DOCUMENT DIRECTORY

Trademarks

"WinJammer" is a trademark of WinJammer Software Ltd.

"WordPerfect" is a registered trademark of WordPerfect Corp.

Copyrights

Credits and Acknowledgements

FLOW Research would like to thank the following people for their help, insights, contributions and support in the creation of this system:

Radi Ghannam
Jane Frances King
Julia King
Robert Marshall
Suzanne McElfresh
Andrew Nahem
Steven Raymond
Jesse Schechter

FLOW RESEARCH: AN OVERVIEW

How Can We Help?
Application Scenarios

Analog and Digital Audio

- Audio-Enabled Real-Time Database
- Sound Studio Control / Mixing-Automation Software

Video: videodisc, digital, non-linear

- Interactive Video: Corporate Policy Training

Graphics and Imaging

- 3D Visualization: Art Gallery Space Planning

Multimedia Networks

- Computer-Supported Collaborative Work

Internet Access

- Public Internet, Private Services

Demos And Presentations

- The Laptop Paralegal
- This Demo

METHODS AND TECHNIQUES

Thinking About Design

- Visualizing Software
- Finding Tools
- Making It Real

Tools We Used

- Autodesk Animator version 1.0
- CorelDRAW! version 3.0
- PHOTO-PAINT version 3.0
- Hijaak Pro version 2.0
- Paint Shop Pro version 2.01
- Pocket Recorder version 2.5
- Visual C++ version 1.5
- WaveEdit version 1.0c
- Microsoft Word for Windows version 2.0c
- SourceSafe version 2.20
- Doc-To-Help version 1.1
- WinJammer version 2.30

WHAT IS FLOW?

Nearly everyone has had this experience: losing sense of time, becoming unusually focused - realizing only later, when the trance breaks, that hours have gone by. The best of these "episodes" are also exceptionally productive. These are states in which we realize, in retrospect, that we were at our very best. This is the state we call Flow.

Another form of flow, familiar to some musicians and athletes, involves tightly-knit groups - a jazz band, for instance, or a baseball team. In the right circumstances, these groups achieve a quasi-telepathic level of communication and cooperation.

It is a heady and powerful feeling. But it raises many questions:

- How can we deliberately achieve this state of flow?
- How can a group or team *learn* to work in flow?
- Is flow always the optimal creative state for an individual or group, or is it only useful some of the time?

It seems appropriate to us that an organization devoted to facilitating the creative process should call itself FLOW Research.

WHAT IS FLOW RESEARCH?

FLOW RESEARCH IS A RESEARCH & DEVELOPMENT COMPANY.

It explores the role of information technology in the creative process. When existing technologies hinder that process, we develop new tools or adaptations of existing tools to solve the problem. Our customers are principally Fortune 500 companies, small high-tech businesses and independent artists. We do a lot of design work and software development, especially in multimedia.

WHAT IS FLOW RESEARCH?

FLOW RESEARCH IS A CONTRACT SOFTWARE DESIGN FIRM.

Our programming team is trained not only to leverage the power of today's sophisticated programming environments, but also to work effectively as a group. We spend more time and resources on staff training than organizations many times our size, because a well-educated staff is the single most important factor in the success of a software project.

Our staff training doesn't stop at software design theory & practice. It covers a range of relevant subjects, including general problem-solving, psychology, human factors, and the history of technology.

We also take pride in our approach to software project management. Each project we start has a designated Project Leader, who is personally responsible for the successful completion of the project. This Project Leader operates as an "intrapreneur," assembling resources and skills from within our organization and from the outside. The Project Leader must also select and manage the development team, while monitoring time and financial constraints.

Our model for software development is derived from magazine publishing. Our programmers are comparable to staff writers, and Daniel Gross is our editor-in-chief. Daniel personally reviews every single line of code that goes into our software. Like a magazine, we also have writing guidelines. These guidelines demand that 90% of each application's code be based on reusable modules. This reduces bugs and code duplication. It also makes it possible for us to offer a level of software maintenance and application reliability that exceeds those of most commercial software products.

WHAT IS FLOW RESEARCH?

FLOW RESEARCH IS WINDOWS™ MULTIMEDIA.

The vast majority of our development efforts target the Microsoft® Windows™ graphical environment. Although Windows is the world's most popular graphical user interface, it has lagged behind other environments in many respects. This is mostly because its designers could not make broad assumptions about the PC on which it would be expected to run. Unlike the Macintosh, which provides a reliable base of highly similar computers, the wide variation of PC configurations makes demanding applications like multimedia difficult to implement. This is our challenge and our specialty.

WHAT IS FLOW RESEARCH?

FLOW RESEARCH IS A CONTRACT MULTIMEDIA PRODUCTION COMPANY.

Our staff includes musicians, professional writers, photographers, graphic design professionals and film makers. All the artwork, music and sound you see in this demo was produced by FLOW Research.

Our network of stringers includes film and video producers, directors, production assistants, illustrators, translators, and of course many gifted software designers. Come to us with an idea for a interactive project, and walk away with anything from a storyboard, to a specification, to a finished product.

WHAT IS MULTIMEDIA?
IS MULTIMEDIA A "COMPUTER" THING?

In reality, multimedia just means "combining information streams." In this sense, a motion picture, which combines moving images and sound, is multimedia. The computer industry has adopted this word to refer to the combination of text, graphics, still and moving images, and recorded and computer-generated sound in an interactive framework.

At FLOW Research, we don't think of multimedia as an application category like "word processing" or "database management." We see the potential for *many* new application categories resulting from the use of sound, images, video, and *time-based information streams*.

Computers help multimedia the way automobiles help transportation. If you're going to the corner store, you can walk; if you're going to another state, you'll probably want to drive.

Similarly, a simple multimedia presentation need not be computer-assisted. But as the size and complexity of the presentation increases, a computer becomes an ever-more necessary tool in preparing and playing back your material.

WHAT IS MULTIMEDIA?
WHY DO I WANT MULTIMEDIA?

Funny question, that. Because really, you don't. You just want a solution to your problems, or a better way to do what you're doing. Multimedia is merely an *enabling technology*, a set of methods and tools that can enhance our control of, and access to, information.

WHAT IS MULTIMEDIA?
MULTIMEDIA BENEFITS: A SIMPLE EXAMPLE

As a trivial example, if your contact-management software lets you associate a picture of a person with their name, address and so on, you can leverage your own ability to recognize faces as a decision-making aid for making calls, planning meetings, etc.

If at some later date this software is upgraded to support multiple users sharing the same contact list, you gain another benefit: your colleagues can associate faces and names for people they've never met. Your salespeople can recognize your customers at trade shows and conferences even if you just hired them last week. This is a good example of technology helping the human side of your business.

WHAT IS MULTIMEDIA?

MULTIMEDIA BENEFITS: AN ELABORATE EXAMPLE

Let's look at another example, this one involving digital video. Capturing and storing video in a computer is a more expensive process than scanning still images, so we have to find a bigger benefit, a more substantial competitive advantage than the one in our previous example.

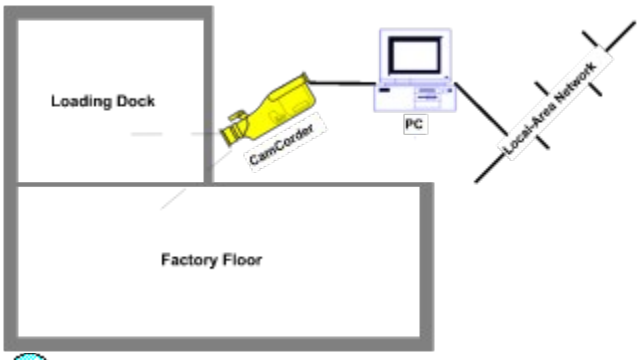
Here is a brief list of some known advantages and disadvantages of computer-based digital video:

Advantages
Disadvantages

Acme Widgets has a just-in-time manufacturing facility which it recently expanded to handle shipping as well. The loading dock is now at the end of the assembly line, and in a perfect world order-processing delays could be cut in half.

While this has happened, Acme management has noticed an alarming increase in product returns. To everyone's knowledge, nothing about the manufacturing process has changed.

Bearing in mind our list of pros and cons, FLOW Research proposes to create a digital video application to improve Acme's quality control.



As you read through this example, you can click on the text highlighted in green in each paragraph to get a description of FLOW Research's approach to the problem.

A consumer-grade camcorder, or an existing security-surveillance camera, is connected to a video capture card on a PC and aimed at the loading area. The PC is optionally linked to a local-area network to provide system-wide access to captured video files.

A simple application running on the PC is tied in to the existing order-processing system. Personnel at the loading dock scan a barcode label on each box of widgets being shipped. This existing system adds a record to a central database with time-of-shipment information.

The PC application captures video segments every time a time-of-shipment record is added to the database. It captures video for 90 seconds - this was empirically determined to be the average time required to fill a box with widgets at the end of the assembly line and move it to the loading dock. The application copies the customer and ordering data from the database and associates it with each captured video segment.

