Summary for Ted Nelson's talk at Terry Winograd's lunchtime seminar, Stanford, 6 Mar 91:

THE SEVEN NELSON PARADIGMS
FOR INTERACTIVE SOFTWARE
or PAC-MAN, THE PROTOTYPE FOR OFFICE SYSTEMS

THE SCHOOLS OF THOUGHT: AI/Media Lab, PARC, Nelson (mostly unheard).
HOW WRONG IT'S GONE! Fascist PC versus MacBotch; the crime of Wizzywig, the folly of "metaphors," the delusion of "functionality," the evil of "files," the horror of "applications" (fanning out fractally).

MY SEVEN ORTHOGONAL PARADIGMS, variously intercombining:
(Note: No room here for hypertext and hypermedia, or "interactive multimedia.")

CINEMA: Interactive software is a movie and more: screen presentation to mind and heart of viewer, *plus* **interaction.**
Global optimization, a definition of Art: all parts unite and co-impact, the task cannot be decomposed into delegable parts, must be centralized in the mind and heart of the Director. A wide variety of *effects* are on the palette, with various costs as *production values* (or, in software, *performance values*).

VIRTUALITY, the *seeming* **of something: its conceptual structure and feel.**
VIRTUALITY VS. METAPHOR: unified, designed generality versus complexity built up from scraps.
GOOD SOFTWARE DESIGN IS DESIGN OF ABSTRACT CONCEPTUAL SPACES, which must be designed as wholes under a unifying artistic commander, as in film. Unified conceptual structure is vital; thus the structangular design of abstract virtuality is the fundamental process of software design.
The *feel* (in film, atmosphere and *mise-en-scene*) must be designed and perfected by the Director's many different adjustments throughout.

THEMATICS, a new threaded metalogic of structure, definition and inner meaning, defined in terms of principles, instances and ramifications. (Part of Nelson's General Schematics.)
Unity and organization may be defined as thematic metapredicates.
Thematic evolution of Pac-Man; how its brilliant achievements foreshadow *true* office software.
The search for cross-cutting organizational threads
Clever collapsing of function and controls (as in JOT™ text editor and PAC-MAN) versus disastrous collapsing (Mac garbage can).

FANTICS, the art and science of presentation (subsuming cinema, writing, diagrammatics and much more).
VISUALIZATION or mentalization: anything can be visualized, using enough tricks. Many views and flipping them fast.
Multidimensionality; paradoxical and punned spaces. The Word-Picture continuum,

the Word-Picture-Interaction Continuum. Mapping of Contents/Subject Field to Presentational Space to Controls.

SEEING CONNECTIONS (Our windowing conventions, such as Xwindows, are screwed up, since they do not allow lines to be drawn from the contents of one window into the contents of another. These conventions will have to be replaced.)

CONVENTIONS IN ALL MEDIA: physical, visual, acoustic units, overlays, contexts, markers, transitions, groupings, identifiers, paragraphs, layouts, montages, jingles.
SOCIAL CONTEXT OF USAGE, eg classroom, TV viewing, radio at work.
ORGANIZATIONAL CONTEXTS, esp. time-slot and season schedule.

XANALOGICAL STORAGE AND PRESENTATION, as embodied in the forthcoming Xanadu™ connection-and-history server from Autodesk/XOC.

Storage must not just hold disconnected lumps or puddings (called *files*); the storage mechanism (i.e., the operating system at some level) must keep track of the changes in a given object, so you can slice it in time as well as space-- in such a way that side-by-side visualization of any two versions or instants in the object's life may be compared in parallel (and pointed out by links between interiors of panels, not allowed by today's windowing systems). *Links* between changing objects must likewise be maintained (and of course easily shown by the parallel display of connected objects).   Generalized mechanisms for the automatic showing of sameness and distinction in such parallel exploration I have long called *thinkertoys*; I consider them *the most important tools for thought* (strangely overlooked by the rest of the field). No thinkertoy exists. This calls for a generalized mechanism of data storage and feed.

Multithreading is the ability to use arbitrary chunks in many different units. (Serious linear writing calls for multithreading organizers, none of which yet exists. Outline processors not only assume that the final product is to be sequential, but inanely assume that it ought to be *kept sequential at every step along the way*.) Even a simple multhreading thinkertoy would be a great improvement over what we have today.

Transclusion means the virtual inclusion of materials across significant boundaries. The Xanadu™ server program will allow transclusion across documents and across accounts; later, across servers, network-wide. Its wholly generalized transclusion brings the hope of a universal literature based on wholly-generalized cross-document transclusion, with royalty on the delivered fragment, substantially clearing up the copyright problem.

LITERATURE: the Final Conglomeration.

The document and "literature" defined and generalized into the screen and repository future.

TOWARD A UNIFIED LANDSCAPE OF DATA. The Xanadu™ model of true representation, interconnection, versioning, repository publishing, and copyright simplification.

ACCESS STRUCTURE MAPPING, discrete and weighted.

Maps of what you can get to from where are crucial to all designs (including architecture, clothing, office systems and interactive software). Till now we have not explicitly designed such structures, resulting in such interconnective horrors as Lotus menus and the New York subway system.