *NoteTakers* for personal use;
- (3) building an *Information Library* for access to shared knowledge and communication;
- (4) testing these ideas and others, at PARC and in a variety of field-contexts (schools, offices, homes), with both adults and children.

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1. Goals and Expected Results

Research Goals

1. Design a communications system and ways to use it which will amplify a person's ability to find, traverse, and understand the knowledge which will be most useful in fulfilling his or her daily life. This implies learning more about the processes of Information Capture, Editing, Integration, and Simulation, where information is text, pictures (dynamic), graphs, music, and so on.
2. Discover more about how the learning process can be focused and amplified by the *NoteTaker* when used as a personally defined electronic medium by children and adults.
3. Find ways to interface the *NoteTaker's* owner, in the smoothest possible fashion, with the communications system.
5. Design an Information Library which will use the *NoteTaker* as a communicator to other people and to a shared knowledge base.
6. Provide a fruitful test-bed for the next personal information system: the *Dynabook*.

Performance Goals for the Support Hardware

1. Be able to capture (both directly and from a shared facility), edit, relate, and display: text, half-tone paintings, music and speech.
2. Be completely self-contained: run on batteries; weigh less than 20 pounds; store several hundred page-equivalents of information.
3. Be able to completely regenerate a screen's worth of information, e.g. turn a page of text, in less than 1/10 sec.
4. Be able to perform approximately as well as the real-time animation and music synthesis systems on the Alto.

Fabrication Goal

We would buy the *NoteTaker* hardware if it existed. Since no system currently does, we will design and build it ourselves.

2. Information Publication and Protection

The *NoteTaker* research goals require that the *NoteTaker* and associated teaching materials be used outside of PARC by a representative sample of people whose lives can be enhanced by the use of a portable information organizer.

There are four categories of information whose clearance are requisite to the success of this project:

First: the physical *NoteTaker* must be cleared for extended loan and use by non-PARC employees outside of PARC's physical plant.

Second: the *NoteTaker* communications system must be made fully available to these users.

Third: Auxiliary teaching materials which will aid these users in learning how to gain maximum benefit from the *NoteTaker* must be cleared.

Fourth: General papers to the Computer Science, Education, and Psychology communities which discuss the use of the *NoteTaker* as a new information resource for children and adults, and whose focus is primarily directed towards the nature and effect of qualitatively different user interface techniques.

There are two categories of information which need not be revealed:

First: The details of HOW and WHY the system is actually able to do what it does need not be revealed. This includes both hardware and virtual-system-level software.

Second: Speculations involving possible successors to the *NoteTaker* are not of prime importance to this research and will be avoided.

Protection of the *NoteTaker* system has three forms:

1. patents and trade secret protection for the hardware package. We do not feel the need to explain the *NoteTaker* virtual machine to anyone, or to show anyone the bottom level code, or to explain any specific systems-level algorithms, such as the storage allocator or incremental garbage collector.

2. copyrights on any soft (off-line and on-line) materials that have potential market value. In order to carry out the research plan, we will be developing materials for training users and materials for educational use of the system (curriculum materials being developed for the *Alto* will be transferable to the *NoteTaker* environment).

One of the research goals for the *NoteTaker* is that it must be able to tell the user everything that is needed without any further assistance. This means that on-line materials which help a person make use of the *NoteTaker* will be available and can be copyrighted.

3. name registration and contracts for users. The

NoteTaker name should be registered, and contractual arrangements should be prepared at this time which will anticipate outside users (non-Xerox employees) who may not be compensated for their cooperation in our studies.

Clearing the hardware/software systems for use with children and adults outside of PARC is vital to this research. We will negotiate restrictions on the particular outsiders who use the machine, for how long, and what controls are to be used. Although some phases of our studies can be carried out with (non-PARC) Xerox employees and their families, it will not be possible in general. Expediently obtaining patents and copyrights will ease our ability to work with outsiders.

We expect to give talks and write a general paper similar to *Personal Dynamic Media* [SSL76-1]. We will typically need domestic and international clearance; we need to mention dates and give specific credit to people who have worked on particular aspects of the system.

Descriptions of interface techniques and statistical information on the use of the systems should be immediately cleared for distribution in scientific journals and meetings.

We expect to write individual reports on application areas for the *NoteTaker*, especially examining the systems' influences on a user's effective professional performance.

We will continue to support graduate students in departments of computer science, education, and psychology. These students write theses that will require publication clearance. To aid the students and our relationship with them, we must negotiate the basis for this clearance at the proposal writing stage of the thesis work with appropriate final review of completed results.

3. Research Plan

1. Study user interface methods: how does (each kind of user) express his requirements--methods for describing information, kinds of questions or forms used in information storage and retrieval, kinds of information needed in user's decision making tasks. [Note, much of this work can and probably should be carried out without the use of a computer.]

2. Design and implement a new communications environment which can interact with, and interpret, a human's wishes in the areas of information storage, retrieval, manipulation, and simulation.

3. Develop applications packages based on a characterization of the (different kinds of) users. This development must answer such questions as: what are the needs of different kinds of users, what basic tools help meet these needs, what is the nature of programming and simulation useful for combining, extending or creating effective user tools. Implement these packages within the communications environment.

Four applications categories are of immediate interest because of the users' need to communicate information to himself and among other users, as well as the potential for using simulation techniques.

academic research (document preparation, literature search, model building and debugging)
teaching (our interests here are mostly with elementary and secondary level "creative thinking" programs, but these ideas are applicable to higher levels of education)

business organization management (personnel administration, meeting schedules, role assignment, and so on)
record keeping (inventory, sales, personnel)
document preparation, filing, distribution

professional (medical and legal) --
factual oriented data and client oriented data,
pattern matching against histories

household management (budget, activity schedules, both recreational and non-recreational)
informational (e.g. recipes, remodeling, repair services)
recreation (e.g. music, painting)

4. Build 30 complete NoteTaker systems.

5. Build a sharable Information Library which includes an associative information storage and retrieval facility, archiving, communication with other people, paper printing, and so forth.

6. Study use of applications packages--how accessibility to *NoteTaker* systems modify user's role: what, if any, are the changes in effective performance of professional role and what are (potential) modifications to social and professional interactions.