After three days of capturing video, a factory foreman queried the video database and reviewed ten video clips. These clips were recordings of the shipping process for orders which accounted for over 50% of product returns in the past 48 hours.

The videos revealed that one of the fork lifts was malfunctioning, dropping its palette of widgets from a height of 18 inches instead of softly landing it on the floor.

The fork lift was repaired, and Acme commissioned FLOW Research to create a computer-based training application, using the existing video hardware, to train loading-dock personnel on proper loading procedures.

As product returns plummeted and the company's reputation for excellence spread, Acme's business boomed.

ADVANTAGES

- File formats have become fairly standardized for low-resolution video (AVI, QuickTime, MPEG)
- Video files can be manipulated like normal computer files - uploaded and downloaded from online services, transferred via electronic mail, etc.
- Individual video frames can be converted to still images and manipulated with a wide variety of existing painting and image-processing applications, then optionally converted back to video frames (allowing for special effects)

DISADVANTAGES

- Resolution and playback speeds are not comparable to regular video
- Even with compression, digital video files consume vast quantities of disk storage
- While playback is fairly straightforward, capturing and editing video is still complicated and expensive

CUSTOMERS PAST AND PRESENT

The following list provides brief descriptions of some recent projects. The intention of the summaries is only to illustrate the scope of our work, and should not be interpreted as exhaustive or complete.

AT&T Bell Laboratories
Dr. T's Music Software
The Duck Corporation
France Telecom
IBM
Montage Group, Ltd.
NTT
US Veterans' Administration
US West Advanced Technologies, Inc.

CUSTOMERS PAST AND PRESENT:
AT&T BELL LABORATORIES

This 1993 project produced a set of tools to simplify TCP/IP network management. Two utilities were developed: one which converted router diagnostic data into a form suitable for importing into Microsoft® Excel™, and one which provided user-specified or automated queries on the resulting records.

One of the project requirements was to support these tools in UNIX, DOS and Windows. The software we delivered used the same source files for all three operating systems.

For a broader discussion of how FLOW can help you with a similar project, see the Internet Access section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
DR. T'S MUSIC SOFTWARE

In 1988, Victor Yurkovsky co-developed *The Phantom*, a hardware/software package providing SMPTE timecode reading and MIDI synchronization features; also *T-BASIC*, a programming language for musicians with advanced MIDI features.

For a broader discussion of how FLOW can help you with a similar project, see the Analog and Digital Audio section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
THE DUCK CORPORATION

In 1991 Victor founded The Duck Corporation, a research-&-development firm specializing in video compression technology. The company is best known for its TrueMotion broadcast-quality video compression/playback software.

For a broader discussion of how FLOW can help you with a similar project, see the Video: videodisc, digital, non-linear section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
FRANCE TELECOM

In 1989, Daniel created NetDisk, a network planning and simulation program for IBM-compatible PCs. The program provided network performance simulation, cost estimates, and automatic determination of bandwidth requirements based on user-specified call traffic. France Telecom distributed this software to its customers interested in expanding the reach of their private networks. To date, thousands of requests for the software have been fulfilled.

For a broader discussion of how FLOW can help you with a similar project, see the Demos And Presentations section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
IBM

IBM was a regular buyer of research reports Daniel produced when he was at Magnetic Press Inc., the New York-based consulting firm he started in 1986 before launching FLOW Research.

More recently, Daniel's 1990 brochure on IBM's TCP/IP network software, produced by the firm of Muir, Cornelius & Moore, won an award from the Society for Technical Communication.

Victor Yurkovsky created a presentation for IBM in 1989 demonstrating the Audio Visual Connection, a multimedia authoring system from IBM's ACIS division. In 1990, Victor designed all of the multimedia presentation software for IBM's Fall COMDEX booth.

For a broader discussion of how FLOW can help you with a similar project, see the Demos And Presentations section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
MONTAGE GROUP, LTD.

Montage is a developer of non-linear digital film- and video-editing systems.

Victor and Daniel provided many services to Montage in the period from 1991 to 1993. Victor produced video-control software, while Daniel produced product documentation and developed add-on utilities for such applications as title generation.

For a broader discussion of how FLOW can help you with a similar project, see the Video: videodisc, digital, non-linear section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
NTT

In the period from 1988 to 1992, Daniel provided a broad range of consulting and intelligence-gathering services to Nippon Telegraph and Telephone. NTT provides all local telephone service in Japan and has also become a major player in newmedia research & development.

Daniel was NTT's representative to the Technical Subcommittee of the X.400 API Association, a vendor group created to develop programming standards for electronic mail applications. In this capacity he was responsible for reporting the subcommittee's activity to NTT, as well as providing ongoing reports on the electronic mail industry generally and voting on NTT's behalf on technical issues before the subcommittee.

NTT was a regular customer of **HyperTour**, a road-show alternative to multi-client studies. Clients tour the U.S. and meet with the key figures developing new multimedia technologies. **HyperTour '91** stopped at Intel's Human Interface Lab, Autodesk, the MIT Media Lab, DiVA Corp., the NYNEX Media Lab, and Avid Technology. **HyperTour '89** met with Apple Computer, Ted Nelson, Timothy Leary, and Rudy Rucker. Participants received tour summaries and free copies of the video documentary made of each tour.

For a broader discussion of how FLOW can help you with a similar project, see the Multimedia Networks section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
US VETERANS' ADMINISTRATION

This project, "Disabled American Veterans: Today's Soldiers At Risk," was subcontracted to us by Albert Woods Design Associates, Inc., a New York design firm which specializes in exhibits and public displays. We were called upon to integrate videodisc motion and still video, graphics, text, and a touchscreen interface to match a storyboard specification. The resulting program won a Silver medal in the "Information Reference/Other" category of the 1993 Invision Multimedia Awards.

For a broader discussion of how FLOW can help you with a similar project, see the Multimedia Networks section in our **Application Scenarios** document.

CUSTOMERS PAST AND PRESENT:
US WEST ADVANCED TECHNOLOGIES, INC.

We are not at liberty to discuss details of this project, subcontracted to us by McLaughlin & Associates, Inc., a Schaumburg, Illinois-based consulting firm. Our work in the project consisted in developing a Windows module which provided "taxi-meter" style billing control over the local or remote execution of Windows applications. We also developed a set of functions to support remote loading and display of Windows dialogs and forms from an SQL-addressable database.

For a broader discussion of how FLOW can help you with a similar project, see the Multimedia Networks section in our **Application Scenarios** document.

FUTURE DIRECTIONS:
MULTI-PLATFORM DEVELOPMENT

FLOW Research currently develops software exclusively for the Microsoft® Windows™ family of graphical environments, including Windows 3.1, Windows for Workgroups, Chicago (Windows 4.0), and Windows NT. This is why, in our current advertising, we assert that "FLOW Research IS Windows Multimedia."

Our motivation for this narrow focus is the lack of multimedia expertise-for-hire available for Windows. Custom and off-the-shelf multimedia solutions based on Apple Macintosh® systems are common. Yet, ironically, existing Windows systems outnumber Macintosh by a big margin.

However, our knowledge extends beyond the Windows sphere. Our programming skills include Macintosh, UNIX, and some specialized environments. By specializing early on, we can guarantee a level of programming competence that will be deep as well as wide.

Starting in the Summer of 1995, FLOW Research will extend its offerings to include Macintosh and UNIX solutions, as well as Windows software.

FUTURE DIRECTIONS:
POST-PRODUCTION SERVICES

The long-term goal of FLOW Research is to provide one-stop shopping for all your multimedia needs, including graphic design, video editing, music & sound production and post-production, image processing services, and so on, in addition to our existing software design service.

In Spring 1995, we will begin to offer music recording, mixing and production services in our Midtown Manhattan office. Over time, we will expand this service to include other facilities relevant to multimedia design and production.

Media, computing, sight and sound technologies are converging. By augmenting our service to include production and post-production, we hope to meet you at the event horizon of this convergence.

How We Do Business

How We Do Business:
Start With People

At the core of the FLOW Research philosophy is the belief that people, not technology, should be the driving force behind the design of any application. To us, the computer is only half of the system. The *entire* system - the synthesis of the computer and the person operating it - must be considered if the technology is to help us be more productive.

When you first meet with one of us, we will not be very interested in your NetWare v3.12 fault-tolerant server controlling a mirrored RAID V disk array. Sure, we know about that stuff. What we *don't* know is what makes your business tick.

What are your workflow bottlenecks? How do you communicate with your customers? Do you know how your employees feel about your existing information systems? What is a regular work day like for you? Do you spend most of your time on the phone? Or running around town? Or tracking down a colleague? Or coaxing your PC into printing a chart?

These are the kinds of things we'll want to know first. Once we understand the flow of information in your *organization*, and once we can assess the role technology plays in your business, then and only then can we begin to work together.

