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INTRODUCTION
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In May's LEA, we wrap up our two-part special revolving around the theme: RE: Searching Our Origins. This time round, guest editors Paul Brown and Catherine Mason have selected five essays.

To begin, Frieder Nake discusses the compArt project and how it is creating an elaborate dynamic digital medium for computer art, where he describes four subspaces of the compArt medium.

Robin Oppenheimer then takes us through the world of regional media arts histories and their contributions to electronic arts. She summarizes examples of late 20th century regional media arts histories research in the U.S. Pacific Northwest and traces some of their complex connections to major art movements and artists, and their interconnectivity and interrelated in complex and unexpected ways.

In Anne Laforet's piece, she examines how the preservation of net art has become a core issue, especially for the cultural institutions which have acquired it, as the advent of the Internet, with its inundation of data, makes the longevity of artworks difficult, if not impossible, to assess.

Following that, Robert Edgar enlightens us on the aesthetic, economic, technological and personal contexts involved with being an early adopter of personal computer programming as an art form.

To conclude, Cynthia Beth Rubin examines the innovations by artists working with early digital imaging software prior to 1988 in her essay, *Digital by Choice: Explorations of Early Software*.

Delving deep into LEA's archives, One From the Vault revives Paul Warren's Alternative Virtual Biennial Exhibition - An Introductory Essay and Artist Profiles, which was first published in LEA in May 1995.

Michael Punt's eclectic offerings for Leonardo Reviews include

reviews dealing with film and music, such as Rene Van Peer's
*Frith in Retroperspective* and *Allies*, and Amy Ione's
*Proteus: A Nineteenth Century Vision*. It also features Andrea
Dahlberg's review of *Edward Said: The Last Interview*, whose
passing leaves the world without "a great intellectual and an
articulate and credible spokesman for Palestine."

We also take a look at the contents and selected abstracts from
the third 2005 issue of *Leonardo* while ISAST News sees a
continuation of our series on the *The Pacific Rim New Media
Summit: A Pre-Symposium to ISEA2006*, coupled with a statement
from the Urbanity and Locative Media working group.

To end, Bytes (featuring announcements and calls for papers)
introduces Amy Ione's latest book, "Innovation and
Visualization" and LEA's latest call for the upcoming special,
Wild Nature and the Digital Life.

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FEATURES
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FOUR SPACES: A DIGITAL MEDIA APPROACH TO THE HISTORY OF
COMPUTER ART

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KEYWORDS

computer art, digital art, algorithmic art, history of computer
art, digital media, space metaphor, algorithmic sign

ABSTRACT

The compArt project is creating an elaborate dynamic digital
medium for computer art. It is based on a space metaphor. The
concept here extends from the physical space of everyday
experience to the semiotic spaces of art history, or
mathematics. Digital art history should not only use the means
any historic recording is using. It should creatively turn to
its own media basis. We propose that artefacts, in the process
of becoming works of art, exist in the artist's studio, the
gallery show room, and the cultural space of art criticism. Four
subspaces of the compArt medium will be described (facts, works,
art works, study).

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INTRODUCTION

Design of digital media is often considered a task in spatial
design. But space and time are both useful concepts in
understanding the world around us. As semiotic animals [1] we
create layers of signs to cover up phenomena of the environment.

In spite of the apparent intangeability of information spaces,
a new awareness is emphasizing location, extension, and body.

Current analyses prefer space over time [2].

We believe that we "enter" a space, stay there, and leave it behind. We also believe that time "passes by". Less naively, we would conclude that, instead of entering, we create space, and we create time rather than observing it passing by. Living is "generating" time and space.

This essay is on the early history of computer art. I will use the idea of space as a means to organize data and processes relevant to that history. History is our product of combining temporal things of the past. We would, therefore, not usually expect spatial categories to be applied to it. But the connectivity of digital spaces allows for a new kind of representing events in contexts. That makes a spatial approach attractive.

A Google search generates results within (almost) no time. This comes at the expense of space: The search results are spread out in space, and we must wander around it in order to discover. The objective side of digital media may therefore be better understood from a space, than from a time perspective. This would constitute an interesting shift of awareness concerning the computer. The necessary, yet hidden, component of digital media is a computer as the kernel of digital media. Efficiency of time would be supplanted by observation of space [3].

Computing has become quite ubiquitous. The media perspective has outscored the tool perspective of computing. Even if "space" appeared as a naive concept in dealing with media, it could be used metaphorically in their design. At the University of Bremen, we do so by developing an elaborate dynamic digital medium for computer art.

"Computer art", here, is the generation of aesthetic objects with the aid of software on a digital computer. Its history started in 1965. Three exhibitions took place that year, which are acknowledged as first public presentations of digital art: Georg Nees at the Studiengalerie of the University of Stuttgart (5-19 February 1965); A. Michael Noll and Bela Julesz at Howard Wise Gallery, New York (6-24 April 1965); Frieder Nake and Georg Nees at Galerie Wendelin Niedlich, Stuttgart (5-26 November 1965) [4]. More artists made their public appearance within the next few years. A small but lively crowd experimented with equipment that would today make one shiver in pure disbelief.

About one generation has passed since then. This seems to be the amount of time against which a phenomenon must survive before it is accepted as of historical relevance. Paul Brown with the CACHE project is one of the most enthusiastic activists securing the origins of digital art. Others [5] play important roles, too. They seem to converge on one aspect.

In the rapidly changing field of digital arts, it may be irrelevant to identify similarities and differences of first beginnings. What should we hope to learn from those forgotten times? Technology was so terribly restricted that nothing could possibly be of any interest to an artist today. But in spite of the huge progress made on all "quantitative" counts, it seems likely that a few fundamental concerns of a "qualitative" nature emerge. The idea of algorithmic art - first conceived in the 1960s - is such a powerful principle. It is not only lasting till today but is gaining power as digital arts spreads. The new aesthetics, Lev Manovich says, is to be found in the engine of

the new culture: in software.

What is still to be discovered, and fully to be acknowledged, is the character of digital art as "algorithmic sign". In following Max Bense, I consider the work of art as a complex sign [6]. Digital works are semiotic creatures too. Their semiotic existence is transformed into an algorithmic state when they get pushed through the computer interface [7]. This theoretical background is important for our project in Bremen. We hope to be able to provide valuable service to the digital art community in the following way.

The abstract space for computer art should eventually contain everything in the field. The space is a digital medium combining three types of activities:

1. Delivery: Typically done by an artist, critic, or curator. Facts, events, processes are delivered as data to our server for inclusion in the medium.

2. Demand: Typically carried out by a researcher, teacher, or everyday person wanting to learn something about computer art.

3. Deposit: Carried out by media specialists on-site. They check and cross-check all data delivered to the server, before they grant certified entry into the data base.

Our maxim is to guarantee the correctness of data maintained in the space, to collect everything within well-defined boundaries, to be up to date to a defined point in time, and to provide joyful and pleasing modes of interaction. Currently, we are busy with design principles, and a series of bottom-up studies for the period into the 1970s.

The following sections describe the purpose and state of the subspaces of the compArt digital medium. An outlook on future work concludes the contribution.

GENERAL ASSUMPTION

We assume the following simple, yet powerful, perspective on the world of art. Persons called artists produce works (artefacts). They want these to be more than pure "works" (i.e. results of work): They want them to be "works of art". Often, they claim that to be the case. Subjectively, they are right. But everybody may declare what she has produced to be a work of art. In the end, only an abstract and complex network that we call "society" turns works into works of art. Briefly, the artist generates the work, society generates the work of art.

Such a starting position may sound odd. Its strongest proponent was Marcel Duchamp. The active artist is, of course, dreaming of that great piece of art she is making. But left alone, she has no chance. A gallerist must be willing to exhibit the work, a critic must write about it, an art magazine must provide space to reproduce the artist's work, teachers should start telling their students about it, art historians should mention it at least in passing, more art shows should include it, postcards should be printed, etc. Society must be ready and work hard if our artist's work is to become a work of art. Artistic production leads to the work, critical consumption leads to the art.

Our hypermedium for computer art takes up this basic idea. It

is subdivided into three layers with four sub-spaces. The middle layer is occcupied by the space of works and the space of art. The top layer is the space of study, and the basic layer that of facts. We now look at those four spaces in turn.

THE SPACE OF WORKS

The artist produces her work in her studio. The traditional way of presenting it to the public is a gallery show. The gallery is the place for the transition from work to art. We decided to design the space of the works as virtual construction of a gallery.

To rebuild a gallery scenario as virtual reality can create a trap of kitsch. We nevertheless present the sites of major events of earliest computer art. The first candidate is the Studiengalerie of TH Stuttgart, the place of Nees' first show [8]. We have reconstructed it from verbal description, drawings, and photographs. It was a revelation when we found a floor plan [9].

Second is the Howard Wise Gallery in New York, where A. Michael Noll and Bela Julesz first presented their works. The gallery no longer exists. It seems to be hard to get data of it, but we are working on it. Galerie Wendelin Niedlich in Stuttgart was site of the third show in 1965. We have completed a virtual reconstruction of its main room [10].

A second group of historic places comprises the sites of breakthrough events: The Institute for Contemporary Arts in London, and the locations of the Tendencies 4 events in Zagreb 1968/69. They should be followed by more, notably the pavilions at the 35th Venice Biennale in the summer of 1970 where an experimental exposition was arranged.

The virtual reconstruction of a gallery must compete with photographs as the main medium so far to transfer an impression of time and place. The goal of authentic pictures must minimize the kitsch factor that results from the discrepancy between the enormous effort for realistic visual appearance, and its futility. Historic places may also be used to display works in phantastically expanding environments. Exhibits would act as algorithmic interfaces to the space of data. Therefore they may change.

We define the task as the quest for virtual documents of historic interest used as database interface of inherent digital aesthetics. Photorealistic and non-photorealistic rendering should be combined in creative ways.

THE SPACE OF ART

Even if only virtual, we navigate the gallery in accord with our physical body experience. The work may become a work of art when it is put into appropriate contexts. Contexts transform physical works into mental artworks. The work of art is a mental construct, not a physical given. As such it is a sign.

Virtual navigation in the space of art should appear like mental navigation. No ground under the feet, but fantastic encounters of light when floating in empty spaces. Free navigation stands for putting-into-context. New experientience for the visitor.

We attempt to do this by reducing entities to simple geometric objects in a vector field of attraction and repulsion. Visitors

observe the effect of the sum total of those forces [11]. The scene is in a state of permanent movement - a metaphor for the constant re-evaluation of works, artists, or styles.

To the visitor, the field of art appears as a look into a dark infinite space. Stars appear and go, as the visitor silently flows through that world. He gets himself into areas of strong attraction between objects, or in quiet areas.

This space of art is a visual metaphor for a very large dynamic data set [12]. We do not expect the one best way of visualization for it. Our approach emphasizes openness and renewed interpretation. "Find, don't search!" is the motto for navigating the space of art [13].

If searching requires symbolic formulation of a query and a powerful heuristic algorithm, finding depends on the leisure and aesthetic pleasure of diving into an unfathomed space with nothing much in mind but the expectation of unexpected discovery. Such a space must provide surprise and joy.

Both modes have their advantages. If I know fairly well what I need to find, the symbolic method of logical query is helpful. If I know only vaguely what I want, the iconic method of physical movement is preferable.

THE SPACE OF STUDY

We provide "virtual laboratories" making up the space of study. Virtual laboratories are dedicated to historic examples of computer art, but topics could be of more general nature as, e.g., color, randomness, or symmetry. The space of study will grow and shrink as topics appear and lose interest.

Manfred Mohr's algorithmic art uses features of the 6D-hypercube to algorithmically define paintings of hard colored polygonal areas. Though the picture looks random, the artist knows the very precise background.

With a simple software tool it is possible to explore part of the background. Applying our *DeviceX* to Mohr's pictures, we transform geometry into topology - a step of abstraction. Areas and edges can be made to blink to help identify the path from the geometry panel to its topography equivalent.

Visual intuition of high-dimensional Euclidean space is nearly impossible. Manipulating aspects of it may, however, create an understanding beyond mathematics. Manipulation, combined with immediate visual feedback, may pave the way to partial insight. Observation of people using *DeviceX* encourages us to continue along this line.

We have developed other virtual laboratories [14]. We expect the combination of historic data, their visualization, and aesthetic experiments to result in a new attitude towards art history - history created from exploration, rather than memorized as collections of data.

One aspect of art appreciation is "immediate" pleasure. We are emotionally, intellectually, or morally moved by the immediate impression of a work. There are many ways of indirect learning about the work, artist, or epoch. Any such knowledge influences our appreciation. We call that the "mediated" pleasure.

There is a third kind of appreciation. The various mediations leave the work itself untouched. It is treated as a distant object from which statements are inferred, i.e. signs are produced. But there is an approach that changes the work, and leaves it unchanged. How is that possible?

The artist's work is the canvas covered with paints, a piece of matter. It has no other purpose but to become the reason for sign production. We wrap the work into contexts: We appreciate it by involving it in semioses.

Signs, other than pure matter, may be changed but returned to their original form as if they had been left untouched [15]. We call this class of signs the "algorithmic sign" [16]. It exists on the digital medium. It appears visibly on the surface of digital media and, at the same time, invisibly deep inside storage and processor. Metaphorically, we may dive into it, intrude on it, and leave it again. But when we leave it, it snaps back to what it had been before.

The algorithmic sign is the mode of existence of computer artefacts in general, and of works of computer art in particular. In the digital domain, semiotic processes may appear as if they were characterized by "unchanging change". It guarantees that we may take the work apart without altering it. The space of study allows for exactly this kind of mediated encounter. The work appears as interface to its construction.
THE SPACE OF FACTS

Everything that appears in one of the spaces of works, art, or study consists of a fact and an appearance. The fact is what remains constant in all its various perceivable appearances.

The facts make up the world of computer art. This view is highly problematic, but we are safe with an extensional view of the space of facts as implementation of a relational data base.

Central to the data base schema are the entities of work, artist, and exhibition, plus a few more. The data base will eventually be the most precious part of the space for computer art [17]. When you search the WWW, you will be surprised about the discrepancies and blatant errors you find. Our goal is to achieve 95 per cent, and more, of completeness, correctness, and consistency.

Completeness is to a large extent a matter of definition and exclusion. What do we define to belong to computer art? To start, we collect data from 1965 to 1970, but extend this into the 1970s. We prefer a pragmatic approach. Only humans can decide. They change their former decisions under the influence of growing insight. Therefore, we prefer a social process of collecting "facts". Selected artists will be asked to enter their data by submitting them via the Internet. Others will later add theirs, and the dynamics of the process will emerge.

We will set up a local organization to cross-check all arriving data before release. Cases may take considerable amounts of time. Categories of validity may become adviceable, as e.g.: certified, plausibly reliable, communicated.

The software system itself will play an important role. The interface must be intuitively clear for artists to participate. The interface must aesthetically appeal to them. It must allow for unexpected requests, proposals, complaints, or errors. We

are working on this and hope to come up with an attractive solution. But it will remain a matter of subjective judgement.
CONCLUSION

I have presented an overview of the compArt approach to the early history of (visual) computer art. Its features are (i) a spatial metaphor as design background for an elaborate hypermedium, (ii) trust in social networks and their distributed potential to generate reliable sediments of data, (iii) gradual bottom-up development of software combined with top-down projection of theory.

Up to this point, our efforts have gained general support by the University of Bremen. We have relied on, and tremendously gained from, students in their project and thesis work. Steps have meanwhile been taken to ally with specialists of art history at the Kunsthalle Bremen. We are optimistic that even under current circumstances a concentrated financial support will be possible.