How We Do Business:
Making The Deal

Sometimes, technology has no part in the appropriate solution to a particular challenge. In that case, we will say so. We want our work to be challenging too. So there's no point for us in imagining a technical fix to a non-technical situation, just to give you a reason to hire us. We'll walk away, but first we'll thank you for your time and try to put you in touch with someone who can help.

If we're all agreed that there *is* a technical component to consider, we'll give you a first-draft assessment of what we can do right then and there. If it sounds reasonable, we'll prepare a written proposal.

We like to keep our proposals short, around three to seven pages. The operating principle here is that we don't want to use more of your time to solve a problem than the amount of time a problem is costing you.

All our proposals include a Memorandum of Understanding, which outlines in broad strokes the work FLOW Research will do for you, how many calendar days it will take, and how much it will cost.

How We Do Business:
Rates and Cost Commitments

FLOW offers two payment plans for Contract services based on the duration of the contract project, and special terms for retainer accounts.

FOR PROJECTS LASTING 180 DAYS OR LESS

35% of the negotiated contract payment, plus any up-front material expense, is paid in advance. 30% is due at a single "half-way" milestone. The balance of 35% is due within 10 days after delivery of the final approved materials.

FOR PROJECTS LASTING MORE THAN 180 DAYS

25% of the negotiated contract payment, plus any up-front material expense, is paid in advance. 50% of the total is spread out over any number of project milestones. The balance of 25% is due within 20 days after delivery of the final approved materials.

TERMS OF PAYMENT - RETAINER ACCOUNTS

FLOW offers credit terms for all Retainer accounts on a case-by-case basis. The standard payment terms are:

10% Prepaid -	Prepay an invoice, discount it by 10%.
5% Net 5 -	Pay an invoice within 5 calendar days, discount it by 5%.
0% Net 20 -	Pay all Invoices in full within 20 calendar days.

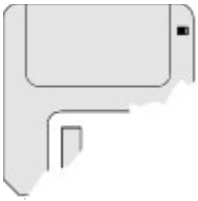
Retainer customers can ask that some projects be billed to them on a contract basis. However, credit terms for contract work require a special arrangement with FLOW. Any customer can apply for credit: just call 212.594.0900 and ask for a credit application.

OUR COST COMMITMENT

For short-term projects - lasting less than six months - FLOW Research offers an up-front, fixed-cost commitment which we believe is unique in our industry. When you sign the Memorandum of Understanding - a simple commitment document included in every proposal we send out - you are agreeing to an *exact* cost for your project. No surprises, no budget overruns, no excuses.

For longer-term projects, we guarantee that our first estimate - the one in our original proposal - will be within 25% of the final cost. For example, if our initial estimate is $10,000, we promise that your total billing from FLOW Research for the project will be no more than $12,500, and could be as low as $7,500.

How We Do Business:
Work In Progress



Once we accept your business and begin work on your project, we have a delicate balancing act to perform. On one hand, we don't want to pester you incessantly with details. On the other hand, we don't want to overlook a critical requirement of your application because it wasn't mentioned.
Two aspects of our approach balance these priorities:

1. Our projects are built around milestones. These are opportunities for you and for us to examine work in progress and compare it to the original project goals.

2. Our first task in any project is to draft your contract. It is the project description included in this contract that defines the scope of our money-back guarantee. In other words, the first product we deliver to you is a document describing *exactly* what we will do for you. This lets us catch misunderstandings early on.

How We Do Business:
Testing, Testing

"That's funny, it worked in the lab..."

For the duration of our development effort on each project, but especially as we come near the final deadline, we test our software in a number of ways.

We run it on many different PC configurations, using different versions of Windows, different versions of specific Windows modules, and alongside standard PC applications selected to reflect your own computing environment. Depending on what's appropriate for a particular application, we use manual tests, automated tests, or a combination.

All our software incorporates version-control safeguards to avoid problems arising from configuration changes, software installation and upgrades, and missing or modified files.

Our policy is to test all software at the customer site before final delivery.

How We Do Business:
Our Guarantee

If we don't meet the project deadline as defined in our contract with you, we will refund *all* the money we received from you, including the advance.

How We Do Business:
It Ain't Over...

...until it's over, goes the saying. And with software, that means it's never over. New products will be introduced that upset or even break your existing applications, even ones from FLOW Research.

That's why we will be there for you, with a no-charge support period after the sale, and an ongoing support program at reasonable rates for as long as you like. All our service contracts are customized for your particular circumstances. A service-contract proposal is sent to you when we deliver the final version of any software you hire us to build.

How We Do Business:
A Sample Proposal

The following is a real proposal, sent to a real client. The specifics of the project have been modified or deleted to protect our customer's confidentiality. Missing passages are described in red text in brackets.

Confidentiality, by the way, is something we take *very* seriously. When you hire us, it is usually to leverage a competitive advantage. It is our sworn duty to protect that advantage. So we keep the details of your project under our hats.

Please bear in mind that each proposal is tailored to the specific needs and requirements of the intended recipient. In other words, while your proposal may look and read very much like this one, your mileage may vary on the details.

Proposal Sections

How We Do Business:
Sample Proposal

June 10, 1994

Prepared for: Customer

Prepared by: Project Leader (212-594-0900)

Summary

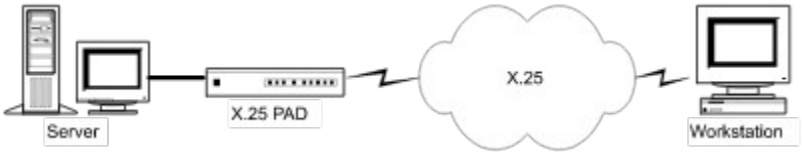
FLOW proposes to develop a [kind of] application for Customer which will run in the Microsoft® Windows™ graphical environment, Version 3.1. The development, testing and documentation of the software will require 79 calendar days. In the enclosed schedule, which assumes a work-start date of April 6, 1994, a prototype will be ready by May 17, and the final release of the software will be ready by June 20.

The flat fee for this project is $20,000 inclusive of FLOW's incidental expenses for the project. Other options are described in this proposal, each with line-item pricing.

The Problem

Customer has an application requirement with the following steps:

[A step-by-step breakdown of the information flow]



[When appropriate, item-lists and breakdowns are clarified with illustrations like the one above.]

The Project

FLOW will create an interactive software program that can:

[An itemized list of the software's features and functionality]

In addition, the software will provide an interface that gives the user precise control of the technique(s) used to [do stuff].

The software will be compatible with Version 3.1 of the Microsoft® Windows™ graphical environment. The specific hardware and software requirements of the target system will be provided to Customer in a Specification Document after FLOW has begun work on the software.

DELIVERABLES

FLOW will specifically provide the following products and services to Customer:

1. A complete, tested version of the software (two disk sets)
2. A setup utility which will fully install the software on a Windows-compatible PC
3. An unlimited end-user site license to the software (single site)
4. Optionally, a limited distribution/resale license to the software
5. Printed (two sets) and (optionally) electronic online software documentation
6. Optionally, two days of on-site training for up to three users

Milestone 1 Deliverables

On or before May 17, FLOW will deliver to Customer a working, but possibly unstable and/or incomplete, prototype of the software.

PROJECT FEES

Item	Subfee
Complete, tested software (two disk sets)	$17,500
Setup utility for Windows-compatible PC	$1,500
Unlimited end-user site license to the software (single site)	$0
Printed software documentation	$1,000
Basic Package Subtotal	**$20,000**
Limited distribution/resale license to the software	*negotiable*
Electronic online software documentation	$1,000
Two days on-site training for up to 3 users	$1,000
Options Subtotal	**$2,000**
TOTAL - Full Package	**$22,000**

MEMORANDUM OF UNDERSTANDING

The enclosed Memorandum of Understanding works like a contract, and is legally binding, but it is more flexible than a traditional contract in that it allows for changes to

the terms of our agreement as circumstances arise in the course of the work.

In order for FLOW to begin work on this project, we must receive a copy of this Memorandum signed by Customer, as well as a check for the amount of the advance specified.

How We Do Business:
Memorandum of Understanding

Summary

1. FLOW proposes to develop a [kind of] application for Customer which will run in the Microsoft® Windows™ graphical environment, Version 3.1. The specific functionality and features of this software will be defined in a Specification Document and Contract which will be produced by FLOW in the course of the project.

Deliverables

2. FLOW will specifically provide the following products and services to Customer:

i. A complete, tested version of the software (two disk sets)

ii. A setup utility which will fully install the software on a Windows-compatible PC

iii. An unlimited end-user site license to the software (single site)

iv. Optionally, a limited distribution/resale license to the software

v. Printed (two sets) and (optionally) electronic online software documentation

vi. Optionally, two days of on-site training for up to three users

Payment, Terms & Rights

Payment

3. Customer will pay FLOW a fee of $20,000 payable in three installments:

i. An advance of 35%, or $7,000, before work begins;

ii. A milestone payment of 30%, or $6,000, on receipt of the deliverables specified for the milestone;

iii. The balance of 35%, or $7,000, within 10 days after receipt of the final set of deliverables for the project.

4. This fee includes an unlimited, single-site license from FLOW to Customer to make an unlimited number of copies and installations of the software for Customer's own use.

5. This fee **does not** include the transfer from FLOW to Customer of copyrights, distribution rights, or rights to relicense. Such transfer of rights would need to be negotiated separately.

6. FLOW will not charge Customer for any reasonable expenses incurred by FLOW in connection with this project.

Terms

7. Technical support will be available to Customer 12 hours a day, from 10AM to 10PM, 7 days a week, for 180 days following Customer's receipt of the last deliverable as described in "Project Schedule" below. FLOW guarantees a 48-hour response time to an incoming technical support request. Technical support may include FLOW's modification of the deliverables. However, FLOW will not be required to provide technical support for deliverables which have been modified by Customer.

8. In the event of dispute(s), the undersigned agree to submit such dispute(s) to non-binding mediation for 90 days from notice of dispute(s). The undersigned and/or their delegate(s) will exert their best efforts to select a single, mutually acceptable, mediator, who need not be a lawyer, to meet with the disputants, review evidence and hear issues and arguments. The parties will share the expenses of the mediator, regardless of outcome. If the disputants do not accept the decision of the mediator or do not otherwise come to a mutual settlement of the dispute(s) within 90 days of notice of the dispute(s), then either party or both may repair to the appropriate New York State courts of law for remedy.

9. This agreement shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, legal representatives, executors and administrators only. This agreement may not be assigned by Customer to any third party.

CONTRACT

10. FLOW will provide to Customer a specification document and contract ("the Contract") within 30 days of the date of this memorandum of understanding. The Contract shall completely define the nature and scope of the work to be performed by FLOW for Customer, including payments, project deadlines, and rights & warranties of each party.

RIGHTS & WARRANTIES

11. Upon receipt of the Contract, Customer may within 10 business days:

A) Terminate the agreement of this memorandum by written notification to FLOW, or

B) Return the Contract, signed by a duly authorized representative of Customer, to

FLOW.

12. If Customer terminates the agreement of this memorandum without returning the signed Contract, Customer forfeits the 35% advance paid to FLOW as per section **3** above.

13. If Customer returns the signed Contract to FLOW, the Contract becomes the binding agreement between Customer and FLOW, and supersedes this Memorandum.

14. FLOW warrants that it will abide by the schedule specified in the Contract, and that it will reimburse Customer any and all moneys paid by Customer to FLOW for this project in the event that FLOW fails to meet the deadlines specified.

15. Customer warrants that it will provide reasonable access to its staff and company information relating to the project. Customer further agrees to hold FLOW safe and harmless from any liability which arises from Customer's failure to provide access to its staff, information or facilities in a timely manner, including but not limited to FLOW's liability to refund Customer as provided in section **14** above.

16. FLOW warrants that the final deliverables will satisfy the requirements of the Contract as approved by Customer. FLOW makes no other warranties, expressed or implied, as to the deliverables' merchantability or fitness for any particular purpose. Customer agrees to hold FLOW safe and harmless from any liability incurred in connection with use of the deliverables, be it Customer's own use of the deliverables, or the use of the deliverables by a Customer licensee.

PROJECT SCHEDULE

Date	Event	Duration (days)
Wed 06-Apr-94	MOU Signed - work begins	
Wed 06-Apr-94	Design + Analysis	12
Mon 18-Apr-94	Preliminary Coding + Test	8
Tue 26-Apr-94	Prototype Coding + Test	14
Tue 10-May-94	**Specification Document**	
Tue 10-May-94	Output Testing (IRIS, etc.)	7
Tue 17-May-94	**MILESTONE: Prototype**	
Tue 17-May-94	Customer Evaluation/Feedback	7
Tue 24-May-94	Phase II Software Coding	12
Fri 03-Jun-94	Phase II Software Testing	7
Fri 10-Jun-94	Phase II Customer Evaluation	5
Wed 15-Jun-94	Final Version of Software	5
Mon 20-Jun-94	End-User On-Site Training	2
	Total Work Days:	**79**

Read and agreed

_____ _____

for FLOW Research, Inc. for Customer

(date) _____ (date) _____

Application Scenarios:
Analog and Digital Audio

Audio-Enabled Real-Time Database

Sound Studio Control / Mixing-Automation Software

ANALOG AND DIGITAL AUDIO:
AUDIO-ENABLED REAL-TIME DATABASE

Sometimes, the best way to visualize is to *listen*.

Our ears and eyes work well together, but few applications advertising support for "business audio" truly take advantage of this fact.

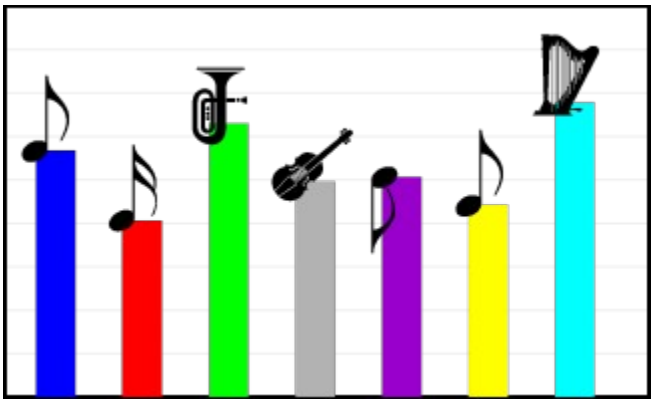
Most people can type the keys F and O much faster than they can speak the words "File, Open." In other words, a voice-recognition system can only be deemed an advantage if it completely eliminates the need for the computer keyboard, and then only under certain circumstances.

It is technically much simpler, and sometimes quite advantageous, to let the computer do the talking.

Our first application concept for the audio category involves the use of "musical alarms." Sound alarms are now common in most Personal Information Management software (PIMs), but the use of sound in PIMs tends to be one-dimensional. That is, a beep or ring is heard, for instance, to warn you of an imminent appointment.

But human hearing is far more descriminating than this sort of "there's a sound/there's silence" duality. In particular, we have a powerful attraction to music. A melody is considered "catchy" if it pops into memory from time to time. Our retention of advertising jingles usually exceeds our ability to remember the spoken word.

Consider then a stock-portfolio management program which uses MIDI sound in addition to charts as a feedback mechanism.



Each alarm in this program has a note and a pitch keyed to a level of severity. Different instruments represent user-defined stock groups. For instance, the sound of a Tuba can signify a change in a Dow-Jones-30 stock price. The pitch of the note reflects the stock price, with middle C being your purchase price and/or today's open.

Of course, a moving-average rate-of-change could be computed for each stock price, or for trading volume - the faster a stock moves, the louder the sound gets.

The net effect of this technique is that the software constantly plays a computer-generated "song," producing thrilling highs on a good day, or the *basso profundo* of a market crash.

Relationships which can be hard to identify with only visual feedback suddenly become obvious. For instance, if you hear the cello playing lower and lower while the harp goes higher and higher, it could mean that Intel Corp. suffered a correction just as Motorola rallied.

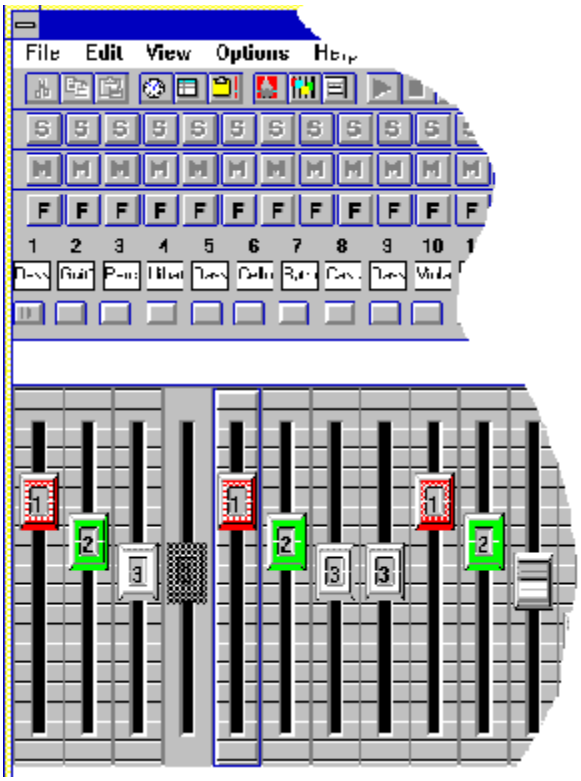
This system would also allow the computer to be left unattended. The sounds, by their painfulness, would indicate if and when human intervention became necessary.

ANALOG AND DIGITAL AUDIO:
SOUND STUDIO CONTROL / MIXING-AUTOMATION SOFTWARE

There is a dire need in the audio post-production industry for computer software that controls professional audio devices. The software would serve two basic purposes: first, to make the computer act like a giant "universal remote control," allowing a single operator to manage a great number of devices; second, to provide a "layer" which integrates all these devices and makes them more interchangeable, in much the same way that a word processing program can print a document on a variety of printers.