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NOTES

1. The German mathematician, Felix Hausdorff, used the pseudonym Paul Mongré when he identified the human as the semiotic animal. The concept is being discussed in semiotic circles.

2. A beautiful recent book celebrates space as a human product. Contributions by architects, artists, writers, philosophers, sociologists are collected in Tom Fecht and Dietmar Kamper (eds.): *Umzug ins Offene. Vier Versuche über den Raum.* Vienna, New York: Springer Verlag (2000) (mostly in German).

3. This is clearly an exaggeration. The development of computer programming is the permanent dialectics of time (efficiency of algorithms) and space (organization of data structures).

4. The picture changes slightly, when we closely look at the time when these researcher-artists started their experiments in algorithmic art: Noll in 1962, Nake in 1963, Nees in 1964. All these dates refer to "digital" art and computers. Ben F. Laposky had started to work with analogue equipment in 1952. Herbert W. Franke followed in Austria in 1959, and Kurd Alsleben in Hamburg around 1960.

5. Without attempting any completeness, I only name Annick

Bureaud, Herbert W. Franke, Roger Malina and Mary Ann Spalter.

6. An early source for this, though in German, is: Frieder Nake: *Ästhetik als Informationsverarbeitung*. Vienna, New York: Springer Verlag (1974).

7. Peter Weibel acknowledges the importance of the paradigm of algorithm in the exhibition, *The Algorithmic Revolution* (ZKM Karlsruhe 2004/05).

8. Until late into the 1960s, the University of Stuttgart was a Technische Hochschule (TH), comparable to an Institute of Technology in the United States of America.

9. Oliver Graf together with Leif Arne Genzmer and Eva-Sophie Katterfeldt have contributed this work as part of their B.Sc. (Digital Media) project. Thanks for help go to Karl Herrmann, Elisabeth Walther, and the Südwestdeutsches Archiv für Architektur und Ingenieurbau in Karlruhe.

10. Yan Lin-Olthoff completed her B.Sc. in Digital Media with this project. Wendelin Niedlich himself critically reviewed it.

11. Sven Goeckels implemented the first prototype as part of his thesis work in computer science. Hermann Cordes is working on an improvement.

12. Jock Mackinlay & Ben Shneiderman (eds.): *Readings in information visualization*. San Mateo, CA: Morgan Kaufmann (1997).

13. I don't search, I find, Picasso is reported to have said.

14. DeviceX was designed and implemented by Matthias Krauß. Jörn Ketelsen and Hermann Cordes have contributed further examples of study experiments. Susanne Grabowski has conducted several design classes with students using some of the implementations.

15. This sloppy formulation mistakes the whole sign relation for one of its components, its syntactics. Only the syntactics of the sign returns to original form.

16. Unfortunately, currently only a German reference can be given: Frieder Nake: Das algorithmische Zeichen. In: W. Bauknecht, W. Brauer, Th. Mück (eds.): *Informatik 2001. Tagungsband der GI/OCG Jahrestagung 2001*. Bd. II, p. 736-742

17. Pablo García González has developed most of the data base schema, and has implemented a first prototype. Lars Fehr and Tim Wendisch are continuing this work.

AUTHOR BIOGRAPHY

Frieder Nake is a professor of computer science at the University of Bremen. His doctoral degree in mathematics is from the University of Stuttgart. Before coming to Bremen in 1972, he was a postdoctoral fellow at the University of Toronto and an Assistant Professor in Computer Science at the University of British Columbia in Vancouver. In the 1960s, he pioneered computer art.  His work was recently exhibited under the title *Frieder Nake: Die präzisen Vergnügen* (The Delights of Precision) at Kunsthalle Bremen (November 2004 to January 2005) and at ZKM Karlsruhe (February to April 2005). - *Ästhetik als

Informationsverarbeitung*. Wien: Springer Verlag (1974).

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REGIONAL MEDIA ARTS HISTORIES AND THEIR CONTRIBUTIONS TO
ELECTRONIC ARTS HISTORIES: A CASE STUDY FROM THE U.S. PACIFIC
NORTHWEST

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KEYWORDS

history, lightshows, electronic arts, multi-media, 1960's,
1970s, Pacific Northwest

ABSTRACT

This paper summarizes examples of late 20th Century regional
media arts histories research in the U.S. Pacific Northwest and
traces some of their complex connections to major art movements
and artists in order to exemplify how the roots of electronic
arts histories from diverse regions of the U.S. are
interconnected and interrelated in complex and unexpected ways.
Learnings from this research are also presented to encourage
others to seek out, present, and preserve their regional media
arts histories.

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ARTICLE 1: CULTURAL DIVERSITY: THE COMMON HERITAGE OF HUMANITY

Culture takes diverse forms across time and space. This
diversity is embodied in the uniqueness and plurality of the
identities of the groups and societies making up humankind. As a
source of exchange, innovation and creativity, cultural
diversity is as necessary for humankind as biodiversity is for
nature. In this sense, it is the common heritage of humanity and
should be recognized and affirmed for the benefit of present and
future generations [1].

In this paper, I will summarize my regional media arts
histories research in the U.S. Pacific Northwest and trace some
of their complex connections to major art movements and artists
in order to exemplify how the roots of electronic arts histories
from diverse regions of the U.S. are interconnected and
interrelated in complex and unexpected ways. To identify and
preserve the ideas and artmaking processes of artists from
different regions is to ensure the healthy cultural diversity of
our future art forms by creating artifact redundancies, and by
revealing hidden networks of friendships, stories, and
influences among lesser-known artists and recognized "masters"
such as Sergei Eisenstein or Nam June Paik.  I will also present
my learnings from this research to encourage others to seek out,
present, and preserve their regional media arts histories.

The electronic arts of the 21st century are a conglomeration of
all the cultural ideas, products and processes that have been
created by artists throughout our long history as a
civilization. They include new forms made possible by the

sophisticated marriage of computer, telecommunication, and media technologies and networks. They also serve as vessels that will carry the digital reproductions of earlier ideas, artforms, and stories into the future.

The basic material of the electronic arts is ephemeral and fragile, since it is composed solely of electronic impulses organized into computer codes and translated on machines that rapidly become obsolete. Therefore, electronic arts histories - their cultural and socioeconomic origins as well as their physical re-presentation - will be traceable mostly through more durable paper documents and "older" analogue media forms of still and moving images and sound.

The process of preserving these electronic artforms emphasizes the non-material direction that artmaking has been going for over a century. It foregrounds the movement towards ephemeral, often collaborative processes, audience interaction, non-linearity, and systems of image/sound-based communication and representation, and the movement away from specific objects or linear narratives or static performances shown in white cubes (galleries and museums) and black boxes (theaters) to passive audiences in a single location. The process-based nature of our increasingly electronic-based culture demands a decentralized approach to cultural preservation that provides redundancy (multiple collections in multiple places) to ensure that key materials and works, as well as multiple points of view, are preserved as some collections are lost or destroyed.

Another byproduct of 20th century art's ephemeral nature is the increasing need to preserve the artists' own words and ideas that give context and original intention to the artwork. The words and ideas of artists, be they regional or international, also begin to uncover and reveal a more diverse, complex web of stories, memories, and recorded traces that are a complex tangle of international friendships and informal knowledge networks that have always existed among artists and arts professionals. Artists of all genres, from all parts of the world, have historically participated in and contributed to an informal, invisible, unacknowledged network of shared ideas and technological explorations that transcend regional and national boundaries as well as specific artforms and technologies. Artists are always traveling to other cities and countries, showing their work in museums, meeting and sharing and talking about ideas with local artists, and also influencing, teaching, and working together on each other's projects. They are consummate networkers.

The stories that emerge from this revealed web of social networks begin to complexify the more popular, "official" histories of the well-known artists and movements. They add to or question the established histories that have already been written in textbooks, periodicals, and museum catalogues. And since the end of the last century, the Internet and World Wide Web have exponentially added to the depth and breadth of this fluid network. To locate and preserve the work of regional media artists is to help document and visualize this core knowledge network repository of 20th century art histories that will inform our cultural future. It is also a way to preserve the unique seeds of ideas and artworks that could yield future solutions to potential global problems.
MEDIA ARE NOW UBIQUITOUS

Since the inventions of portable, affordable film, audio and

video recording technologies in the last half of the 20th century, ordinary citizens have had the capacity to record their personal or community stories in the form of photos, home movies and independently-made media such as documentaries, public access TV and radio shows, and personal, often experimental films, videos and audiotapes.  Artists, documentary producers, and a wide spectrum of media makers have taken on subjects, ideas and stories of people, places, and events that mainstream mass media and the traditional artworld rarely track or present. These recorded documents represent the true plurality of history that comes from multiple first-hand accounts, and the makers have become de facto historians through their documenting, storytelling, and experimental, often deeply personal media making of the past 50+ years.

The films and videos made by 20th century media artists can also represent historical content that transcend the specific work of art made by a single artist at a particular time and place. They might be the only recording of other artists' ephemeral works (performances, dances, soundtracks, etc.). For example, filmmaker Ronald Nameth documented Andy Warhol's *Exploding Plastic Inevitable* multi-media performance with the Velvet Underground at the Dom in New York City in 1966.  His film is both a unique filmic recreation of that performance and also a rare historic documentation, as no other person successfully recorded the event on motion picture film.

Media arts centers, cultural organizations, libraries, and communities of media groups and makers have now become the reluctant and under-resourced repositories and preservers of vital, mostly forgotten 20th century art histories. The fading printed documents, photos, films, audio and videotapes in these collections often connect to larger, more documented histories such as Conceptual Art, Pop Art, Performance Art, New Music, and Postmodern Dance, and other major art and cultural movements. Locating these physical repositories is where the work of regional media arts historians begins.

THE MAKING OF A REGIONAL MEDIA ARTS HISTORIAN

As an independent scholar and media arts historian, I have researched, presented and helped preserve Pacific Northwest regional multi-media arts histories that include Seattle's "and/or" alternative arts space (1974-1984) and the Bellevue Film Festival (1966-81). These histories link regional arts professionals and artists who created all varieties of multi-media art forms in the Pacific Northwest to well-known artists, ideas, creative processes, and major movements of mid-20th century art such as Performance Art, Video Art, Fluxus, Happenings, Computer Animation, and Underground Film.

My interest in regional media arts histories goes back to the early 1980s in Atlanta when I became the executive director of Image Film/Video Center (Independent Media Artists of Georgia, etc.).  There I discovered a rich, relatively short history of an art form - video - that was not yet accepted in the official art world of museums and galleries. When I moved to Seattle and became the executive director of 911 Media Arts Center in 1989, I started to research the history of 911's "mother" institution called "and/or". It was an alternative artspace in Seattle founded in 1974 by a diverse group of artists that helped spawn Seattle's current contemporary art scene. It supported and presented many of the now-well-known early video, performance, and multi-media artists (Joan Jonas, Bill Viola, Hans Haacke,

Adrian Piper, etc.), and was part of an international network of artspaces that supported artists working in new art forms not usually shown in traditional museums or galleries. It was in these spaces that artists found the resources and audiences to continue experimenting with new artmaking practices and technologies such as performance art, installations, media production (including the then-new technology of video), and earlier forms of communications technologies such as telex and videophones.

I was invited to research and tell the story of "and/or" by the Flintridge Foundation in 1991, so I hired two artist/researchers and we spent a year hosting meetings with a large group of "and/or's" founding artists and members who still lived in Seattle. We researched the extensive archives of "and/or" that had been donated to the University of Washington's Special Collections.  I wrote about and published "and/or" and alternative artspace histories in the first six issues of 911's newly-created quarterly newsletter, and we presented an array of screenings and events throughout the year that revealed parts of "and/or's" amazing legacy.

One of the artists involved in "and/or's" early days, Annie Grosshans, was inspired to produce a documentary called *An Abundance of Heat* that focused on one of the founders.  During production, she was able to locate and copy rare experimental and public service announcement videotapes made by "and/or" artists at the local PBS station in the late 1970s, along with other visual images and first-hand memories that were all incorporated into the video documentary. As an unwitting media arts historian, she was able to re-record tapes that have since become unplayable, thus preserving aspects of this history as part of her documentary.

This project revealed to me for the first time the direct links between local artists, organizations, and their national contemporaries that connected the birth and formation of Seattle's larger contemporary arts community to this core group and the organization they created. "and/or" had been an intense hub for new ideas, new ways of making art, and for connecting seattle's artists to the international world of contemporary art. Local painters picked up video cameras and made work because they saw Joan Jonas's tapes. Steve Paxton taught local dancers and artists new ideas about movement that still reverberate in the Seattle dance scene. And this history needed to be presented and preserved in multiple forms and formats (publications, public events, videos, etc.) If we were to have access to these histories and the ideas that came from them.

In July 2000, I was hired to be the world's first (we invented the term as far as we know) Media-Arts-Historian-In-Residence by Brian Wallace. He was the chief (and only) curator of the Bellevue Art Museum, a regional museum that was just opening its new Stephen Hull-designed building in a nearby suburb (and has since closed its doors and is attempting to re-open).  He had discovered a dusty box of programs and posters from the Bellevue Film Festival (1966-81) and wanted to revive the festival but did not know anything about its history.

In the first year, I researched the Bellevue Film Festival, which had evolved in Seattle as part of a larger national network of artists and organizations during a very fertile time in U.S. cultural history.  Futurists like Marshall McLuhan and Buckminster Fuller, who talked about the role of media and

technology in society, caught the imagination of artists via the popular press. It was a time when technology was foregrounded in the national consciousness due to the growth of television as a medium that reflected the tumultuous politics and happenings of the day (such as the Viet Nam War, demonstrations against racial injustice, the counterculture movement in San Francisco, landing a man on the moon, and the assassinations of national leaders). The development of new digital technologies such as mainframe computers that were the antecedents of personal computing and electronic imaging were also part of this time period. And Seattle hosted a Century 21 World's Fair in 1962 that showcased many of these emerging technologies.

We discovered that the Bellevue Film Festival (BFF) was born in 1966 through the extraordinary volunteer efforts of two Bellevue college-educated housewives. Based on the advice of then-arts-reporter and now-famous author Tom Robbins (*Even Cowgirls Get the Blues*), they researched how to present an experimental film festival. They offered a $1,000 first prize that attracted many of the best experimental filmmakers from across the U.S., Canada, and Europe. It was part of the Bellevue Arts and Crafts Fair, and was held during the fair in July in a nearby movie theater. BFF became one of the three premiere experimental film festivals in the U.S. during that era and played a key role in connecting Seattle's small artist/filmmaker community to an international network of experimental filmmaking practices and ideas [2].

I researched this history by tracking down existing artists and people connected to the festival, interviewing them, locating historical printed and visual materials, and then hosting a day-long *Day of Remembering the Bellevue Film Festival* at the museum in March, 2001. I collaborated with students from the Bellevue Community College (BCC) video program who videotaped all the presentations. I also invited key historical figures such as past judges (John Hanhardt, now Senior Film and Media Arts Curator of the Guggenheim Museum) and past prize-winning artists (local filmmakers Doris Chase, Karl Krogstad and others). Everyone presented their memories and favorite films from the festival. In the process, I also worked with the local film transfer lab, Alpha Cine, to transfer some of the films to digital video in order to preserve them. The videotapes were edited into five TV shows by the BCC students and they continue to air on our local cable access TV channels.

This project reinforced my previous learnings from the "and/or" history, and demonstrated how this regional history connected to the larger media arts histories of underground film, media installations, cinema verite, and computer animation. John Hanhardt presented clips from some of the Festival films that have since become touchstones to understanding the works of electronic artists, such as Bruce Conner's collage films and Larry Cuba's early computer animation films. And we were able to document this history in several forms and mediums, including videotaping the public presentations and creating a museum exhibition, so that we could present and preserve these histories simultaneously.