Unlike sequencers or high-end digital audio editing systems, this software would deal only with the mixing of sound. Who needs to mix sound? Musicians, producers (of films, TV shows, videos, commercials, record albums), engineers (at concerts, in radio stations), multimedia designers, game software designers... Take two minutes to close your eyes and open your ears. How many sounds around you are "manufactured"? Each manufactured sound has a source.

The mixdown and finishing process for sound is far less automated than other aspects of sound production. Studio musicians, for instance, have the ability to "punch in." A cellist who doesn't like three particular notes in a solo can record a second "take" of just those notes. The machines do the work of synchronizing the new take with the previous recording. This "punch in" feature is less common at the mixing level; all but the most expensive recording studios mix sound tracks manually. The only way to remix a soundtrack manually is to mix the whole thing again. With mixing-automation software, sound editors can remix a specific part of a soundtrack and save most of the previous mix.



Manufacturers of professional audio devices are churning out new products at an increasingly frenetic pace. As each new generation of audio gizmos becomes available, the small-budget sound pro must answer some tough questions:

- Are the advantages of the new gizmo worth the expense and frustration of installing and learning how to operate it?
- Will the new gizmo work with my existing collection of gizmos?
- If I don't buy/learn this gizmo, will I still be able to compete?

Mixing-automation software would make the pill of new audio technology easier to swallow, by providing support for the most popular new gizmos. It's plug-and-play - the new device can be used with the same old interface. The software could also guide you through the process of connecting your gizmo to your existing pile of tech. Finally, the software would take a lot of the fear out of buying new gizmos, since you know you would be able to use them right away.

APPLICATION SCENARIOS:
VIDEO: VIDEODISC, DIGITAL, NON-LINEAR
INTERACTIVE VIDEO: CORPORATE POLICY TRAINING

It is common to hear or read about interactive video training in heavy industry, such as aircraft or automobile manufacturing. It is quite rare to see upper-management training using this technology.

One would think that the most powerful training tools available would be used for employees whose decisions can most deeply affect a company's business.

Consider an interactive training application geared toward educating upper management about corporate policy. The scope of topics could include:

- Confidentiality and non-disclosure
- Corporate Communications and Public Relations
- Sales and Marketing
- Inter-departmental Cooperation

In this game-style application, a user is faced with a number of video scenarios - a customer walking in, a disgruntled creditor, a salesperson - and multiple-choice reponse options are presented. "Consequence" videos are then played back based on the user's selection.

The use of digital video or videodisc in this context makes it possible to create "on-the-fly" sequences composed of multiple stored video clips. Video also serves as a powerful

psychological reinforcement - it is much more persuasive to see an angry customer yelling at you than it is to read a text message about public-relations procedure.

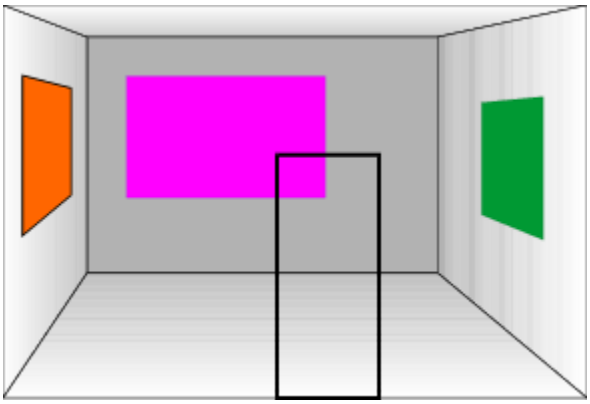
Application Scenarios:
Graphics and Imaging
3D Visualization: Art Gallery Space Planning

Space planning for any organization is an exacting process. Fortunately for most businesses, this is not an everyday activity.

An art gallery or museum, however, must constantly rearrange its place of business. The awkward size and fragility of artworks further compounds the difficulty.

Imagine, then, a CAD-like system for the preparation of art exhibits. When run for the first time, the software would ask for general parameters - the overall size of the space, locations of doors, elevators, and other relevant data.

All the art to be displayed is scanned and stored in a still-image database. In addition to the image, this database also stores the artworks' overall dimensions, shipping and temperature requirements, etc.



The application then provides an interactive 3D "walk-through" of the gallery. Selecting from the art database, you can precisely position each piece in the space. The software takes into account which artworks will fit through which doors, while the display allows the curator or gallery owner to make decisions about the proximity of related works.

APPLICATION SCENARIOS:
MULTIMEDIA NETWORKS
COMPUTER-SUPPORTED COLLABORATIVE WORK

Computer-supported Collaborative Work, or CSCW, is the name originally given to an area of software development known today as "groupware."

A new buzzphrase, "workflow management," has also emerged. In terms of available products, these categories of applications span a surprising range. Depending on where you look, you'll find systems based on:

- Enhanced electronic mail
- Real-time video-conferencing
- Document-routing and markup software
- Process-modelling and project management
- Multi-user personal information managers

The FLOW Research concept of teamwork dictates a different approach to this application category, based on the following principles:

- Instead of "deriving" a workflow-management system from an existing category of software, start with an analysis of existing work processes which deliberately *ignores* any existing technological support.
- Bearing in mind the old saying - "The map is not the territory" - focus on the use

of technology to *expedite* a process, rather than simulate or model it.

- Keep the design focused on *communications* and *relationships*, rather than on objects and storage. As in assembly-line manufacturing, optimal workflow comes from keeping the information moving, not accumulating it. And the real power in the information comes from the *interconnection* of facts, not individual isolated facts.

From these ideas we extract the following outline of a multi-user application which integrates a contact database with electronic mail and document management features.

The "universe" of this application is composed of the following items:

- People
- Organizations
- Locations
- Telephone, Fax and Electronic Addresses
- Documents and Messages
- Relational Items, which we call "Connectors"
- User-defined Items
- User-defined Connectors

All items are stored in "flat" lists - single-table databases, for those who prefer technical nomenclature - and each item is assigned a system-wide unique identifier. A separate list stores a table of Connectors between items.

The entire information system presents its contents in the form of a tree. The top level of the tree is arbitrary and can be changed by the user at any time.

In the illustration below, we've chosen organizations as the top level of our tree display. For simplicity in the diagram, we show only a small part of a tree, and use only three types of items: Organizations, People and Locations.

The diagram illustrates the use of three kinds of Connectors:

"Employs," a Connector which relates an Organization to a Person, indicates that the "connected" person works for that oganization.

The "Location" connector links any item to a Location item. The diagram uses this connector to link a street address with a Person.

"Headquarters," a Connector linking Organizations and Locations, defines the address of a company's headquarters. It is essentially a special case of the "Location" connector.

It is important to note that while some items appear duplicated in the diagram (for instance, Daniel Gross is employed by both E Corp. and FLOW Research), only one item is actually stored by the system.

This feature can be very helpful to help maintain the factual accuracy of large tables of information. For instance, if a company moves one of its branch offices, all People linked by a Connector to that branch office's unique Location item will automatically be updated by editing that single item.

The Connector-driven organization of data in this system also simplifies queries which would be onerous in a relational database system. For instance, to find all the organizations employing Daniel Gross, it is a simple matter to "flip" the tree display, placing People at the top of the tree. The list of organizations employing Daniel would then appear as "branches" of Daniel's Item in the tree.

Finally, the system supports the ability to gain information by indirection. In the diagram above, Eric Blair has no Location (address). However, the tree shows us that he is employed by Company B, and there is a "Headquarters" Location on file for that company. In attempting to contact Eric, we could try sending mail to his company's headquarters. In traditional relational database systems, implementing this sort of inductive data retrieval would be problematic at best.

FLOW Research has developed proprietary database management algorithms to implement the kind of information management system outlined above. These include version-control and update techniques that allow "subtrees" of the information base to be transferred to a remote system - such as a portable computer - and merged back into the main system at a later date with no loss in data integrity.

APPLICATION SCENARIOS:
INTERNET ACCESS
PUBLIC INTERNET, PRIVATE SERVICES

First, there were PCs (Personal Computers).

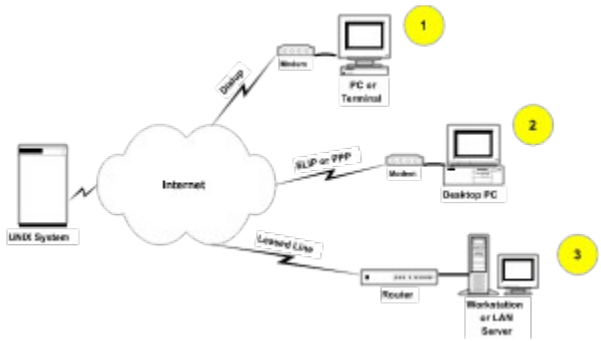
Then, we discovered IPCs (Interpersonal Computers, or PCs linked by a local-area network).

Now, we are on the brink of a new era. Whatever comes next, two substantial changes will distinguish the next generation of systems from those we now know:

- They will not be isolated, but clustered in small local workgroups, which will in turn be connected to a global computing network.
- Their computing power will not be self-contained; instead, a local interface will delegate computational subtasks to other nodes in a completely transparent fashion.

By all accounts, this global network will be based on, or derived from, the Internet.

There are essentially three tiers of access to the Internet currently available.



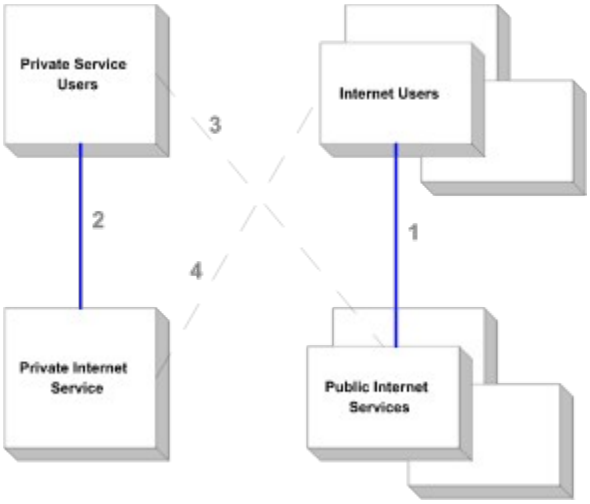
1. A standard dial-up terminal/host connection

2. A SLIP or PPP connection, which uses the modem and a layer of software to extend TCP/IP networking features over a dial-up phone line

3. A dedicated connection using a router and a leased line, at speeds typically ranging from 5,600 to 154,000 characters per second.

Most Internet users perceive it as an information resource, an online service similar to CompuServe or America Online. But the Internet is something else altogether. It is a global Wide-Area Network, offering planet-wide reach to nearly any computer at a very low cost.

Because the Internet is a true network, access to Internet sites and services is completely programmable. While it is a public network, the Internet supports private point-to-point transactions. This makes it possible to imagine the following arrangement:



The solid and dashed lines in the diagram above represent the following four service-access scenarios:

1. Regular access to the Internet by the global community of Internet users;

2. Access to the private service by registered users of the service, using the Internet as a transport - the Internet is otherwise invisible to these users;

3. Access to the private service by Internet users, on a selective basis at the discretion of the Private Service's owner or administrator;

4. Access to global Internet services by private-service users, on a selective basis at the discretion of the Private Service's owner or administrator.

This scenario demonstrates the tremendous benefits of the Internet for any wide-area application which wants to combine the benefits of a proprietary online service, client/server computing, and the wealth of resources available from a public data network.

FLOW Research is currently developing a C++ class library encapsulating the Windows Sockets interface, a recognized standard for building Internet client applications for the Windows environment.

Application Scenarios:
Demos And Presentations

The Laptop Paralegal

This Demo

DEMOS AND PRESENTATIONS:
THE LAPTOP PARALEGAL

In many businesses, presentation is deemed to be very important, but still secondary to the main goals of creating the product or providing the service.

Not so in the legal profession. In court, or in negotiations, presentation is an integral part of legal service. What's more, legal presentations are less predictable than say, a Sales & Marketing presentation. The information that needs to be conveyed changes drastically with the situation and context.

Imagine, then, a portable computer storing documents, video clips, still images, all tied in to a high-speed search engine. Imagine taking this computer into court. Imagine typing in a few words just uttered by the opposition's expert witness, finding the relevant document, and voicing an objection, all in the space of six seconds.

Such a system would clearly have application beyond the legal world. Anyone in the business of making presentations, who requires the ability to quickly customize the appearance and sequence of the information, would be well-equipped with such a "laptop assistant."

The successful development of such a system relies on a search engine with the following features:

- The ability to search through vast amounts of disk-based information while minimizing access to that disk (which slows down the search process and exhausts portables running on battery power)
- Support for rapid processing of an imprecise search - that is, one that is not

specified with keyphrases or boolean connectors

- The ability to sort search results by the ambiguous quality known as "relevance."

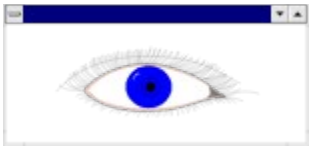
FLOW Research has developed an algorithm, called NeuroText™, that meets these requirements. The algorithm was originally presented to the public by Daniel Gross at the 1990 JIPDEC Conference on Artificial Intelligence and Hypermedia in Tokyo.

DEMOS AND PRESENTATIONS:
THIS DEMO

While this demo program and its documents are full of our ideas and suggestions about interactive presentation, they are also illustrations of the kind of work FLOW Research can do for you.

For an overview of the design and planning process behind this demo, please read the Thinking About Design sections of our **Methods and Techniques** document.

THINKING ABOUT DESIGN:
VISUALIZING SOFTWARE



The first step in designing effective software is to be able to imagine it. At FLOW Research, we call this mental exercise *visualization*.

The point of the exercise is to mentally create a session with the software. For every project, some aspects of the software's behavior are easily visualized, and others are very difficult. We take notes on the hard-to-imagine parts, and our first design meetings focus on them.

The goal of software visualization is to give every project participant a complete vision of the design. Our benchmark of success is when every team member can describe the software's purpose and design *as if they had come up with the idea themselves*.

For this demo disk, we created a number of simple prototypes, knowing full well that not one of them would suit our purpose. We experimented with these until we developed a satisfactory understanding of the strengths and weaknesses of each prototype.

The first specification meeting for the demo disk set out to define an integrated model for the software that combined the strengths of all the prototypes, while avoiding or minimizing their weaknesses.

At the end of the second specification meeting, the "look" and behavior of the demo were nailed down.

THINKING ABOUT DESIGN:
FINDING TOOLS

The next step in creating the demo was to select the appropriate resources and tools. We tend to favor tools we know well over more powerful tools that we don't fully master. After all, in spite of the sophistication of today's software, the human mind still makes the most important contribution to the development process.

For a review of all the tools used in the creation of this demo, see the Tools We Used section in this document.

THINKING ABOUT DESIGN:
MAKING IT REAL

This demo was developed entirely in C++, using Microsoft Visual C++ version 1.5. The images of our key staff members were scanned in from Polaroid® shots. The image files were retouched in Corel Photo-Paint, converted to GIF format, and imported into Autodesk Animator. Using Animator's "Unzag" tool, we anti-aliased all the edges in each image to give the finished "flic" a more film-like feel. It is for the same reason that we stayed away from video input which has less depth of field and contrast than film and AVI files which don't provide the ability to touch up individual frames.

The FLOW Research "splash" image featuring our logo against a sunset background was also created in Corel PHOTO-PAINT. Our logo is a Metafile, so we first had to convert it to a bitmap in Hijaak Pro, then open it in Photo-Paint to place it on the background. The final image was color-reduced to 16 colors in Paint Shop Pro

We used custom VBX controls whenever possible to create the buttons in our windows. When these didn't give us the flavor we wanted, we either modified their behavior in code, or created custom controls.

The MIDI songs that accompany each person's bio in the Staff Window were recorded and edited using WinJammer, a popular shareware MIDI sequencer. The MIDI files were designed to meet Microsoft's multimedia authoring guidelines. These guidelines require each file to essentially contain the same song twice: some tracks in the file store the song for low-end synthesizers, while other tracks store the same song for more sophisticated synthesizers, such as the **Roland SoundCanvas** SCC-1 card that we favor for professional music composition.

The "Hello" sound bites were recorded using MediaVision's Pocket Recorder, a Windows utility that is supplied with the company's **Pro Audio Spectrum 16** card. We recorded the sounds at CD-quality - for techies, that's 44.1 KHz, 16-bit samples. We then used Microsoft's WaveEdit to reduce the sound files to a smaller size, by decreasing both the sample size and the sample rate. This compromise was necessary to ensure that the sounds could be played back on low-end sound cards.

The sound loop in our "About" Window was created by connecting our SoundCanvas directly to our digital sound card, then playing the song in WinJammer and recording in Pocket Recorder simultaneously. The resulting sound file was then retouched and edited in WaveEdit as with the sound bites. The sound is a (very) short sequence from *Moments of Life*, a pop song Daniel composed a few years ago.

The document you are now reading was created in Microsoft Word using Doc-To-Help, a tool that facilitates the creation of files compatible with the Windows Help system.

Many other tricks and ruses were used to create this demo, but we'll leave you to discover them on your own. Or, if you're really stumped, give us a call at **212.594.0900**. Maybe you can talk us in to giving away a few trade secrets.

METHODS AND TECHNIQUES:
TOOLS WE USED

The following sections describe the software tools we used to create this demo disk. In each section, you can click on the company name at the top of the section to obtain contact information.