I also began to understand how artists influence each other, and how seeing the work of other artists leads to more work, collaborations and friendships. The importance of access to other artists' works became underscored as I saw how visionary multi-media artist Stan Vanderbeek learned a new color-separation technique from Seattle filmmakers Bob Brown and Frank

Olvey. Their truly innovative process can now be traced in the
works of many other prominent media artists of that time who had
only seen Vanderbeek's films and were influenced by them.
LEARNINGS AND CONCLUSION

I believe that the research and preservation of regional media
arts histories has broad implications for the future of our
culture. My work as a media arts historian has instilled in me a
sense of urgency, as I witness the deaths of key pioneering
figures. Time is not on the side of preserving these histories,
and future artists and our civilization as a whole will be the
losers of this precious legacy. The preservation of regional
media arts histories is important work that needs to be done now
so that the larger arts histories of the 20th century are told
and preserved from multiple perspectives, and in multiple
locations. They represent the cultural diversity of all the
regions in this country where media artists have picked up a
camera or a microphone and made art or recorded the work or
words of other artists. Here are some of the learnings I have
gleaned from my work:

MEDIA ARTS HISTORIES ARE EPHEMERAL:

Media forms are recorded on fragile, often non-archival
materials of photographic paper, videotape, audiotape, film,
etc. that must be copied and preserved if future generations are
to benefit from their contents. These art works are mostly
written about in obscure, often out-of-print publications that
now need to also be saved by libraries, media arts centers and
individuals who wrote, published and subscribed to them. And
their conceptual and creative origins are in the memories of the
participants who are aging and dying. So it is imperative that
those memories be captured somehow - in oral interviews, on
videotape, in writing, in photos.

Media arts histories are connected to larger 20th century
visual art histories:
Major visual artists such as Joseph Cornell, Man Ray and
Salvador Dali all made films that are part of both 20th century
media arts and the larger visual arts histories. Their films
also serve as documents that record their lives and their
collaborative processes since they appear in the films, such as
in Rene Clair's *Entre Act* that stars Dali and Man Ray.
Regionally, media artists document their fellow visual and
performing artists' works, thus preserving the more obscure or
early works by dancers, musicians etc. who might someday prove
to be important artists.

Media arts histories can be recorded, exhibited and preserved
in many ways. Here are some of the strategies that can be used
to preserve existing media artworks:

1.    Locate and preserve existing original documents and media
recordings including the following: [a] Photos and documentaries
about media artists, or shows produced by local TV stations
(news stories or short features for local magazine shows or
radio or cable access TV shows), or documentaries made by the
media artists themselves; [b] Periodicals, museum programs,
newspaper articles, artists' writings, personal archives, and
out-of-print articles and books that record media art histories.
These are often owned by the artists themselves, who are often
their own archivist by default.

2.    Create a visual exhibition or long-term project that can

include the following elements: [a] New interviews with artists to capture their memories and stories; [b] Public presentations by artists that are recorded via still photos, video and/or audio; [c] Screenings of original media works with artists present, possibly working with a local film transfer company to create digital copies to preserve the films themselves; [d] Production of local community radio or cable TV shows that incorporate interviews, artists' work, etc.; [e] Museum exhibits that display original historical materials, videos, timelines, etc., possibly including a catalogue as a stand-alone record; [f] New writings that tell histories from a present-day perspective written by the artists or art history students or curators who are researching media arts histories; [g] Websites that contain the written and visual histories.

Regional media arts histories are just beginning to be recorded, recognized and linked to larger art histories of the 20th century. It is never too late to begin the vital process of preserving and re-presenting regional media arts histories - it only takes a few passionate people. My hope is to inspire others to take up this vital work of preserving our cultural diversity for future generations before we lose any more of our historical cultural treasures.

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2. *Bellevue Film Festival* on www.historylink.org/_output.cfm?file_id=3469

AUTHOR BIOGRAPHY

Robin Oppenheimer is an internationally-recognized media arts historian, curator, writer, and independent scholar who has worked in the field since 1980. She was the first Media-Arts-Historian-in-Residence at Bellevue Art Museum, near Seattle (2000-02), and co-produced an Experiments in Art & Technology (E.A.T.) Reunion symposium at the University of Washington on October 25-26, 2002 (www.eatreunion.org). She is a former Executive Director of 911 Media Arts Center in Seattle and IMAGE Film/Video Center in Atlanta, where she also directed the Atlanta Film & Video Festival.

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PRESERVATION OF NET ART

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KEYWORDS

preservation, net art, capture, archive, museum, preservation strategies

ABSTRACT

Preserving net art practices has become a core issue, especially for the cultural institutions which have acquired it, as Internet is a flux of data, with its many different technologies evolving at various paces, making the longevity of artworks difficult, if not impossible, to assess.

Three preservation strategies will be brought out: From museums' initiatives, archives' projects and, in conclusion, a hybrid model that would make the institution a living archive, combining both the inter-relational aspect of automatic archiving and a more qualitative museum approach.

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PRESERVATION OF NET ART

"The curators of contemporary art museums who know what preserving slides, video art or CD-Roms means, were the first ones who took an interest in Art.Teleportacia [1]. But what to start with concerning net art? How to deal with it? How to turn something which can't be kept on a shelf into a collector's item? Everything would be much easier if net art was only web art, if net art was only made of hypertext pages, ingenious animations and experiments with the browser (that's exactly what uninteresting projects are). The works could then be simply bought and left on the purchaser's server. But how to deal with works whose main part can't be found on the webpages of a server but rather in the journey which begins on the server and can't be controlled?" (Olia Lialina, 2001) [2].

With the development of the Internet as a mean of communication, artists have appropriated the network to experiment new artistic, social and technical practices that have been gathered under the term net art. Museums and cultural institutions soon showed interest in those works, commissioning, exhibiting, collecting net art. Preservation then appears as a core issue, as Internet is a flux of data, with its many different technologies evolving at various paces, making the longevity of artworks difficult, if not impossible, to assess.

The necessity to preserve, document and capture online (and more generally electronic) artworks has made papers and projects devoted to that topic grown in number. Similarly, in the archival communities, net art is seen as an interesting space for experimentation because if it's possible to preserve both the information and the "look-and-feel", then many, if not all, types of Internet resources can then be preserved.

Preservation involves care and passing down of objects, values, concepts from yesterday or today to the future. It also means choices to be made, and losses to be dealt with.

Current data storage capacities may give the illusion of the possible conservation of all human productions in the short term. Automatic data processing, without any human intervention, is a strong current of development. However, preservation involves a selection according to a set of precise and defined criteria. This selection is not necessarily made as the artwork is created, generally the process requires a period of time to determine whether the preservation of a work is relevant. Contemporary art, whether analog or digital, has shortened the time between creation and preservation, (at least partly) due to the interactions between artists constantly pushing the boundaries of art, art institutions integrating them at a faster

pace and audiences reacting in various ways [ 3 ]. And yet, the difference between a physical and a digital object is that, for the digital one, preservation has to be planned quickly after its creation because of potential obsolescence.

Working out a specific preservation strategy is not an easy task for museums because net art brings new problems to institutions, despite their recent experience of preserving other forms of ephemeral artworks such as land art, performance or conceptual art. Or, rather than new issues, two separate sets of questions combine with each other, on the one hand, artworks preservation practices (which now appear as only the results of consensus, and then need to be re-assessed), and on the other, specialized knowledge in the conservation of digital content. The alliance of the two transforms it into an experimentation space exciting and perilous at the same time.

In order to maintain and conserve an online artwork, it is first necessary to determine the elements that constitute it. Is it its (html) source code or the experience of the piece for the visitor?

Many parameters determine the way a net art piece will be viewed: Browser and plug-ins versions, executable scripts on client and/or server sides, dependency towards other online resources (links to other websites, access to databases, webcams, audio, video streams, etc.), speed of internet connection, computer's capacities (processor speed, screen properties, operating systems). All of them should be taken into consideration in the conservation process as they evolve quickly and independantly from each other, depending upon many technological, cultural and economic actors who often have diverging, and short-term, interests [ 4 ].

Beyond technical issues, arises for the museum a question both conceptual and practical: How to delimit an online artwork? [ 5 ]. A net art piece can be in continual evolution, from contributions by one or many persons to content incorporated from other websites. The perception of the boundaries of the works with their environment is then not easy to get, even for the artists themselves. This issue is also significant within the framework of intellectual property.

An online artwork can be delimited only through a deep understanding of the original context of its creation, context that should also be preserved as far as possible because preservation and presentation strategies are closely related. For instance, if an institution would acquire *Shredder* [ 6 ], a famous net artwork by Marc Napier, created in 1998, which "shreds" the content of a webpage chosen by the website visitor (*Shredder* interprets html code in a different way than a traditional browser), should it be exhibited or presented with the websites and technologies available at the moment of its creation or with the tools and content at the moment of its actualization(s)? Both are possible but have different meanings.

To deal with the characteristics of online art practices and the Internet environment, specific preservation strategies have to be found. We will focus on three approaches.

As Richard Rinehart pointed out, "there is no longer one monolithic original artifact, and there is no longer one silver-jacketed preservation method. Instead we need a layered preservation strategy that admits fragments and traces,

emulation software, re-creation, reassemblage" [7].

Within the museum context, Jon Ippolito, artist and curator at the Guggenheim Museum, came up with an original approach, *Variable Media* [8], which perceives the artwork outside of its medium, so that it can evolve, be re-created, for instance when its original medium becomes obsolete. Every art work is envisaged individually, more as a score than a finite, unchanging object.

The variable media approach is not focused only on net art, but also deals with every contemporary art form that put an emphasis on process rather than on the object, such as conceptual art, land art, minimal art, installations, and performance. Net art has actually perhaps more kinship with those forms than with video art, experimental film or kinetic sculpture which it is often associated with.

When an artwork is acquired by the museum, its "behaviors" [9] are defined to describe it beyond its physicality. The acquisition is also the opportunity for a deep dialog between the museum and the artist through a questionnaire. The artist is invited to choose one or many preservation strategies among four: Storage, migration, emulation, reinterpretation.

Storage, the most classic solution, often the default one as well, consists of putting on digital media the artworks which will disappear when its material or data will become obsolete.

Migration implies an upgrade from one storage media to another, when a file is converted in a new media or when it's saved into a more recent version of a software. A consequence of migration may be a change in the appearance of an artwork, for instance if some functions of a software disappear from one version to another.

Emulation [10] consists of recreating the appearance of a work (with a different souce code). Preserving computers on which artworks have been created is not conceivable at long term, but it is possible to emulate them. By installing the different software layers that have been preserved, it is possible to execute the artwork (original or modified) files to recreate it. It seems simpler and less expensive than migration because then the level of intervention is not at the file level but at the operating system or hardware level (depending on the kind of emulation chosen), and those solutions can be developed by a network of institutions. Emulation works best for autonomous software, and for net art, one main issue is the possibility of network emulation. It goes beyond emulating connection speed, to internet protocols, server- and client-side softwares, and perhaps even the content of the Internet for some projects like *Shredder*. Despite the many developments in the emulation field, it is probable that only some elements of an online artwork could be preserved. Nevertheless, those fragments are very precious to museums.

One of the main contributions to the variable media paradigm is the identification of a fourth strategy, reinterpretation, to get free of the physical, technological aspect of the artwork. It means re-creating the work each time it is actualized, faithful to the artist's intentions but which may be very different materially from its original form. The museum then has a more active role. "As outlandish as the idea may seem to traditional collecting practices, the Variable Media Initiative

offers an alternative for those whose conception of their work goes beyond its manifestation in a particular form. And it helps us imagine the museum as an incubator for living, changing artworks, rather than a mausoleum for dead ones" [11].

Variable Media is not the only institutional framework for net art preservation. *Archiving the Avant-Garde* [12], subtitled *Documenting and Preserving Digital / Variable Media Art*, is an initiative from the Berkeley Art Museum & Pacific Film Archive. Associated with Variable Media and other structures, *Archiving the Avant-Garde* develops, and tests, models for notation, cataloguing, accession, and emulation within the museum environment.

Another advanced initiative is the V2_ archive. Not a museum per se, V2_ is a centre devoted to unstable media art based in Rotterdam. V2_ is now installing its archive [13] after a period of research [14].

The goal of the V2_ archive is to document the artworks and projects presented or produced at V2_, not acquiring and preserving them. However, it is not always possible to distinguish an online project from its documentation and vice-versa. Similarly, it is harder to tell apart data and metadata in an online environment.

Instead of preservation, V2_ has chosen to use the term "capture", because unstable media art works can be actualized in many ways, without necessarily having an "original state", driven by the process more than by the result. "Capturing means assembling all necessary information on a project and its subordinate aspects, structuring this information in such a way that it gives a good impression of the different manifestations of the project and keeping the resulting metadata blueprints of the electronic art activities accessible for future research" [15]. In that way, V2_'s initiative reflects the current shift from preservation towards documentation that is taking place within cultural institutions.

V2_'s project, which is also considered an artistic project in which guest artists can intervene, is an interesting transition between the museum and archive worlds because it lends to both of them, without being exactly the hybrid model in the conclusion of its essay.

Electronic documents' archiving, and particularly Internet, is more and more a key, and tricky, issue for many archive institutions. Although museums' and archives' objectives and methods do differ, it is pertinent to look closer at archives' initiatives to preserve online materials.

Two attitudes towards internet archiving coexist: One which stems from archives and libraries, based on the gathering of identified documents (accompanied by metadata) and one which comes from the computer community which relies on webbots (which regularly record all possible websites) and search engines. In the first case, collections of documents are gathered and catalogued, in a qualitative manner and according to precise criteria [16]. In the second view, the web is archived as it evolves (such as the internet archive [17], a website which

gives access to online content captured over the years to everybody, and particularly researchers, so that the memory of the Internet does not disappear). Those two positions are not so distinct as the archivists create webbots as well and the Internet community develops softwares to integrate metadata and interrelationships in webpages.

For the archivist community, two main solutions are being pursued for archiving the web: Either archiving every element that composes a website, or taking a snapshop of it all at once at periodic times. They can be combined. For instance, La Bibliotheque Nationale de France, which has been preparing itself for the future legal deposit [18] of the Internet, has created software tools to capture the "French web" and also selected a panel of websites to be processed individually.

From the two previous approaches, we wish to bring out a hybrid preservation model, which combines a museum method, even as radical as the variable media initiative, and automatic and continuous archiving of the Internet.

As Annick Bureaud, Nathalie Lafforgue and Joël Boutteville suggested in a study for the French Ministry of Culture, "the art museum which receives unique items isn't certainly the model of the conservation of electronic art anymore, even if it still can fulfil this function on the fringe or open its premices to other forms of conservation. On the other hand, the archaeological museum seems to be a more accurate example: It combines scholarly culture and everyday items; it keeps "broken pieces" (equivalent to works which don't work as they should any more) it can fathom out; it deals with the repetition and accumulation of identical objects in different conditions which ensure the mental reconstitution of the original condition. This archeology is already necessary in electronic art. Indeed, many pioneers' works don't work any more or don't work properly and need a check-up, and some have started to vanish purely and simply" [19].

This model seems then relevant to comprehend, and deal with, net art works and their context. Indeed, net art works' environment (online critical writing, annotated links, mailing lists, etc) is not preserved by museums that concentrate on the artworks themselves, taking part, in spite of themselves, in the disappearance of the original context of the works. On the contrary, automatic net archiving takes into account the inter-relational aspect of net art which evolves within a dynamic environment. Regular and automated indexing (which doesn't necessitate the active intervention of a person in charge of preservation) allows to follow very closely the way art works evolve. However, automatic recording doesn't necessarily mean that the works are functioning similarly than at the time of their capture when they were on their original servers, especially as a large part of the web, nicknamed the "invisible" or "deep" web, can be accessed only through requests in databases or beyond passwords, making it difficult to robots to view, and record, data (even if partial captures can be performed).