Autodesk: Autodesk Animator version 1.0
Corel: CorelDRAW! version 3.0
Corel: PHOTO-PAINT version 3.0
Inset Systems: Hijaak Pro version 2.0
JASC, Inc.: Paint Shop Pro version 2.01
Media Vision: Pocket Recorder version 2.5
Microsoft: Visual C++ version 1.5
Microsoft: WaveEdit version 1.0c
Microsoft: Word for Windows version 2.0c
One Tree Software: SourceSafe version 2.20
WexTech Systems: Doc-To-Help version 1.1
WinJammer Software Ltd.: WinJammer version 2.30

TOOLS WE USED:

AUTODESK
AUTODESK ANIMATOR VERSION 1.0

Autodesk Animator is an integrated paint and animation program. Version 1.0 introduced the de-facto standard FLI file format for animations. We use Animator instead of its more capable sibling, Animator Pro for creating small-screen (320 by 200 pixels) animations.

The one trick to keep in mind when using Animator to create animations for the Windows environment is the form-factor difference. Virtually all Windows systems are configured with a so-called "square" aspect ratio. That is to say, the aspect ratio of the display resolution (in pixels) is equal to the aspect ratio of the physical display (in inches). However, the 320-by-200-pixel screen used by Animator is not "square ratio."

Producing an animation that does not appear distorted requires jumping back and forth between Animator running in DOS and the Animator Player for Windows. To create a true square or circle, for instance, the numerical dimensions must be watched carefully. Each frame usually requires manual touch-up to appear "just right" for Windows playback.

TOOLS WE USED:

COREL
CORELDRAW! VERSION 3.0

An object-oriented drawing program, CorelDRAW provides a rich and intuitive framework for the creation of computer line art - and in a pinch, the program serves well for precise mechanical drawing.

The original release of CorelDRAW dramatically raised the standard of Windows application design. The range of its features and its interface style put it in a league with applications that, up to then, were only found on Macintosh computers.

The latest version of CorelDRAW is version 4. FLOW Research is staying with version 3.0 because we don't need the new version's animation capabilities. At some point we will evaluate the new version, and you may read about it in a future edition of this demo disk.

Version 3 represented a major change in Corel's flagship product. While the CorelDRAW interface was still recognizable and familiar, the product bundled several applications, including charting and slideshow tools. The image-editing program, PHOTO-PAINT, is a FLOW Research favorite. The entire package sells for less than comparable products including only one of these tools.

The FLOW Research logo is a CorelDRAW concoction. Many of the illustrations in this document were also created using CorelDRAW.

Those who have worked with CorelDRAW since the early days know that its Windows

Metafile export feature is notoriously incompatible with other Windows applications. This is not the fault of CorelDRAW: most applications simply can't process a Metafile that's too complex. That's why we also needed Hijaak Pro version 2.0.

TOOLS WE USED:

COREL
PHOTO-PAINT VERSION 3.0

While less capable than top-of-the-line paint programs such as Adobe® PhotoShop™ and Aldus® PhotoStyler™, PHOTO-PAINT is a full-featured image-editing package. Its support for different color systems (RGB, CMYK, HLS, palette-based) is excellent. PHOTO-PAINT also offers advanced features like a "magic wand" selection tool and true-color (24-bit) support.

Like most image-editing programs, PHOTO-PAINT is output-oriented. However, when the computer's screen is the target, some system-specific image-processing functions are needed. For this final step, when we were done with an image in PHOTO-PAINT we would edit it in Paint Shop Pro.

TOOLS WE USED:

INSET SYSTEMS
HIJAAK PRO VERSION 2.0

There are few aspects of computer-based visual work more frustrating than dealing with graphics file formats. New formats seem to grow like weeds, without rhyme or reason.

To cut through these problems and get on with your work, we heartilty recommend Hijaak Pro. It can read hundreds of variations of several dozen standard file formats, including "vector" graphics, bitmaps and many fax software image formats. The software also features a "batch" mode so you can queue up many files to be converted, go to lunch, and return to find all your conversions completed automatically.

We use Hijaak Pro most frequently to convert CorelDRAW images to the Windows standard Metafile format, and for converting Metafiles to bitmaps.

TOOLS WE USED:

JASC, INC.
PAINT SHOP PRO VERSION 2.01

Paint Shop Pro is the kind of program that raises the ante for shareware developers everywhere. Though not a fully-featured paint program like Corel's PHOTO-PAINT, Paint Shop solves a few nagging problems for manipulating images in Windows.

Our two favorite features are: the "screen-grabber" function, which lets you select a window or screen area and import it as an image; and the color-reduction option, which does a remarkable job of converting images to the 16 standard Windows colors. The "FLOW Sunset" image in the demo's main window was converted from a true-color image to 16 colors using Paint Shop Pro.

TOOLS WE USED:

MEDIA VISION
POCKET RECORDER VERSION 2.5

Media Vision's **Pro Audio Spectrum** card has become one of the more popular sound cards for PCs, in no small part because of the exceptional quality of the utilities bundled with the card.

Pocket Recorder is our rough-and-ready utility for recording audio samples. Among our many "likes" for this product are: the LED-style real-time level indicator shown while recording; the status area showing the duration of the current sound in seconds, the sampling rate and sample size; and the free disk-space displayed in hours, minutes and seconds.

Pocket Recorder allows coarse-grained editing of sound files, but for fine-tuning we prefer Microsoft's WaveEdit utility.

TOOLS WE USED:

MICROSOFT
VISUAL C++ VERSION 1.5

It doesn't have the fastest compiler. The built-in text editor is below par. It is full of options that only a handful of people on the entire planet understand.

For our money, Microsoft Visual C++ is the best Windows development environment there is. There are slicker systems. There are richer systems. But in our opinion Microsoft wins in the following key areas:

- The best and most thorough online electronic documentation;
- The clearest and most immediately useful source-code samples;
- The most comprehensive and most extensible C++ class library;
- The best support for OLE;
- The shortest time from idea to prototype in our in-house tests.

It doesn't matter that Visual C++ is not the best available product from a technical standpoint. Our programmers become productive faster with Visual C++ than with products from Borland, Symantec, or Watcom. We do keep these other development systems handy, however, in case a customer needs us to work with their own "corporate standard" for development.

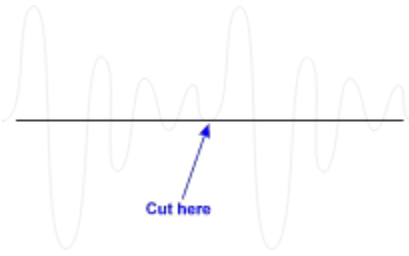
TOOLS WE USED:

MICROSOFT
WAVEEDIT VERSION 1.0C

This sound-editing utility was included with Microsoft's Video for Windows Software Development Kit (SDK) version 1.0. The latest release of the Video for Windows SDK, version 1.1, unfortunately doesn't include this fine program. It has been replaced with a slightly-improved version of the Windows Sound Recorder which supports installable drivers for audio compression and decompression.

Among the many excellent shareware sound editors we use, none have the waveform display quality of WaveEdit. The display-zoom feature combined with single-sample cut-and-paste editing make this the ideal tool for quick, seamless edits.

The key to clean sound editing is to make all cuts on "zero," or dead-silence, samples. WaveEdit's display and mouse-or-keyboard block selection make it easy to do accurate edits.



WaveEdit lacks the sophisticated features of professional digital-audio editing systems. But for block-style editing, it does the job just as well.

Although WaveEdit is now presumably obsolete, we will continue to use it until someone in the lab has the time to develop a comparable substitute.

TOOLS WE USED:

MICROSOFT
WORD FOR WINDOWS VERSION 2.0C

Selecting a company-standard word processing package is one of the more difficult challenges for an information-driven business. For FLOW Research, it came down to two issues: learning-curve and extensibility.

The combination of WordPerfect command help, the Word Tutorial, and the WordBASIC extension language makes Word our standard. However, FLOW doesn't mandate individual preferences, and some of our employees are happy with Lotus Ami Pro or WordPerfect.

A big benefit of Word for us has been the availability of many excellent add-on products, particularly the Doc-To-Help system for preparing software documentation and online Help files.

TOOLS WE USED:

ONE TREE SOFTWARE
SOURCESAFE VERSION 2.20

Version control is a critical part of team-oriented software development. Without it, programmers can not work in a group. They're just people sharing office space.

SourceSafe is our favorite version-control system for a number of reasons:

- Availability of DOS, Windows, UNIX and Macintosh packages;
- Hierarchical management of projects;
- No-nonsense system for increasing the number of software licenses;
- The ability to share source code automatically across several projects.

FLOW Research also uses SourceSafe to manage version-control for documents, spreadsheets, and other files. This provides a reliable repository and source of the most recent management-approved version of a document. SourceSafe's "store last version only" feature ensures that precious disk storage is not wasted. It also prevents embarassing problems, such as sending an out-of-date proposal to a customer.

TOOLS WE USED:

WEXTECH SYSTEMS: DOC-TO-HELP VERSION 1.1

The benefits of detailed electronic documentation and context-sensitive help cannot be overestimated. While Windows offers a facility for creating sophisticated help documents (like the one you're reading now), the process of structuring topics and "marking up" the text to create jump points is tedious and complicated.

Doc-To-Help combines a software library with macros and stylesheets designed to work with Microsoft Word. In addition to simplifying the creation of Help files, Doc-To-Help also provides the ability to create both printed documentation and Help files from a single source document.

TOOLS WE USED:

WINJAMMER SOFTWARE LTD.: WINJAMMER VERSION 2.30

After years of lagging behind their Macintosh-based equivalents, MIDI sequencing programs for Windows have finally come into their own.

At FLOW Research, we still prefer the DOS-based **Voyetra Sequencer Plus Gold** for professional-level music composition although this may change very soon.

For multimedia music, our favorite for some time now has been WinJammer. This shareware utility, and especially its more able non-shareware successor, WinJammer Pro, are on a par with the best commercial software available today.

Two WinJammer features have won our gratitude for their help in creating the music for this demo: first, the program's ability to play MIDI to different hardware devices simultaneously; second, the "shift following notes" feature of the note editor, which makes it very easy to add or remove a note without offsetting the entire remainder of the song in an extra step.

GLOSSARY

AVI

C++

CAD

CMYK

GIF

HLS

Human Factors

Internet

LAN

Local-Area Network

Metafile

MIDI

MPEG

Multi-user

Newmedia

PPP

QuickTime

RGB

Search Engine

SLIP

SMPTE

TCP/IP

WAN

Wide-Area Network

AVI

Audio-**V**ideo **I**nterleave, a format created by Microsoft and supported by Microsoft Video for Windows. The format includes support for "plug in" components that allow third parties to create their own compression and decompression schemes. See Also QuickTime and MPEG.

C++

An object-oriented extension of the popular "C" programming language. This is the development language of choice at FLOW Research.

CAD

Computer-**A**ided **D**esign. When speaking of software, refers to applications that allow for very precise drawing and three-dimensional rendering of objects. These applications can be used to design anything from mousetraps to buildings.

CMYK

Cyan-**M**agenta-**Y**ellow-Blac**K**, a color system originally developed for the the so-called "four-color" inking process used in full-color paper printing. This is the preferred color system for dealing with light-reflecting media, such as paper and film. See Also HLS and RGB.

GIF

Graphics **I**nterchange **F**ormat, an image file format defined by CompuServe which has become highly popular because of its ability to compress images.

HLS

Hue-**L**uminosity **S**aturation, a color system favored for dealing with light-emitting media, especially video signals. HLS makes it very easy to separate the black-and-white, light-and-dark parts of an image from its actual colors. This is connected to the history of television technology, since color was added to a black-and-white signal for compatibility with older TV sets. To try this on your own TV, use your remote control to set the "Hue" on your set all the way to zero. You will then see the image in black-and-white.

HLS has taken a back seat to the RGB system for most applications. See Also CMYK and RGB.

HUMAN FACTORS

A branch of systems analysis relating to ergonomics, computer-human interface (CHI), and generally the interplay of forces between people and things. An understanding of human factors is essential for, among other things, good software interface design.

INTERNET

A global computer network connecting universities, research centers, military installations, and increasingly, private-sector business organizations as well. Born from the merger of ARPANet (the research-lab network connecting sites working on projects of the Defense Advanced Research Projects Agency, or DARPA), BITNET (which linked universities using IBM mainframe computers), and NSFNet (the data network of the National Science Foundation). Considered by many to form the basis of the much overhyped "Information Superhighway." See Also TCP/IP.

LAN

See Local-Area Network

LOCAL-AREA NETWORK

A high-speed communications system for interconnecting computers in a single office, department or building, allowing users of any connected system to share files, devices and other resources. See Also Wide-Area Network.

METAFILE

A Windows standard file format and command language for storing and displaying so-called "vector" graphics. Unlike bitmap graphics, Metafiles can be distorted or resized while still maintaining the best appearance possible for a given display resolution. Metafiles use techniques similar to the ones found in PostScript and TrueType to make scaleable graphics.

MIDI

Musical **I**nstrument **D**evice **I**nterface - a set of standards defining both a communications protocol and a file format for managing electronic music.

MPEG

A format for the storage and compression of computer-based digital video defined by the **M**otion **P**icture **E**ngineering **G**roup. MPEG I, the original standard, is specifically designed to allow 30 frame-per-second full-screen playback from video stored on a CD-ROM. MPEG II, a new standard in-progress, will offer increased resolution. The MPEG standard has been criticized for the very high cost of the hardware required to compress video in MPEG format. See Also AVI and QuickTime.

MULTI-USER

When used to describe a computer system, indicates the ability to run applications for more than one user. When describing software, indicates an application's ability to let several users (typically on a local-area network) share and simultaneously update a single document or database.

NEWMEDIA

A term describing the extraordinary breadth of the new forms of information made possible by electronics, and computers in particular. We prefer this word to "multimedia," which has been so burdened with meanings that it barely means anything.

PPP

Phone **P**acket **P**rotocol, a standard which allows a computer to become a node on a TCP/IP network using a modem and telephone line. See Also SLIP.

QUICKTIME

A set of file formats and functions defined by Apple Computer allowing for capture and playback of audio and video on Macintosh computers. Apple has also released a version of QuickTime for Microsoft Windows. See Also AVI and MPEG.

RGB

Red-**G**reen-**B**lue, the preferred color system for dealing with light-emitting media (such as video and computer graphics). See Also HLS and CMYK.

Search Engine

A software module that allows scanning of large information bases to locate elements that meet specific criteria. Most first-generation engines were based on keywords, and produced lists of documents that contained those words. Today's engines are much more sophisticated, providing more intuitive, "fuzzy" interfaces for defining search terms.

SLIP

Serial **L**ine **I**nternet **P**rotocol, a set of standards defining how a computer can become a node on a TCP/IP network using a modem and a dial-up telephone connection. See Also Internet and PPP.

SMPTE

Stands for **S**ociety of **M**otion **P**icture and **T**elevision **E**ngineers. Usually used to refer to the standards defined by this organization, such as the North American NTSC standard for video signals, and timecode, the standard for measuring time in audio, video and film production.

TCP/IP

Transmission **C**ontrol **P**rotocol / **I**nternet **P**rogram, a low-level network transmission protocol popular among users of UNIX-based workstations. TCP/IP is the protocol used for data transmission in the Internet.

WAN

See Wide-Area Network

WIDE-AREA NETWORK

A high-speed communications system that connects computers over a wide geographical area. These networks allow files and other resources to be shared as if all connected users were working in the same facility. Wide-Area nets can span two locations, an entire city, or the world. See Also Local-Area Network.

Sharing video files over a network reduces the upgrade cost of other PCs, since they only need to support video playback.

FLOW rule: *exploit existing systems wherever and whenever possible. Do not reinvent the wheel.*

This arrangement reduces the storage requirements for captured video, and also limits the amount of information to be processed. ***FLOW rule:*** *never manage more information than is absolutely required.*

FLOW rule: *don't automate a process that a human being can do better than a machine. Automation must help the decision-making process, not replace it.*

FLOW rule: *recycle technological resources. As an organization grows and changes, it must* ***reconfigure*** *its resources to face new challenges.*

Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
Tel: 415.332.2344
Fax: 415.331.8093

Corel Corporation
1600 Carling Avenue, Ottawa
Ontario, Canada K1Z 8R7
Tel: 613.728.8200
Fax: 613.728.9790
CompuServe: GO COREL

Inset Systems
71 Commerce Drive
Brookfield, CT 06804-3405
Tel: 800.374.6738
Fax: 203.775.5634
CompuServe: GO INSET

JASC, Inc.
10901 Red Circle Drive, Suite 340
Minnetonka, MN 55343
Tel: 612.930.9171
Fax: 612.930.9172

Media Vision Inc.
47300 Bayside Parkway
Fremont, CA 94538
Tel: 800.684.6699
Fax: 510.770.8648
CompuServe: GO MEDIAVISION

Microsoft Corp.
One Microsoft Way
Redmond, WA 98052-6399
Tel: 800.426.9400
Fax: 206.936.7329
CompuServe: GO MSOFT

One Tree Software
P.O. Box 11639
Raleigh, NC 27604
Tel: 800.397.2323
Fax: 919.821.5222

Premia Corp.
1075 NW Murray Boulevard, Suite 268
Portland, OR 97229
Tel: 503.641.6000
Fax: 503.641.6001

WexTech Systems, Inc.
310 Madison Avenue, Suite 905
New York, NY 10017
Tel: 212.949.9595

WinJammer Software Limited
69 Rancliffe Road, Oakville
Ontario, Canada L6H 1B1
Tel: 905.842.3708
Fax: 905.842.2732
CompuServe: 72662,3021