By emphasizing the dialog between net art works and their environment, the institution would become a living archive, a research space, with fragments of artworks which could be updated and re-activated in multiple ways. Moreover, it could take the form of a partnership of organizations with different scopes, methods and goals, a meta-institution composed of the

many actors involved in preserving net art and online resources.

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NOTES

1. http://art.teleportacia.org/ is "the former first and the only real net art" by the artist Olia Lialina.

2. Olia Lialina, *Un lien serait déjà assez*, Archée, Montréal (2001).
http://archee.qc.ca/ar.php?page=imp&no=163 personal translation from French to English.

3. Nathalie Heinich, *Le triple jeu de l'art contemporain*, Paris: Les Editions de Minuit (1998).

4. For instance, browsers, and plug-ins that are currently often free of charge for Internet users are copyrighted products belonging to corporations. Therefore, in the future, they might not be updated or supported anymore, necessitate a fee, etc. A key issue of digital preservation then is the necessity to have free, open source software to allow unrestricted data exchange, modification and reversibility.

5. Howard Besser, *Longevity of Electronic Art* (2001).
http://www.gseis.ucla.edu/~howard/papers/elect-art-longevity.html

6. http://www.potatoland.org/shredder/shredder.html

7. Richard Rinehart, *Berkeley Art Museum/Pacific Film Archive*. In Alain Depocas, Jon Ippolito, Caitlin Jones (eds), *Permanence Through Change: The Variable Media Approach*, New York, Etats-Unis: The Solomon R. Guggenheim Foundation, and Montréal, Canada: La Fondation Daniel Langlois pour l'art, la science et la technologie (2003) p. 25.

8. http://www.variablemedia.net/

9. The artworks can be installed, performed, reproduced, duplicated, interactive, encoded, networked or contained. Those terms go beyond a mere separation per medium or a simple opposition between analog and digital.

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16. See for instance the National Library of Australia's PADI (Preserving Access to Sigital Information) Project. http://www.nla.gov.au/padi/ and more specifically http://www.nla.gov.au/padi/topics/9.html

17. http://www.archive.org/

18. http://www.bnf.fr/pages/infopro/depotleg/dli_intro.htm

19. Joël Boutteville, Annick Bureaud, Nathalie Lafforgue, *Art et technologie: La monstration*, Délégation aux arts plastiques (DAP), Ministère de la Culture et de la Communication (1996) Section iv.ii.3. http://www.olats.org/livresetudes/etudes/monstration/presentation site.htm personal translation from French to English.

AUTHOR BIOGRAPHY

Anne Laforet is currently working on a Ph.D thesis entitled *Preservation of net art in museums, an analysis of moving practices* at the University of Avignon in the Culture & Communication Department. She has just finished writing a report on the same topic for the DAP (Delegation aux Arts Plastiques) / French Ministry of Culture.

Since 1998, her research is focused on Internet specific artworks and the way museum institutions approach, collect and preserve them. She has recently talked about the preservation of net art at the symposium *Preservation of Electronic Records: New-Knowledge and Decision-making* in Ottawa and at ICHIM03 in Paris.

Parallel to her academic research, she is exploring network-based creation in multiple ways, as an artist, event organizer and writer.

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THE CONTEXT FOR FIRST GENERATION PERSONAL COMPUTER ART

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KEYWORDS

history, computer art, programming art, video art, personal computer art, 1980s

ABSTRACT

In this article Robert Edgar details the aesthetic, economic, technological and personal contexts involved with being an early adopter of personal computer programming as an art form. Economics played a central part for many of the early personal computer artists, and the price of film was influential in Robert's transition from filmmaking to computer programming after moving to Silicon Valley in the late 1970s. Moving to Atlanta in 1985, he joined Art Com, a virtual computer art community through the Well, which provided a platform for early PC art distribution. Robert's work in the next decade included

*Memory Theatre One* (1985), *Living Cinema* (1988) and *Sand, or How Computers Imagine Truth in Cinema* (1994).

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ESTABLISHING AN AESTHETIC: BACKGROUNDS IN FILM AND VIDEO, 1970S

While attending art school at Syracuse University in the early 1970s, I'd hitchhike down to see my high school friend Robert Polidori in New York City, who worked at the newly-opened Anthology Film Archives. At Anthology he'd screen picks from the archives for me, including works by Harry Smith, Gregory Markopoulos, Michael Snow and Stan Brakhage.

I was especially attracted to the aesthetic materialist strategies common to many of these films.  Through abstract expressionism and contemporary film there was a focus on the sensuality of the medium itself, avoiding the usual focus on content and acting. With film, there is the light burning into the emulsion, the chemical curing of the film, the physical scraping and cutting during editing, the subsequent re-sequencing of the exposures, and the optical printing and juxtapositions available through post-production. All of these could be and were used as compositional strategies teasing something unique from the medium out to your senses. Once such a formal compositional strategy is isolated in an artwork, it becomes part of the content of the world; through a reversal of the direction symbolism is usually conceived.

The anthropologist Clifford Geertz [1] once wrote about a calendar the Balinese had that told the quality of the time, instead of just the quantity. It consisted of many "loops" of different lengths of time, from a few days to many years. The quality of any one day was described by the particular nature of the combination from the loop that happened to be juxtaposed on that day.

Well, this was a fantastic idea. First of all, it reminded me of the conceptual systems of Ramon Lull, whom I'd read about in *The Art of Memory* by Frances Yates [2]. Lull conceived of different-sized wheels of symbols, again juxtaposed by their chance coincidence at any one point. This was a machine for generating meaning from symbol systems captured from the world. So there was Lull, there were the Balinese, there was Eisensteinian montage, and then there was this systematic approach to art making that was all over New York: Steve Reich's audio loops, systematic duration modulation, microphone swings and phase shifts…and so the idea of an art presentation that could tell the time *and* quality of the day!

I had an eight-millimeter projector into which I could load three film loops of differing lengths at one time, and project through all of them to show continual recombinations. My wife, friends and I would start up a set of loops, put on some sympathetic music, and watch as the snow swirled around in the Syracuse winter.

EARLY GLIMPSES OF COMPUTERS AND ART: 1975-76

At Synapse - the 1970s Syracuse video collective that spawned Bill Viola and where I taught early courses in video art - Carl Geiger purchased one of the first Altair computers. He generated non-objective stills by entering programs using nine flip switches: Eight to define a byte, and one to enter it into RAM.

There was no storage, so he had to enter your program each time you wanted to run it. Carl would run the computer output through the Synapse video switcher to play hell with the video synch pulses and keying voltages, and capture the output with a still camera. Occasionally we'd drag the school Moog Synthesizer from Franklin Morris' electronic music classroom, where we'd try modulating the switcher and colorizers with the Moog output.

There was also Judson Rosebush, later to provide technical assistance for making Disney's Tron.  Jud made stacks of punch cards, and fed them into a mainframe usually reserved for analyzing the results of behavioral studies for the Psychology department. He typed up graphic commands, parked a Bolex in front of a tiny screen, and still-framed geometric plots to create short animated films.

Bill Etra stopped by Synapse, showing us a first glimpse of an almost-practical video effects system he'd created. It would perform wipes and mortises by controlling the synch voltages. The output of his system was to a small video screen, and while his early system couldn't be recorded directly to tape, it showed where this type of experimentation was going, and that it would make money.

I saw computers at the time as promising, but I thought you had to put too much work into them in order to get something out. My aesthetics were built upon capturing and modulating. Film and video, for me, were first subtractive - where you captured images from the world - and then manipulative, where you edited and modulated what you'd captured. I didn't see where the computers around me had enough capturing, so I stayed with film and video.

A COUPLE OF SHORT TEACHING GIGS

In 1977, I taught for a semester at University of South Florida (USF) in Tampa, replacing filmmaker Will Hindle while he recuperated from a heart attack. Stan Vanderbeek had just left USF. He was legendary for going to army surplus stores and pawnshops, finding old junked cinema-ish hardware and purchasing it for the school. He'd fill up rooms at USF, but it was a one-way trip for the equipment - he rarely did anything with it. It reminded me of visiting Canal Street in NYC and buying camera and projector parts. With USF, Stan found a patron for supporting such a habit.

I couldn't find a permanent college teaching job, so I ended up working with psychologist Bill Deterline, creating self-paced training courses for *Beseler Cue/See* teaching machines.

The Beseler was "interactive", but the process of developing content for them was long and expensive. They had a super-8 film cartridge inside, along with an audiocassette and a microprocessor. The student watched a screen, listened to the audio, and when prompted, clicked one of four buttons to answer multiple-choice questions.  Well, the interactivity was a bit light, but for the time it was seminal.

SWITCHING TECHNOLOGIES: THE EARLY 1980S

Working for Deterline got my wife and me out of Florida and into Silicon Valley by 1978. Work had me traveling, and I brought my Beaulieu with me. I continued making my own films, funding them on a rather slender salary. $500 for an answer

print was a long savings push, and at that price I didn't feel I could afford more than one. Then, in 1980, the Hunt brothers tried to corner the silver market, and the price of film rose so far that I couldn't afford film stock.

Around 1982, Sinclair put an ad in Scientific American for a small, inexpensive personal computer - the ZX-81. I could handle the cost. Once I paid for a computer, I could produce work for free-costing only the time it took to program it. Worked for me.

Now armed with 16K of RAM, a cassette recorder for application and data storage, and a demented book on Sinclair BASIC, I set out to see what I could do. The results were two small animations: *The Pads* (2' 20", 1982) and *Amphibian* (4' 30", 1982). I showed these in a faculty show at New College of California, where I taught filmmaking and aesthetics. While I still wasn't able to capture images, this was interesting. It was time to switch.

My friend and mentor Neal Margolis showed me an authoring language called GraForth. It had a perverse but efficient syntax that was appealing, and its author Paul Lutus had done an incredible job of providing the ability to produce animated 3-D graphics and music that played on the 1-mhz Apple II. I sold my Beaulieu and bought an Apple //e.

MUSIC AND ADVENTURE

I'd played guitar since I was 12, but traveling for Deterline I bought a mandolin so I could carry an instrument with me on airplanes. My wife and I caught a concert in Marin at this time: David Crosby and the David Grisman Quintet. Watching Crosby fumble around and then hearing Grisman's band scorching the air showed it was time to leave the 60s and 70s behind for a new California. Neal brought a guitar into work one day and we ended up putting a newgrass band together.

One of the musicians was Warren Robinett, who had done some interesting stuff at Atari programming the first visual adventure game. An adventure game had the player hunting through rooms and spaces looking for objects. We sat in a Palo Alto sports bar one night while he explained what he'd done and what he was presently programming: a "construction set" to help seven-year-olds learn logic. This became *Rocky's Boots*.

I asked if he'd ever heard of Michael Snow. Nope. I lent him *Cover to Cover* [ 3] one of my favorite pieces, and he was deeply unimpressed. But now I knew what to do with a computer.

NEW WORK IN A NEW MEDIUM: *MEMORY THEATRE ONE*

Using a computer I could create architectures containing images with texts that explicated them. This was a perfect medium for realizing the medieval memory theatres in Yates' book. Of course, when Giulio Camillo's *L' Idea del Theatro dell' eccellen* was published in 1550, philosophy consisted of the creation of closed and perfect systems, with simple geometries and arithmetic steps. Today, our universe was leaky and our concepts "always already" perforated. I didn't believe I could deliver a closed cosmology. But I could capture texts and illuminate images.

I contrasted found texts and personal musings. A two-story ring of 12 pairs of rooms, through which the viewer could wander,

viewing images and reading texts.

To juxtapose a text and a still image, and to do it with impact, the text would have to be short. But I wanted to include longer texts too. So I added a library, where the viewer could read longer selections.

I added an element of aesthetic materialism that I thought was unique for the medium. As the viewer "ego" moved from room to room, s/he received the form of an icon, to be maneuvered using a joystick. There was a different icon for each room-pair, for a total of 12. I then added one more room, an "Additive Memory Room". From my *Memory Theatre One* documentation:

"The Additive Memory room holds a cross-sectional representation of the Room Ring. The 12 'stamps' arranged on the clock face are the result of exmode overprinting of all the room icons except the one it represents. The resulting stamp exhibits the differential pattern of all the overprinted icons… somewhat analogous to the differential pattern on an exposed holographic film.

"The ego in the Additive Memory Room is the result of over-printing all of the 12 icons in exmode. When you move the ego over one of the stamps, the difference - which becomes visible - is the missing icon" [4].

Exmode printing was a logical method for combining the pixels of images when one is "printed" over another. If you use it to print two images, the resulting image is the difference between the two.

So I constructed an icon for each room consisting of all the room icons except for the one that represents that particular room. For the icon in the Additive Memory Room, I used exmode printing to create an icon that was the difference of all 12. It should be pointed out that all of these Additive Room icons looked like the snow on a television screen: Apparently random black and white dots.

When the viewer moves the comprehensive icon over the icon for a particular room, the exmode printing then produces the missing icon. The room's symbol  referred to exactly the icon that was NOT present in the room. This seemed like a perfect sculpture for representing the relationship between inside and outside in 1985, when I completed *Memory Theatre One*.

SUPPORT FOR A NEW ART FORM: ARTCOM AND THE WELL

I'd lived in the bay area for about seven years, but hadn't contacted other local artists who were exploring aesthetics with personal computers. When I moved to Atlanta in March of 1985, *Memory Theatre One* was almost finished. I met Lisa Frank in Atlanta, who put me in touch with her sister Nancy Frank, then partnered with Carl Loeffler of ArtCom in San Francisco! Now Carl was someone I should have met years earlier.

I sent him a copy of *Memory Theatre*, and he was instantly enthusiastic. Carl had just gotten ArtCom up on The Well; an early online community hosted in Marin County and set up by Stewart Brand. Carl had focused for a few years on video and performance art, and now was shifting to computers and networking. Anna Couey was working with Carl at the time, and wrote of Memory Theatre One "It changed my notions about art

forever" [5].

Fred Truck had joined Carl to provide systems administration
help for The Well. He was collecting correspondence art projects
that he would perform, calling the collection *The Performance
Bank*. He wanted to publish the collection, but found that it
was expensive to do an acceptable job of it. Like me, he turned
to personal computers.

His first interactive work was a fine one: *The Illustrated Art
Engine*. Fred wrote a list-oriented program that compared two
files - either text or graphic files - and, using a programmable
analysis of their attributes, synthesized a third file. Fred saw
that what the computer allowed was a new way to get behind the
brush…not behind the handle manipulating paint-like effects, but
behind the wet hairy end, playing around with the logic of the
image formation itself. Like Lull, Fred designed an engine of
creation that would tell him about the nature of things.

Judy Malloy decided to use personal computer databases as
formats for narratives. You want to find out what's
happening…search the database! This cleanly conceived approach
led to many works, including *Uncle Roger* and her *Bad
Information* databases. There have been people since Judy to
create computer-based narratives, but Judy was the original.

Sonya Rapoport used computers to collect information on how
viewers would interact with her installations, and then used the
collected data to generate printouts. The printout scrolls, some
of which would be huge, would provide both an accounting of the
interactions and a graphic representations. Participants in
Sonya's events would take home printouts "as a reward" [6]. To
me it seemed as though Sonya was a mix between Marcel Duchamp
and the anthropologist Claude Levi-Strauss, collecting sometimes
humorous data and generating tables, reports and graphs that
gave form to-what? For Levi-Strauss, it was the underlying form
of culture itself.

Something that was different then from today was that most
people who had spent the time to learn how to use computers had
not also spent the time studying and developing aesthetics.
Conversely, most of those who had studied and/or practiced
aesthetics had not spent the time learning how computers worked.
Computers had not yet become ubiquitous, and mastering them
required a rather long, dry dedication.

TECHNOLOGY FROM WORK

In Atlanta I started a digital media company with Mitchell
Bring, who sold Georgia Power on creating a marketing room built
around a visual database modeled after the Aspen Project demo
that MIT produced a few years earlier.

The idea was to provide a way for companies who might move to
Georgia to tour available cities, sites and existing buildings.
We created an interactive map system, allowing a viewer to use a
touch screen to jump to any major city or town in Georgia and
view short video clips about the local economy, work force,
quality of life, schools, infrastructure etc. The viewer could
look through a complete mapping of Georgia USGS maps at various
scales. There were also drive-throughs of industrial parks,
where the viewer could touch a building in the park and see
images of it, read data about who owned it, local
infrastructure, asking price etc. All of this tied into a

current database of industrial buildings available in Georgia.

Previous to this system, Georgia Power had a company fly down to Atlanta, then they loaded everyone into a helicopter and spent several days flying among sites. With this system, the company representative would fly to Atlanta and spend half a day using the system to tour available sites. Then they would fly to the top couple of sites for a personal look. Our company ended up developing systems for economic development organizations throughout the world.

I was introduced to Truevision's Targa video-capture technology through our work developing the Georgia Power system. The Targa was one of the first video capture boards. Our system used an array of videodisc players to hold all the video. We used the Targa board to overlay videos with graphics.

AT LAST - ADDING CAPTURE TO THE COMPUTER

After developing *Memory Theatre One*, I still wanted badly to work with captured images. The Targa board provided the bridge between video and computing. There was another aspect I wanted to change too.

While I'd used 3-D animation for moving between the *Memory Theatre One* rooms, the rooms, for the most part, were static. This architecture was analogous to the relationship among film frames, and the transitions were like film splicing. But I wanted to move beyond that - my mental metaphor was of data streams that I would preload and turn off, on, and modify in order to create a mis-en-scene - I wanted to populate the rooms myself,. Again looking at Eisensteinian montage categories, I wanted to add a new one, based on making choices in real time. I wanted to make a cinema-instrument that I could play like I played my guitar.

My *Memory Theatre One* was well reviewed, and I was able to put together a good case for a grant for funding creation of my Living Cinema system. The Atlanta Council of the Arts gave me $14,000 to be used for creating my system, money from heaven. I was able to purchase all the software and hardware I needed for $12,000, and I took the rest back and told them to give it to another artist who needed it. I don't think they had seen that type of behavior before, but I was extremely appreciative of the grant, and had what I needed to do what I needed to do. Now all I needed was to learn how.

Having taught myself Forth to program *Memory Theatre One*, I set about learning C. The engineers I worked with at Still Current Design graciously helped me learn. One of them also helped me with some assembly language for controlling a video disc.

By 1988 I premiered an early working system at the Image Film and Video Center in Atlanta on two small video screens for a standing-room only crowd. Oops. In about six months I held another showing, this time with a full projection system, performing with local artist Dutch Knotts, who used a new audio sampler. We had worked out a few pieces together, but mostly we improvised, one playing off the other. I performed with Living Cinema - often with Dutch - in several places, including Tisch School in NYC and San Jose State. Then I took a job with Commodore and switched to the Amiga.

Eventually people have to switch from one operating system to another. This is one thing for end users, but another for programmers. When you're programming digital media performance, everything changes when you move from one platform to another. They just don't behave in the same way, and you have to learn how to plan preloads, buffers, what low-level routines are available to you etc. I had moved from the Apple // to MS-DOS to the Amiga in a couple of years, and it was difficult to keep switching among platforms. Director didn't exist as such, and certainly nothing for real-time cinema creation. But with the Amiga evolved two new tools though: the Toaster and a multitasking OS.

I made a last cinema system using the Amiga, a video capture card, and an authoring environment. Since no one program could give me all the functionality I needed, I took advantage of AREXX, an inter-application language that allowed me to set up communications among several running concurrently.

As I performed with Living Cinema I did a lot of sitting and thinking about was happening and what to do next. Performances had a fairly slow pace. That didn't bother me particularly, having watched plenty of slowly-unfolding "structural" films…having made several myself…and listening to the music of La Monte Young and Steve Reich. But I'd also heard some slowly developing live Moog concerts in the early 1970s. I'd had a feeling that the composer was considering what to do next, and that the tempo resulted from that contemplation.

I figured that instead of loading new files, I wanted instead to just change the flow of rushing data. I could turn things off and on, but I didn't want the system waiting for me to act.

Instead of a keyboard, I used a newly purchased MIDI pickup on my guitar as a controller. I used AREXX to pick up specific MIDI notes that would control the sources of audio, video and text. The data sources played through sets of sequences I had preloaded in the computer. I also had sounds preloaded, both musical and sound samples, and in the performance I played my guitar, triggering changes in the visuals as I went along.

Once more economics was to change my direction. I'd been at Computer Curriculum Corporation, and left to start a new company, Iconceptual. I couldn't use the Amiga, by then a dying breed, as a programming platform for business. While I was still involved with video, I needed to be able to distribute on popular platforms…and the Amiga wasn't that. I had to sell my Amiga system to buy a Macintosh. So I boxed all my custom hardware and software and sent it off to a buyer on the east coast, using the money to buy the "computer for the rest of us".

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NOTES

1. Clifford Geertz, *Person, Time, and Conduct in Bali*, Geertz, Clifford, in *The Interpretation of Cultures*, Basic Books (1973).

2. Frances A. Yates, *The Art of Memory*, University of Chicago Press (1966).

3. Michael Snow, *Cover to Cover*.

4. Robert Edgar, *Memory Theatre One Documentation*, Atlanta (1985).

5. Anna Couey and Judy Malloy, *A Conversation with Robert Edgar*, in *Art Wire*, Berkeley, California (1995).

6. Sonya Rapoport, in an email to the author.

AUTHOR BIOGRAPHY

Robert was one of the first to use personal computer programming to practice art. His computer-based work includes *Memory Theatre One* (1985), *Living Cinema* (1988), *Sand, or How Computers Imagine Truth in Cinema* (1994), and *Memory Theatre Two* (2003). Robert holds an MFA from Syracuse University's College of Visual and Performing Arts. He grew up in Cocoa Beach, Florida during the birth of the NASA Space Program and presently lives in Silicon Valley. Robert is presently preparing a DVD-ROM to accompany a book on the history of Memory Theaters with German Historians Dr. Kirsten Wagner and Dr. Peter Matussek.

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DIGITAL BY CHOICE: IMAGING IN THE PRE-PHOTOSHOP ERA

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ABSTRACT

An examination of the innovations by artists working with early digital imaging software prior to 1988.  Why did these artists, many of whom were trained as painters and printmakers, leave behind traditional media and turn to computers  in the days when there was little support for the medium? What are the lasting contributions of these artists?

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Throughout the 1980s, when scanning was absurdly expensive and limited, when output meant photographing the screen, and when artists who used computers were accused of not being creative, of being machine dependent, and oddly of not being enough involved with the raw material of computers, a small group of artists gave up pencil and paint and moved to digital imaging.

What motivated these artists? The reasons that are typically given today: Ease of production, photographic accuracy, and the possibilities of multiple outputs were not yet relevant. Unlike early programming artists, those who came from painting and printmaking to early dedicated systems generally were not drawn by the machine itself. The challenge lay elsewhere, in the aesthetic possibilities of digital imaging, which were foreseen

by artists who learned the medium without manuals or tech support. Pulled in by the allure of surprising new color combinations, playful juxtapositions, and shifts in scale and pattern, these artists invented a visual vocabulary of their own.

Twenty years ago a debate loomed large in the digital world. The real pioneer artists were the programmers, and there is no doubt that we all owe a debt to these creative thinkers. But as artists who were not programming began to explore computer imaging, they also began to make discoveries. Still, there were those who questioned if they were creating anything new, or merely users, taking skills from other media and using the computer to imitate what we already knew how to do.

The time has come to reopen this dialogue. From today's view, we can see that a new fluidity of compositional expression and innovations in representational imagery were a natural extension of the computer. All tools influence the resulting works, but to argue that the computer was just another tool denies the real impact that it has had on the images of today, the ones that we see not only on gallery walls but on television, in advertising, and in every aspect of our visual world.

The interpretation of history presented in this text come from the author's own experiences as one of the artists who jumped into computer imaging in those early days. The vision explored here comes from a personal history, shared and discussed with others who were there, but which remains largely undocumented. The quoted artists include colleagues from electronic artist gatherings from more than 10 years ago, and artists who responded to calls for input posted on mailing lists such as ISEA-forum, and presented at an open meeting at SIGGRAPH.

Thus, while many important artists have been omitted, the intent of this text is not to provide definitive documentation of who was who, but rather to open the history dialogue to embrace the contributions of early software users, who, along with the programming pioneers, gave us today's digital art. Where no other source is noted, the recollections and conclusions are the author's own.

DEFINING A NEW MEDIUM

The first users of early digital paint systems were, not surprisingly, artists who were already comfortably working in traditional media. This point is worth mentioning here because in today's world, software innovations are frequently introduced to students and professionals in the field who need only make a small leap to discover what new creative possibilities are offered by the changes. Also, the isolation that artists faced 15 and 20 years ago no longer exists in an era when even the most remote artist can join email discussion lists, and when the majority of artists have a colleague who can share brainstorming questions so casually that struggles for new understanding are hardly even struggles.

It is difficult from a contemporary perspective to remember that early imaging systems arrived with almost no documentation, and what instructions did exist were written with only the most mechanical, mundane applications in mind, because no one had yet envisioned other applications. The partnerships between innovative artistic production and computer science research that have evolved with the participation of the entertainment industry and other markets did not yet exist, and software was

developed largely to reflect what was already possible in other media.

The artists who gathered at early meetings such as SCAN, organized by a group in Philadelphia, and the first ISEAs (FISEA, SISEA) in the Netherlands, came from the worlds of painting, photography, video, and sculpture. No doubt exciting innovations were taking place in the commercial worlds of television and print, but designers in these areas were not necessarily "digital by choice", and frequently operated with the support of their work environment.

The questions posed here are specifically aimed at understanding the contributions of those artists who left behind the medium in which they were trained, and who did so for no apparent reason other than being drawn by the new aesthetic possibilities of electronic media. The choices that they made, the investigations that they undertook, made them pioneers in defining the new medium.

NEW CONCEPTUAL PROCESSES, NEW IMAGERY

While the first generation of pioneering programming artists might be called proceduralists, the first generation of early software users were the anti-proceduralists. The computer gave artists the possibility to brainstorm an evolving image in a way that paint never could. Early computer artists sacrificed the richness of surface in a well executed painting, and at the time gave up the possibility of producing large scale work, in an era when scale was important. What artists got in trade was exploration without end, the ability to explore juxtaposition that was not collaged layering but true recontextualization, and ultimately the possibility to invent a personal visual vocabulary that spoke to the heart of the individualism of the contemporary artistic practice.

This is in sharp contrast to painting and drawing with traditional media. The physical limitations of thin paint over thick paint demand a certain rigor of technical control, and the richness and impact of the final painted image are dependent on the effective execution of the work, regardless of the conceptual qualities of the work. A painting of muddy, overworked colors and cracking surfaces cannot be saved, and the artist who cannot overcome this is stuck without a vehicle for expression.

One cannot overestimate how exciting it was for artists 20 years ago to discover that with the computer one had the ability to invert the process of an evolving image, to be able to not only move forward in developing an image, but then to flip back to earlier stages and work in another direction, without any loss in the "freshness" of the resulting image.

Philip Sanders is one of the artists who began programming, but jumped to using software as soon as it was available because it gave him to opportunity to explore a nonlinear thought process. As Sanders says "I had always been fascinated by the process of building up an image in stages, and felt a sense of loss when previous imagery was covered by later painting or construction, although I liked the richness and complexity that created." The resulting computer paintings still have a richness of texture that comes from working through stages of experimentation, the little haphazard traces of earlier stages, that one normally identifies with painting [1].

Sanders dropped pixels across his digital self-portraits as one might drop paint on a canvas, even though the actual surface is flat, if a surface exists at all outside of the luminous monitor. Did he put down the texture first, or lay down the broad strokes that define the portrait itself? The tension between the two surfaces, pixel vibration against bold black, is the defining force of the image, and it speaks without revealing process, a purity which was new at the moment.

As Annette Weintraub said: "…as a painter my work was very responsive and intuitive and I 'built' images by assembling fragments and then responding to them. My digital work was approached very differently: I was much more interested in the ideas behind the images. While I continued to follow a process of layering images and evaluating the new image that developed, I found myself starting with a more conscious idea; the work was more socially engaged and began to incorporate narrative. My work became less hermetic and more accessible" [2].

Although Weintraub's first exposure to computers was in 1982 in graphic design and typesetting, by 1983 she had access to a dedicated paint system called Easel, and began to experiment with drawing inside the computer [3]. Eventually developing a new visual vocabulary with the computer, even her early digital drawings of architectural details and playful geometric forms led to explorations beyond paint, as some elements are repeated on a flatter frontal plane, while others sit in a deeper expanse, and others seem to spin. The intense color, in part a result of the limitations of the early palette, contributes to the ambiguity of the space.

Beginning in 1986, Sharon Steuer used the computer to experiment with new color combinations. As a painter, she may have used surface texture to set off her figurative images, but the horse and rider in her 1986 digital image sit against broad stripes of a bizarrely successful but totally unexpected color combination.  The limited color range of early software kept her textures to a minimum, which, ironically, leads to the success of this image. Her images appear to be direct, facile drawings, belying the hours of color experimentation that led to the strength of the image [4].

UNEXPECTED JUXTAPOSITIONS: NEW NARRATIVES

Roz Dimon sketched image over image, inventing narratives in layers of referential marks with a boldness could have only come out of the computer [5]. The relative sizes of the symbols, the juxtaposition of readable images against lyrical gestures, all this appears to have been put down effortlessly.  The casual observer does not know that digital art gave her the option to change, rotate, modify until the illusion of spontaneity springs from her well developed compositions.

Paul Hertz began as a programming artist, making rich geometric abstractions which move across the picture plane [6]. His early paint software images, however, reflect a different aesthetic: The mystery that comes from expected juxtapositions that push the elements into a dialogue, creating a kind of culture clash of landscape and construction, in an uneasy fit that ultimately engages the viewer in reconciling the difference among the elements.

Victor Acevedo's imagery forced the issue of unexpected

juxtaposition even further. Few artists working in paint, printmaking, or video would think of putting a geometric form so much on top of a painterly rendering of personages that the humans seem to be fighting for the right to even exist. Before turning to the computer he combined photographs with drawings, and first turned to the computer as the means to sketch out these ideas. Acevedo soon discovered, however, that computer imaging could produce results that were interesting in and of themselves, without translation to tradition media [7].

Anna Ursyn began by writing her own software, and then shifted to using commercial software, in a quest to make her gestural lines take on new meanings through juxtaposition and repetition. She writes "since the 80s, I have been fascinated with the computers' abilities to make very precise markings controlled by a program, to be later juxtaposed with a free-hand line" [8]. Her works then and now pull the viewer into a fantasy world of rhythms, referring to nature but evoking the structure of calculated repetition.

Peter Callas came to the computer as a video artist. Beginning in 1984, he began using digital technology to combine moving video and still imagery. In a 1998 talk at the Powerhouse Museum, discussing how he used the Fairlight video system for stencils rather than for intended use of special effects, Callas stated that his inventive strategy "…led me towards a kind of emblematic approach to the use of imagery and further away from narrative structures. It also permitted me to work almost entirely without scripts - so that the CVI became for me a kind of electronic collage device which encouraged and even amplified the serendipity of random association" [9]. In doing this, Callas approached the digital not as a set of rules and limitations, but as a tool to be pushed to create a new vocabulary of his own. This is the key that needs to be remembered, that the artists were not just using a tool, but inventing a use for the tool itself.

VIDEO INPUT: BEFORE ACCESSIBLE SCANNING

Scanning in the 1980s was anything but photographic. Today's digital artists input images effortlessly and in their own studios, but few artists could afford scans in the early days, when scans were so expensive that scanning even one image required prudent choices, and the results would be in black and white only, not color, not grayscale, but black and white. As a result, many artists turned to video grabs, using a video camera to input into the computer. Since all images were low resolution at the time, the lower resolution of the video did not present a problem, but cameras themselves were still very expensive, thus many artists found themselves using inferior cameras. Quality video, by the standards of the day, was limited to grayscale, challenging the artist to experiment with adding color creatively.

Because video input was the most widespread method of inputing images that were not drawn directly into the computer, the imagery that artists developed tended to grow from ideas surrounding video and film.  It also provided an interesting confluence of programming and software art. The fact that any input was time consuming and images were a bit messy inspired an aesthetic of experimentation, prompting many artists to creatively tease a complex composition out of a blurry, messy, low-resolution image.

Greg Garvey began his unusual use of portrait frame grabs as a programming artist, but migrated to using Targa/TIPS (Truevision Image Processing) paint program system in 1986, as it became available. Manipulating and distorting frame grabs, he found that the traces of the pixel added a dimension to his work that is lacking in much of the work produced with today's software. His pixelated gestures taunt the realism of the portrait image, which in turn is frequently repeated to play against itself [10].

Michael Wright's early works employed scanning to create bizarre narratives, reminiscent of Surrealist Painting. The near realism of video images woven seamlessly together gives a sense of the unfamiliar, of moving into ghostly territory, with an unexpected electric color palette. While Wright had always sketched people around him, the camcorder combined with the computer gave him the tools to take his images further in exploring human movement. Wright began to record sequences of movement, selecting the most interesting frame grabs, and infusing them with color [11].

Eventually the early Amiga computer offered the option to incorporate a video camera mounted on a copy stand with a color filter, and by turning the color wheel, one could input a color image somewhat resembling real world color. The low resolution, modified quality of the image invited many artists to add digital gestures. Imported images were so non-photographic that it was easy to see them as simply raw material in the digital painter's toolbox. As Roz Dimon describes her process: "I began with a photograph, scanning it in with a weird contraction you had to turn on the camera to get all the colors to come in. It was so primitive, but exciting. I loved seeing the pixels appear on the screen. Then I painted on top of the photograph and painted actually with the photo, turning it, changing it… giving it new meaning" [12].

Jean-Luc Touillon approached the computer in the same manner as the sketchbook when he began using a computer in 1986 with the earliest paint packages, searching for the best tools for his lyrical sketches. While his sketches remained spontaneous and skillful, early on he took to exploring surface illusion in the computer. As soon as scanning became readily accessible, he jumped on it, scanning tea bags, natural objects, fabric, anything that he found to provide the counterweight to his gestures [13].

In Anna Ursyn's 1986 work *Motor Hotel*, the low resolution imposed by the limitations of MacPaint meant that the image was rendered in patterns of black and white, playing against the stark realism of the image [14]. The result is a haunting mystery story frozen in time.

CROSS-MEDIA WORKS

One of the difficulties of working on the computer in the early days was the issue of output. Before digital printing it was possible to either photograph the screen or, as the technology evolved, to output to film or video. Prints were made from slides and photographs, and hard copy from the artist's own studio was only possible for those who went from photographs to traditional printmaking. The welcome result of this difficulty was that early on it encouraged artists to think about crossing the traditional discipline borders of visual art.

From the vantage point of 20 years into computer imaging, it is

more universally understood that the computer is rapidly erasing what were once the subdivisions within the visual arts: Painting, printmaking, photography and graphic design quickly melded, soon embracing video and other time-based presentations, then graphic design, and now even the boundaries between 2D and 3D (sculpture, ceramics, architecture) are beginning to melt. Once elements are in the computer system, the intrinsically nonlinear creative process of computer software generated art allows it to ooze in different directions.

For some artists who began using a computer in the early programming days, this oozing led from one way of thinking, from geometric abstraction, into referential imagery, leaving behind an understanding of the tinkering side of the computer that led them easily into interactive work and installations. The blurring of boundaries also allowed imagery to reference more than one way of thinking, more than one tradition within art, simultaneously. Certainly artists have done this for years, but the hybridization of "media" within the computer stimulated new ways of thinking that would not have easily emerged in other media.

In 1988, Simon Biggs presented his installation work *Golem* as video installation with two monitors appearing as an open book, in reference to illuminated manuscripts. As a programming artist who dates from the era of punch cards with no monitors or input devices, Biggs did not use paint software until 1987, when he began working with Quantel Paintbox and Spaceward Supernova's. His transformation from a non-digital painter/drawer to a computer artist grew out of his pre-digital practice of generating many drawings and then selecting a few in a nearly random process that is familiar to many digital artists working today. Although he began by producing paintings based on computer drawings, by 1984 the Biggs was recording his drawings to video and making interactive installations, in which the viewers actions influenced the animations [15].

Ginette Daigneault was a minimalist sculptor when she began using Cubicomp, and early 3D animation system in 1986. By 1988 she had discovered Paintbrush on an IBM platform. Working with clouds as a thematic subject, she would redraw her drawings into the computer, and then manipulate them. In 1988 she exhibited her first computer work, printing clouds in black and white with a dot matrix printer, the machine of the business world, and then drawing with pencils over them, in an installation that included 300 small paper trees [16].

As a printmaker, Karen Guzak used the computer to create patterns that she later transferred to lithographs, through photographically enlarged digital images and drawing by hand on plates. Although patterning had already been an important part of her work, one can feel the strength of the repetition coming from a certain clarity of color and lyrical gesture stemming from the mechanical, which in her hands became a creative element in her use of IBIS, developed by Ellie Mathews and Carl Youngmann in the early 80s [17].

PAINTERS, PRINTMAKERS, AND THE COMPUTER AS SKETCHBOOK

As in all media, the limitations of the early computer medium led to new creativity. It was the difficulty of input which contributed to the impetus to reuse elements. Once a source was input, either by laborious mouse or tablet drawing, or later by equally time consuming video scanning, the artist was motivated

to reuse, distort, and repeat the source, rather than spend more time inputting.

Before the days of easy output, or any real output, the computer served as a sketchbook for many artists who never gave up traditional media. James Faure Walker, Michael Wright, Sharon Steuer, and Karen Guzak are all artists who continued to work in paint and printmaking. Faure Walker, Wright and Steuer worked with painted images outside the computer that was directly related to the experiments inside the computer, and in some ways the work was similar enough that one might wonder why the computer was ever important.

As Steuer says, it was the ability to take risks that made it all so exciting. The stimulation of the never ending manipulations by computer moved these artists to new ways of thinking about color and composition, and without this stimulation their non-digital work would not have evolved as it did [18].

It was the easy entry and fluidity of exploration that grabbed many of the first generation of artists. As Michael Wright summarized: "I found that the computer offered new possibilities in terms of color, speed, and video input. I also found that it enhanced my analog work which focused on figurative work. It offered new insight in terms of how I looked and participated in the creative process." He goes on to say, "The computer has given me the freedom & ability to find, develop, and explore my personal image making journey. I continue to move back and forth between my painting on canvas and painting on a monitor. It has given me more speed in the process which has allowed me to be caught up in a busy day to day schedule and still evolve my body of work" [19].

James Faure Walker's early work demonstrates the joy of compositional invention coming from a few working with a few simple, flat forms. In *Happy Circle*, dating from 1988, the same form is colored in three different colors and slightly distorted, then placed so differently within the composition that the borders of the image itself crop the form repeatedly, prompting the viewer to dance with the form right off the page, brought back by only by a central circle of "happy" forms. For him, the limitations of print prompted compositional innovation, as he writes "… there was no affordable way of printing an image much larger than 6" x 8"( 15cm x 20cm). So I simply doubled the width, or assembled a composite image in a 3 x 3 matrix, thereby expanding both memory and the scale of the image. This was a new way of thinking about a composition, an image that you could not see as a whole till printed and assembled" [20].

THE ALLURE OF THE NEW

Finally, it was the thrill of the new that pulled artists to the computer. The excitement of discovery, of harnessing a wild beast that pushed back with unexpected but delightful results proved to be irresistible.

As Victor Bosson wrote: "As an artist using a computer to make art in the 1980s on the west coast of Canada, far from the centre of the electronic art making universe; you were isolated and often alone. Virtually everything I did was created to allow me to become familiar with the new media I had chosen to work in. There was no pool of knowledge that I could drink from. Having said that, the isolation gave me a sense of freedom and I

was able to experiment with a wide range of techniques" [21].

Roz Dimon summarized what many working then experienced: "… I could hardly operate a toaster, so for me to use the computer to paint was an act of passion, if not downright insanity. But deep inside it felt right, it made sense, it was the medium I needed to communicate with the culture I found myself a part of. I had to have it… it was the largest unplanned detour of my life and sent a curve ball that's still going 20 years later" [22]. She knew that the combining of images, the repetition, the bizarre breakdown of imagery through pixelation, all of this was reflective of the new aesthetic.

I write this as one of the artists who was there, who worked on a computer in the early days before easy manuals and home systems, who found myself driving home at 2:00a.m. not knowing where the hours had gone. The computer disrupted our lives and rerouted our careers, and we loved it.

CONCLUSION

The debate of 20 years ago focused on the merits of using a computer to make images that could have technically been made with existing media.  Without programming, was there really anything new about using digital paint over traditional paint, or moving digital images over video and film? All of the artists who responded to questions about how the computer influenced process testify to the power of the digital imaging process as the impetus for developing new imagery. It is not that the images could not have been done in paint or traditional materials, but that the images themselves grew out of a different dialogue with the evolving image.

The real revolution of the digital age is not that it has brought a new medium to the art world, but that it has freed the image from the medium. Early users of software worked with no sense of what the output might be, but rather with evolving imagery inside the computer as visual idea, not as applied paint or pencil, and ultimately, not so much pixel as display.  The very critique leveled against early software users, that the lack of involvement with the computational essence of the medium created a distance from process and therefore made the work less valid, is a critique derived from a traditional way of working with imagery, in which the artist focuses on the command of a difficult medium as equally as the conceptual challenges of the image and design.

The conclusions in this article reflect my own experiences as one of the artists who was there. When I sat at an Artronic paint-box system for the first time in 1984, I immediately found the opportunity to further explore the compositional challenges that were the focus of my paintings at that time: Use of borders, repetition, and self-reference.  Leaving the object of the painted canvas behind for the display was liberating in all aspects, as it made the variations of related imagery a more natural investigation of the related ideas.

That the investigations of related ideas would lead to where many of us are today, creating bodies of work that bridge traditions of formerly distinct media (painting, print, video, photography) in a new way of looking at representation and reference, have led us to the edge of a new aesthetic that is rapidly expanding not only notions of art, but notions of the audience for art. The image has been lifted off the page, out of

the precious, both conceptually and literally, and even if we still make objects (prints, DVDs) we have left behind the narrow definitions of art as object and crossed into the era of the image.

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NOTES

1. Philip Sanders, private correspondence (1 September 2004).

2. Annette Weintraub, private correspondence (18 September 2004) see also http://www.annetteweintraub.com.

3. Weintraub [ 2].

4. Sharon Steuer, private correspondence (7 August 2004) see also http://www.ssteuer.com.

5. Roz Dimon, private correspondence (12 August 2004) see also http://www.rozdimon.com.

6. Paul Hertz, private correspondenc (3 August 3 2004) see also http://collaboratory.nunet.net/phertz/portfoli/.

7. Victor Acevedo, private correspondence (17 September 2004) see also http://www.acevedomedia.com.

8. Anna Ursyn, private correspondence (3 August 2004) see also http://www.ursyn.com.

9. Peter Callas, talk at Synthetics, Powerhouse Museum (26 July 1998)
http://www.anu.edu.au/ITA/CSA/callas/redu/CAN_+SYNTHETICS.HTML
see also http://www.anu.edu.au/ITA/CSA/callas/INDEX.HTML.

10. Greg Garvey, private correspondence (2 October 2004).

11. Michael Wright, private correspondence (14 September 2004) see also http://home.earthlink.net/~mrwstudios/index.html.

12. Roz Dimon, private correspondence (12 August 2004).

13. Jean-Luc Touillon, private correspondence (9 August 2004) see also http://www.touillon.com.

14. Anna Ursyn, private correspondence (3 August 2004).

15. Simon Biggs, private correspondence (2 August 2004) see also http://www.littlepig.org.uk.

16. Ginnette Daignault, private correspondence (13 September 2004).

17. Karen Guzak, private correspondence (16 August 2004) see also http://www.angelarmsworks.com/karen/prints.html.

18. Sharon Steuer, private correspondence (7 August 2004).

19. Michael Wright, private correspondence (14 September 2004).

20. James Faure Walker, http://www.dam.org/faure-walker/index.htm.

21. Victor Bosson, private correspondence (25 August 2004).

22. Roz Dimon, private correspondence (12 August 2004).

AUTHOR BIOGRAPHY

Cynthia Beth Rubin began creating and exhibiting digital art in 1984, beginning with the early Artronic system.  Trained as a painter, she now works exclusively in many aspects of digital imaging, ranging from web based works, to still images, to video and installation, in works drawing on cultural legacies as a point of departure. The recipient of numerous grants, including the first Connecticut Commission on the Arts grant in New Media, the New England Foundation on the Arts, the Memorial Foundation for Jewish Culture, among others, her work has been included in numerous editions of SIGGRAPH, ISEA, and other festivals such as Imagina, SCAN, and the Jewish Film Festival. Rubin is based in Connecticut, teaches part-time at the Rhode Island School of Design, and serves on the Board of ISEA.

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ONE FROM THE VAULT: FROM THE LEA ARCHIVES
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ALTERNATIVE VIRTUAL BIENNIAL EXHIBITION - AN INTRODUCTORY ESSAY AND ARTIST PROFILES
First published: (LEA 3:5), May 1995
http://mitpress2.mit.edu/e-journals/LEA/TEXT/Vol_2/lea_v3_n05.txt

by Paul Warren, artist-curator
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ART IS A LANGUAGE

The purpose of this exhibit is to present visual art which is based upon an alternative new aesthetic. It is not a rejected aesthetic. It is an ignored aesthetic. And yet this new direction is emerging in progressive music, theater, opera, interior design, architecture, film and dance. In fact, the only major progressive art form which has resisted this direction is visual art. The possible explanations for this refusal are too involved for such a brief essay. However, a few issues should be addressed to better understand the art in this exhibition.

The five artists shown here have consciously accepted an outsidership position from the mainstream progressive artworld. They don't believe that shock-value art, especially art which is generated from a "low culture" aesthetic, continues to function as a vital means of communication. For them, an art which challenges a weak and dwindling middle class is no longer relevant. Or, for that matter, progressive.

This is not to say these artists are nostalgically looking backward into a simpler and rosier past. Each is pushing outward beyond a purely historical use of imagery. In fact, by bringing history back into the dialogue, these artists are using the language of art in ways never seen before.

The title of this essay is "Art Is a Language" because visual forms have meanings just as words have meanings. And meanings come from history. Even new words are defined according to words which we know. Without historical significance, we can know very little about ourselves and our world.

And yet, art which makes reference to history is quickly labeled  regressive by those who uphold a "progressive" agenda (an agenda which is actually based upon mid-19th century thinking). Perhaps this new art, which does not look like our preconceptions of what new art is supposed to look like, is even more shocking.

[ THIS TEXT CAN BE VIEWED IN ITS ENTIRETY BY LEA/LEONARDO SUBSCRIBERS AT:
http://mitpress2.mit.edu/e-journals/LEA/archive.html]

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LEONARDO REVIEWS
2005.5

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This month as Leonardo Reviews settles into its new offices at The University of Plymouth we are publishing 14 reviews from our panel members. As you may know the process at Leonardo Reviews is one in which material for review is sent to the offices and panel members select items that fall within their interest and expertise. The material that is sent comprises mainly new books and occasionally catalogues and journals. We also receive a number of video tapes and music CDs, and this month's selection from Leonardo Reviews draws attention to this with reprints of four reviews dealing with music and film.

Writing about music and film is especially challenging because the added aesthetic dimension means that often the material has to be patiently revisited half a dozen times in order to know it sufficiently (books of course can be assimilated in a much more incremental way with constant revision).

I am also especially glad to feature the last interview with Edward Said, a person of great intellectual generosity and patience whose balance and objectivity brought to the world's attention dimensions that without him would have remained unsaid.

These and other reviews can be found at:
http://leonardoreviews.mit.edu

Michael Punt
Editor-in-Chief
Leonardo Reviews


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REVIEWS POSTED APRIL 2005

The Aesthetics of Ruins
by Robert Ginsberg.
Reviewed by Allan Graubard

A Blinding Flash of Light: Photography Between Disciplines and Media
by David Tomas

Reviewed by Jan Baetens

Building Stata: The Design and Construction of Frank O. Gehry's
Stata Center at MIT
by Nancy E. Joyce
Reviewed by Rob Harle (Australia)

Creative Evolutionary Systems
Edited by Peter Bentley and David Corne
Reviewed by Robert Pepperell

Fractal Speech Processing
by Marwan Al-Akaidi
Reviewed by Stefaan Van Ryssen

Frith in Retroperspective
and
Allies
by Fred Frith
Reviewed by René van Peer

Hopes & Fears
by Art Bears
Reviewed by Michael R. (Mike) Mosher

Machine Consciousness
by Owen Holland, ed.
Reviewed by Stefaan Van Ryssen

Matchibako: Japanese Matchbook Art of the 20s and 30s
by Maggie Kinser Hohle
Reviewed by Michael R. (Mike) Mosher

Playing for Time
and
Mosquito/See Through
by The Necks
Reviewed by René van Peer

Proteus: A Nineteenth Century Vision
by David Lebrun
Reviewed by Amy Ione

Edward Said: The Last Interview
by Mike Dibb
Reviewed by Andrea Dahlberg

Sky Garden
by Yo Miles! (Henry Kaiser and Wadada Leo Smith)
Reviewed by Michael R. (Mike) Mosher

Unforgiven
by Edward Buscombe
Reviewed by Jan Baetens

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FRITH IN RETROPERSPECTIVE: CHEAP AT HALF THE PRICE

by Fred Frith
ReR Megacorp, London, UK, 2004
Audio CD-ROM, FRO 06, $13.00
Distributor's website: http://www.rermegacorp.com.

ALLIES

by Fred Frith
ReR Megacorp, London, UK, 2004
Audio CD-ROM, FRO 07, $13.00
Distributor's website: http://www.rermegacorp.com.

Reviewed by René van Peer
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These titles start off the second batch of Fred Frith re-issues
through the ReR Megacorp imprint Fred Records. *Cheap at Half
the Price* was originally released in 1983 as the third and last
solo album Frith recorded for Ralph Records. Allies was apiece
commissioned by Bebe Miller to accompany a dance performance in
1989, and was released in a revised version (the rhythm track,
for which a drum computer had been used, was replaced by Joey
Baron's drumming) by RecRec Music in 1996.

After the demise of the groundbreaking British impro-rock
group, Henry Cow, by the end of the 1970s, Frith embarked
energetically on an incredible variety of projects. Among these
were the groups Art Bears, Massacre, and Skeleton Crew, and
collaborations with Material, The Residents, and with numerous
individual musicians. And, of course, solo exploits. These
included the Ralph albums, but also improvised concerts, such as
those in a tour through Japan in 1981, which was captured on a
magnificent double LP-set.

Up till then, Frith's music had sounded like a tightrope act
that had him balance between the production of uncompromisingly
intense sounds and sumptuously beautiful melodies that could
easily be danced to. The sounds he accomplished were very often
the result of having to work under low budget circumstances. The
need to adapt to limitations set by non state-of-the-art studio
equipment pushed his creativity to uncommon levels. He made
extensive use of recordings captured at home and around town and
processed these tapes with scissors and glue. On the two
previous solo albums for Ralph, he had invited guest musicians
from bands he was working with; the instruments he himself
played included (apart from guitar, bass guitar, violin and
keyboards) all manner of homemade contraptions.

These instruments also made their appearance on *Cheap at Half
the Price*. What was new, however, was that besides these, he
played a Casio 101, and that he actually sang. Moreover, on the
face of it most of the tracks (half of them songs, half of them
instrumentals) seemed to exude a happy-go-lucky mood - with
backing vocals going 'ooh' in the refrain to the opening song
*Some Clouds Don't*. As Chris Cutler writes in the ReR online
catalogue, it caused "raised eyebrows at the time (from, as Fred
calls them 'progressive music snobs' - of which I guess I was
one) for its apparent simplicity and departure from what was
then thought of as Fred Style."

I have to admit that I was also one of those snobs. Listening
to this re-issue more than 20 years later, I am astonished and
embarrassed to find how little I grasped back then of what Frith
had put into it. Not only was it to a large extent consistent
with what he had been doing, traces of earlier albums made their
way onto this one. *Some Clouds Do* is built on the same driving

rhythm of Pauls Sears' drumming as *What a Dilemma on Gravity*. The fun and dance at the end of *Don't Cry for Me* on that same album surfaces on *Cheap at Half the Price* in *Absent Friends*. Sometimes collaborations he was doing with other musicians seem to filter through in his own music. The keyboard melody of Walking Song sounds like it might have come from a Residents album.

On the other hand, *Cheap at Half the Price* foreshadowed the work he was about to do with Tom Cora in *Skeleton Crew* – deceptively simple catchy songs with melodies that grow from Scandinavian and Eastern European traditional music styles that they both loved, danceable rhythms, an inventive use of basic tools (during a concert at the Moers Festival, Frith at one point played percussion by quickly stroking a microphone with a paint brush), and prerecorded tapes of voices of power that lose much of their authority in this setting.

Tracing this lineage makes clear that this album was very much part of the complex of musical activities Frith engaged in at the time, rather than a departure. More than that, he wove lots of those strands together into one coherent work. It bursts with inventiveness, and eradiates the irrepressible joy of playful creativity. It does have its darker side as well, however. *Same Old Me* is gloomily introspective, thrust forward by relentless bass and percussion, a litany of helpless discontent capped with a delirious fanfare. It is one of the examples of the complexity flowing underneath the seemingly carefree and beaming surface. It is only toward the end that this strange spell of contradictory moods is broken by the elated guitar and violin solos in *Absent Friends*.

*Allies* (minus the drums) was made six years later, and released (with drums added) in 1996. Again, as on *Cheap at Half the Price*, inventive studio work plays a role on this album. Frith's guitar melodies are immediately recognizable, but the overall effect is totally different from the earlier title. No catchy tunes, but rather a careful and thoughtful development of basic material, making the music sometimes reminiscent of The Necks. What is different, though, is that the ongoing movement of the music often gets ruffled by sudden intrusions, like a train of thought temporarily disoriented by flashes of insight, before doggedly moving on; and that Frith is seconded by George Cartwright on alto sax, Tom Cora on cello, and Joey Baron on drums.

Frith himself provides the backbone of the music on bass, keyboards and guitar. Cora and Cartwright join him, sometimes with solos, sometimes strutting the central structure, sometimes falling through the roof. The opening track *Rifka*, for instance, is built around long soft-toned chords on the keyboard and strings of the guitar being hit at a medium pace. Cora's cello, initially following Frith's guitar picking, plays a whimsical melody of brief hocketing notes, interspersed with outbreaks on the guitar and the saxophone. Every now and then the whole thing breaks down and starts again with a long drawn out glissando slicing through the ensemble like a hot knife through butter. And all the time Baron imperturbably ticks, pats, and hits around his kit, undaunted by bouts of excitement or disarray. This detached mode is of course absolutely appropriate, as Baron added his playing years after the others had committed their music to tape.

The way in which Baron's drumming fits seamlessly in the music

is indicative of the meticulous work that went into constructing
*Allies*. Listening closely, you'll hear with how much care
Frith worked on the finer details of the recording. Although the
album has six cuts, the efforts of the musicians unite these
into one consistent flow, even when chord structures and
melodies vary. It does have a longer span than *Cheap at Half
the Price*, which consists of separate tunes, but the energy of
the former seems more restrained, subdued. *Allies* is a river
of sound to float around in. *Cheap* is an album to wryly tap
your toes to.


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EDWARD SAID: THE LAST INTERVIEW

by Mike Dibb
First Run/Icarus Films, Brooklyn, New York, 2004
114 minutes, col.
Distributor's website: http://www.frif.com.

Reviewed by Andrea Dahlberg
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Less than a year before his death on 25 September 2003 Edward
Said gave this, his final interview, over the course of three
days. Said speaks of his illness and how he was virtually unable
to read, write, and listen to music. But there is no sign in
this remarkable film of any abatement of his immense
intellectual energy or passionate engagement with life. Said
speaks for almost two hours about his life, his major works
including *Orientalism* and *Culture and Imperialism*, his
films, his role as a member of the Palestine National Council
and his subsequent profound disillusionment with Arafat and the
Oslo Accords. It is hard to think of another individual who
could carry an entire film of this length merely by speaking to
an appropriately low-key interviewer like Charles Glass.

With a face that could have been painted by el Greco, Said is
blazingly articulate. He illustrates his points with references
to Vico, Foucault, Jane Austen, Gerard Manley Hopkins, Conrad,
Graham Greene, Daumier, Tagore, Faulkner, Shakespeare,
Hemingway, Mailer, Eliot, Roth, Chomsky and Napoleon. He
describes his obsession with counterpoint and his preference for
Rossellini over Verdi (Verdi is always "in italics"). Said also
discusses American self-identity, the U.S. educational system,
and the provincial nature of its intellectuals, like Roth and
Mailer who remain focused on the interior life of the country
and do not engage with its immense impact in the world. Yet he
is always accessible and engaging. Whether describing his
schooling in Cairo and the U.S., his views of his parents, his
existential experiences of exile or his intellectual and
political passions, Said makes sparks fly and paints a vast,
vivid world that he inhabits more intensely than most. Said's
emotional and imaginative range is as great as his intellect. I
have had the pleasure of watching this film with people who are
well versed in Said's work and others who had barely heard of
him. Not one of them failed to be drawn in, energized, and left
wanting to respond to Said's ideas.

The director of this film, Mike Dibb, was a friend of Said's
who knew his subject sufficiently well to make the roles of the
interviewer and the camera as unobtrusive as possible. Said
wears the same clothes over the three day period when the film

was shot, which helps create the illusion that the viewer is the third party in a small room listening to Said and, to a lesser extent, Glass conversing. The result is an intimate portrait of a great mind.

With the passing of Edward Said the world has lost a great intellectual and an articulate and credible spokesman for Palestine. This film has captured the man himself.

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PROTEUS: A NINETEENTH CENTURY VISION

by David Lebrun
First Run / Icarus Films, Brooklyn, NY, 2004
DVD, 59 mins., col.
Sale: $390
Distributor's website: http://www.frif.com/.

Reviewed by Amy Ione
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Mixing an array of visuals with a powerful script, *Proteus: A Nineteenth Century Vision* is a remarkable movie that continually urges the mind to reach beyond what is examined on the screen. David Lebrun, the director, achieves this result by framing the hour around the life of Ernst Haeckel (1834-1919). Opening with a collage of details from engravings of this time, the viewer immediately senses that *Proteus* is not a typical film. This intuition is confirmed as animated sequences of Ernst Haeckel's geometric drawings are joined with well-edited sequences showing images of 19th century painters, graphic artists, photographers and scientific illustrators. Culled from European and American collections, these images expand on the environment that led to the formation of Haeckel's vision of a unity of all nature.

What I liked most about the film was the interweaving of Haeckel's paintings and intricate drawings with the narrative. Raised as a Christian and trained as a scientist, the young Haeckel found himself torn between science and art, materialism and religion, rationality and passion, outer and inner worlds. His early sense of "conflicting realities" was turned around when he envisioned a unity while working with the intricate geometric skeletons of the tiny undersea organisms called radiolaria. The scientific projects that followed were capable of touching his deepest artistic tendencies. Ultimately forming a vision of confluence, he was able to discover, describe, classify and paint 4000 species of these one-celled creatures. Haeckel's greatest contribution grew from their strikingly crystalline structure, which led him to maintain that the simplest organic life had originated spontaneously from inorganic matter by a sort of crystallization. Eventually, Haeckel proposed his Biogenetic Law, and his research in the development of higher organisms led to the famous phrase 'ontogeny recapitulates phylogeny' that we now associate with his name.

Well-known as a zoologist and evolutionist who was greatly influenced by Darwin as Haeckel was, *Proteus* does an excellent

job in explaining that Haeckel initially saw the pull toward art and science in terms of a conflict between the rigors of science and the Romanticism of the 19th century. LeBrun meticulously parallel's Haeckel's evolution toward a holistic vision through his documentation of the era's focus on the ocean depths, including key events such as the laying of the transatlantic cable. This well-orchestrated approach aids the viewer in perceiving how the exploration of underwater variations influenced his path and places Haeckel within both the scientific and artistic communities. Indeed, as *Proteus* seamlessly blends the empirical and visionary relationships to the invisible, mysterious ocean depths we see him in terms of how the spiritual view of Romantic poetry, myth, and painting related to views of history, biology, and oceanography. For example, a taste of the Romanticism that was in the air is exquisitely captured when the film juxtaposes Gustave Dore's illustrations of Coleridge's *Rime of the Ancient Mariner* with commentary on the poem itself without losing sight of how the ocean's mysteries stimulated investigative problem solving. Haeckel's interest in examining the variety of living creatures that inhabit the sea was a part of the scientific worldview, and thus his projects offered another kind of commentary on how the ocean's secrets were exposed and brought to the surface.

Watching the video I was captivated by the integration of the images and its flow. It was only when it concluded that I began to think that evolution continues to have difficultly explaining the variety and specificity of the radioloarian and dinoflagellate species. [They have eyes, whipping tails, and hunting behavior even though they are single-celled!] While not sure where this "fits" in terms of the film's thesis, it still seems important to not lose sight of this "detail". I also found I did not fully accept the script's idea that the 19th century was drawn to the ocean depths much as those of 20th century looked toward outer space. Without a doubt, I agreed when the early narration stated that each age has its own image of the world, and those of the 19th century were drawn to the ocean depths much as the 20th century turned toward outer space. However, as the story unfolded I found myself thinking of the 20th century figures influenced by Haeckel and how powerfully their ideas established the later century's trajectory from psychology to the brain and consciousness.

In light of Haeckel's reach, it seems more astute to compare the draw of the ocean in the 19th century with the turn toward both inner and outer space throughout the twentieth century. Both Sigmund Freud (1856-1939) and Carl G. Jung (1871-1961) acknowledged their debt to Haeckel. Jung was inspired by Goethe's *Faust*, much as *Proteus* outlines to have been the case with Haeckel, and many of the events in Haeckel's life were reminiscent of Jung's biography. These include his internal conflict early in life when he was pulled towards art and science, his fascination with Goethe's work, and his religious upbringing. Given the many similarities, it is perhaps not surprising that I kept seeing Jung's drawings and *mandalas* in my mind as the varied images flashed on the screen. This enlarged conclusion is buttressed when we add in another thinker, Santiago Ramón y Cajal (1852-1954). Cajal is often called the "Father of Neurobiology" and, like Haeckel, had considered a career in art. Instead, he too studied medicine, eventually bringing his love for drawing to his studies of the brain, often sketching out his ideas. While we know Cajal was impressed by Haeckel's evolutionary theories, it is hard to say if the neuroscientist contemplated how this 19th century figure

similarly found a way to integrate his artistic talents with his scientific research.

Wonderfully edited and animated, the final product is an indescribable viewing experience. Moreover, the release of *Proteus* suggests that the urge to re-examine this visionary thinker is justly gaining momentum. The late Stephen Jay Gould, who re-visited this thinker's contributions in his *Ontogeny and Phylogeny* (1977), provided an examination of the relationship between evolution and the development of the individual organism. Like *Proteus*, Gould offers a sympathetic reconsideration of Haeckel in his effort to re-acquaint the reader with this German biologist's "Biogenetic law", largely dismissed today. *Proteus*, almost 30 years later, has expanded Gould's work. It offers a stimulating and stunning experience in the form of a poetic statement. As such, the film demonstrates that creative minds are fertile and varied. It reminds us that many thinkers who link art and science see a world in which there is synergy rather than conflict between these modes. Perhaps this statement is *Proteus'* (and Haeckel's) greatest.

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LEONARDO JOURNAL

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ARTIST'S ARTICLE

PHENOMENOLOGY AND ARTISTIC PRAXIS: AN APPLICATION TO MARINE ECOLOGICAL COMMUNICATION

by Jane Quon

The author's ecologically informed art praxis can be traced back to her experiences while deep-diving off Tasmania's eastern coast. These provided a plethora of aesthetic sensations, but also images of the appalling degradation wrought upon the marine environment by humans. Her art focuses upon this juxtaposition between natural harmony and ecological dysfunction. The artist/author outlines her views on artistic communication generally and, specifically, on the role of art as *ecological* communication and discusses the significance of presenting her multimedia and sculptural installations in "general" public contexts. She discusses three of her artworks and possible future projects.

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SPECIAL SECTION

THE RAW DATA DIET, ALL CONSUMING BODIES AND THE SHAPE OF THINGS TO COME

by Lynn Hershman

The author discusses the construction of synthetic female cyborgian agents that expand singular identity into a networked trajectory composed of flowing data that cannibalizes processed

information, which mutates into re-expressed, unpredictable patterns.

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SPECIAL SECTION

MEDIA COMMEDIA: *THE ROMAN FORUM PROJECT*

by Antoinette LaFarge and Robert Allen

The authors discuss what they term "media commedia": Performance works melding comedic performance traditions with new media technologies. They focus on *The Roman Forum Project*, a series of mixed-reality performance projects they produced whose subject is contemporary American politics and media as seen through the eyes of ancient Romans. They discuss the developing relationship between the Internet and public discourse; their use of avatars to explore the boundaries between performance and identity; their use of the Internet as an improvisational space; and the *mise-en-abyme* effects of working with mixed realities (including text-based virtual worlds).

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COLOR PLATES

SPECIAL SECTION

COMPLEX CURVATURES IN FORM THEORY AND STRING THEORY

by Cheryl Akner Koler and Lars Bergström

The authors use new aesthetic criteria concerning structures and properties to explain parallel concepts within theoretical astroparticle physics and contemporary form/compositional research. These aesthetic criteria stem from complex curvature models developed both in string theory and in artistic perceptual research on transitional surfaces and concavities. The authors compare the complex curvatures of the mathematically derived Calabi-Yau manifold with one of Akner Koler's sculptures, which explores an organic interpretation of the looping curvature of a Möbius strip. A goal of the collaboration is to gain experience and insight into the twisting paradoxical forces in the 3D world and to explore the properties of transparency as applied to the Calabi-Yau manifold and a point cloud translation of Akner Koler's sculpture.

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TECHNICAL NOTE

POLYNOMIOGRAPHY: FROM THE FUNDAMENTAL THEOREM OF ALGEBRA TO ART

by Bahman Kalantari

The author introduces *polynomiography*, a bridge between the Fundamental Theorem of Algebra and art. Polynomiography provides a tool for artists to create a 2D image - a *polynomiograph* - based on the computer visualization of a polynomial equation. The image is dependent upon the solutions of a polynomial equation, various interactive coloring schemes driven by *iteration functions* and several other parameters under the

control of the polynomiographer's choice and creativity. Polynomiography software can mask all of the underlying mathematics, offering a tool that, although easy to use, affords the polynomiographer infinite artistic capabilities.

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GENERAL ARTICLE

JELLYFISH ON THE CEILING AND DEER IN THE DEN: THE BIOLOGY OF INTERIOR DECORATION

by Maura C. Flannery

Few homes are without at least one or two representations of living things. The author argues that this penchant for organic decoration is related to what Edward O. Wilson calls "biophilia," an innate urge in humans to have contact with other species. As many people now live apart from the natural world, pictures, statues, dried flowers and other reminders of flora and fauna are ways of satisfying biophilic urges. The author contends that it is important to appreciate this manifestation of biophilia and to foster it as one dimension of the larger purpose of using biophilia to encourage efforts to preserve the living world in the broadest sense.

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GENERAL ARTICLE

CAUTION - OBJECTS ARE CLOSER THAN THEY APPEAR: PERSPECTIVELY INVERTED PSEUDOSCOPIC IMAGES BEHIND ACCELERATED SPACE

by Glenn Biegon
glennbiegon [@] hotmail [dot] com

Perspective inversion reverses the flow of naturalistic pictorial space, creating a disorienting, anti-naturalistic sense of space. Inverted perspective's subversive power appears limited, however, given that no art-historical examples depict fully inverted objects in systematically inverted "unlimited spaces," such as landscapes. The author addresses this limitation through analysis of "converse" and "pseudoscopic" 3D images - Charles wheatstone's two paradigms for inverting binocular depth. Wheatstone's inverted imagery proves geometrically identical to 3D art-historical precedents that conceal their perspective inversion: Namely, relief sculpture, set design and architecture employing three-dimensionally "forced" perspective. As hinted by depth-inverted stereograms, linear perspective employed together with reversed overlapping cues systematically inverts unlimited space in both 2- and 3D pictures.

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ISAST NEWS

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THE PACIFIC RIM NEW MEDIA SUMMIT (PRNMS)
A PRE-SYMPOSIUM TO ISEA2006
7-8 August 2006, San Jose, California

The ISEA2006 Symposium is being held in conjunction with the

first biennial ZeroOne San Jose Global Festival for Art on the
Edge in San Jose, California, 5--13 August 2006.  As part of the
ISEA2006 Symposium, the CADRE Laboratory for New Media at San
Jose State University will host a 2-day pre-symposium entitled
the *Pacific Rim New Media Summit*, co-sponsored by Leonardo.

With a purview encompassing all states and nations that border
the Pacific Ocean, the Pacific Rim New Media Summit is intended
to explore and build interpretive bridges between institutional,
corporate, social and cultural enterprises, with an emphasis on
the emergence of new media arts programs.

In preparation for the summit, seven working groups are
currently laying the groundwork for the main areas of
investigation to be pursued in depth at the summit: Creative
Community, Curatorial, Education, Directory, Eco-Social
Activism, Mobile Computing and Urbanity, and Latin American-
Pacific/Asia New Media.

Following is another statement from one of the working group
chairs, in the continuation of our ongoing series as a build-up
to the conference.


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THE PRNMS WORKING GROUP ON URBANITY AND LOCATIVE MEDIA

by Soh Yeong Roh, Urbanity Chair
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SCOPE AND OBJECTIVES

Digital technology and communication media have brought about
new perceptions and social interactions in the urban
environment, transforming the ways we experience our cities.
The concepts of space, time, and social relationship in the
urban environment are put in flux via emerging technologies such
as wireless networks, locative media and mobile computing.
There is growing interest among communities of artists and
designers, viewing the city as fluid interface, geographical
canvas, social playground, and as public space.  Using mobile
phones, laptops, surveillance cameras and even radio, these
artists and designers are exploring various hybrid spaces,
between place and media technologies, the physical and the
virtual, the social and the personal, the past and the present,
and so on.

On the cross-platforms of art/design, technology, and social
sciences, submissions are sought to deal with the issues of
participation, play, process, and engagement upon the theme of
urbanity and locative media.  The papers and projects may
reflect on, but are not limited to, the following critical
issues and ideas:

* What are the creative roles and alternative visions that

locative media bring to the urban environment?

* How can artistic intervention and tactical approaches
transform the ways we experience the city?

* How are the past, present and future of the city envisioned
and experienced through locative media?

* How does digital technology open new ways to engage people in
the public domain?

* How can diverse aspects of the city - whether cultural,
historical, or social  - be reflected and engaged via locative
media?

* How can the artist's vision and sensibility contribute to new
visions on urbanity?

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BYTES

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NEW PUBLICATION BY AMY IONE

Amy Ione's *Innovation and Visualization* is the first, in
detail account, that relates the development of visual images to

innovations in art, communication, scientific research, and
technological advance.

Integrated case studies allow Ione to put aside C.P. Snow's
"two culture" framework in favor of cross-disciplinary examples
that refute the science/humanities dichotomy. The themes, which
range from cognitive science to illuminated manuscripts and
media studies, will appeal to generalists as well as specialists
(artists, art historians, cognitive scientists, etc.) interested
in comparing our image-saturated culture with the environments
of earlier eras.

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* Worldwide Call for Submissions *

Wild Nature and the Digital Life
Guest Editors: Sue Thomas and Dene Grigar
digitalwild [@] astn [dot] net
http://mitpress2.mit.edu/e-
journals/LEA/LEA2004/authors.htm#digiwild

The Leonardo Electronic Almanac (ISSN No: 1071-4391) is
inviting papers [and artworks] themed around Wild Nature and the
Digital Life.

Wild nature has traditionally been perceived as the preserve of
the physical world and may seem to have little to do with the
abstract spaces of the digital. But what can be described as
"wild nature" at a time when much of the earth's land is being
annexed by cities, brought into production, and turned into
tourist meccas or eco-excursions?  How are humans reinventing
"the wild" digitally?   What is the relationship between humans
and wild nature, and has it changed with the advent of the
computer technology? Is the notion of wild nature limited to the
physical world, and if not, then where else can we find it? How
do those who are most immersed in the digital integrate it with
the physical?

While a critical response to these questions is highly
encouraged, we are equally interested in the wide-angle view and
in the intimate. Specifically, we welcome essays, interviews,
reports and other genres of writing that speak to the ways in
which we reconcile and integrate the relationship between wild
nature and the digital life; that address the part that wild
nature plays in our work; looks at the ways the functionality of
our body in the digital compares with the way it works in the
mountains, in the ocean, or other physical spaces; and explores
the changes that the wired life has brought about to our
domestic and professional habitat, how it may have changed our
health, or shifted our understanding of ecosystems and of other
species on this planet and elsewhere.

Topics of interest might include (but are not limited to):

· Projects combining art and natural history
· Art and nature collaborations
· Telematics and consciousness
· Historical context
· Connectedness studies
· Embodiment theory
· Emergence studies
· Anthropology and social networks
· Ecology and the environment
· Natural magic and spirituality

The twin conceptual territories of bits and atoms are closer than they may at first seem. This call invites papers and works that explore ways in which the wired sensibility has led us full circle towards an enhanced engagement with wild nature.

LEA encourages international artists / academics / researchers / students / practitioners / theorists to submit their proposals for consideration. We particularly encourage authors outside North America and Europe to send proposals for essays / artists statements.

As part of this special, LEA is looking to publish:

- Critical Essays
- Artist Statement/works in the LEA Gallery
- Bibliographies (a peer reviewed bibliography with key texts/references in Digital Life)
- Academic Curriculum (LEA encourages academics conducting course programmes in this area to contact us)

Expressions of interest and outline should include:

- A brief description of proposed text (300 words)
- A brief author biography
- Any related URLs
- Contact details

In the subject heading of the email message, please use "Name of Artist/Project Title: LEA Wild Nature and Digital Life - Date Submitted". Please cut and paste all text into body of email (without attachments). Detailed editorial guidelines at:
http://mitpress2.mit.edu/e-journals/LEA/submit

Deadline for expressions of interest: 8 July 2005

Timeline (please note the timeline is subject to changes)

8 July 2005 - submission of abstracts
22 July 2005 - short-listed candidates informed
2 September 2005 - contributors to submit full papers for peer review

Please send proposals or queries to:
Sue Thomas and Dene Grigar
digitalwild@astn.net

and
Nisar Keshvani
LEA Editor-in-Chief
lea@mitpress.mit.edu

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ARTNODES and LEONARDO ANNOUNCE: the "LABS" database of Spanish-language
thesis abstracts on art/science/technology.

First deadline for submission of abstracts: 30 June 2005

The Universitat Oberta de Catalunya, through its #Artnodes area, in
collaboration with Leonardo/ the International Society of Art, Science and
Technology, announce the launch of  LABS (Leonardo ABstracts Service), an
online database of Spanish-language thesis abstracts from Ph.D. or master's
theses on the intersections emerging between art, science and technology.

All those with completed theses in Spanish are invited to submit abstracts
of their PhD theses for publication consideration in the database. The
submission deadline is 30 June 2005.

http://www.uoc.edu/artnodes/leonardolabs

LABS is designed for those who have completed postgraduate research in the
arts (visual, audio, performance or text) involving the use of computing or
other sciences and technologies, or who, in some way or another, investigate
the philosophical, historical and critical approaches and applications for
science and technology in the arts.  Scientists and researchers who address
the artistic applications of their research may also submit thesis
abstracts.

Authors are invited to send the abstracts of their theses of between 100 and
200 words to the database. A Peer Review Panel (PRP) made up of academics
and artists and chaired by the #Artnodes coordinator, Pau Alsina, will
review these abstracts bi-annually.

The PRP for the period 2005-2006 is made up of Rodrigo Alonso, professor at
the University of Buenos Aires; Pau Alsina, professor at the UOC; Laura
Baigorri, professor at the University of Barcelona; José Luis Brea,
professor at the University of Castilla--la Mancha; Karin OhlenschlÃ¤ger,
co-director of Medialab Madrid; and the artist Rafael Lozano-Hemmer.

All accepted abstracts will be published in the database, and a selection
chosen by the PRP for their special relevance are to be published each four

months in the Leonardo Electronic Almanac or in the #Artnodes
online area.
The author receiving the highest ranking from the PRP will be
invited to
send an article to be considered for publication in the
Leonardo journal
produced by the MIT Press in English or in the #Artnodes
journal in Spanish
or Catalan.

FOR AUTHORS OF THESES IN ENGLISH

This project is an extension of the English-language thesis
database at
Pomona College, under the direction of Sheila Pinkel. If your
thesis is
written in English submit your abstract to this URL:

http://leonardolabs.pomona.edu

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for all those
interested in the interaction of the arts, sciences and
technology. To
become a member of our organization and for further info:

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