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Art ("and" or "versus") Technology
Some Personal Observations

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Introduction
The Dualism of Art and Technology

"Art and Technology," like art-and-anything, addresses a dual agenda. To describe oneself as a conceptual artist, a feminist artist, or a video artist is to acknowledge a dualism between one's genre, politics, or medium and one's art. And like all dualisms, sometimes there is symbiosis and sometimes there is strife.

I believe in the existence of "pure art," art without any other agenda but the art itself. I became convinced when I met He Gong, a young Chinese artist, several years ago while we were both in residence at the Banff Centre for the Arts. He had spent the first part of his studies learning political art (by and for the Chinese government) and the latter part as an activist artist working against his government. He spoke English and had a strong background in contemporary art (from his dissident university instructors), but this was his first time outside of China. He Gong spent weeks in his studio working vigorously on a personal installation made of wood, rice paper, ink brush, and eventually, fire. He once said to me "I am so grateful. This is the first time in my life a can do épure art.'"

For some of us, sometimes, the artmaking obsession channels itself into particular issues, in my case - technology. It is my observation and belief that technology, particularly computer and media technology, is having an increasingly profound effect on everyone on the planet. And that if artists don't jump in and pro-actively help shape these powerful new tools, it will be left by default to advertisers, the military, organized religion, and sex peddlers. Some of us believe the stakes are high.

That's been my attitude for the past twenty years, and I've had the good fortune during that time of working inside a variety of institutions with similar beliefs (or which at least tolerated mine). These places supported my own work and for this I am grateful. In fact, my projects could not have been realized without their help.

But it wasn't always a cakewalk. Sometimes it felt like the "art" and the "technology" forces were in opposition. This paper offers observations and reflections on some of these issues. The purpose here is to learn from the past.

MIT (1976-1980)
Is the demo the beginning or the end?

MIT was a lively place for art and technology during the late 1970s, when I was there first as a graduate student

and later as a Fellow at the art center, the Center for Advanced Visual Studies. CAVS focused on environmental art under the direction of Otto Piene and its founder Gyorgy Kepes. The Film/Video Department, run by Ricky Leacock, was participating in all sorts of video experiments. Meanwhile, Nicholas Negroponte headed the Architecture Machine Group, which was well-funded and increasingly getting involved in media.

In 1977 I had this crazy idea to move a movie projector to mimic the original camera movement. I asked Nicholas for funding. He agreed, and I made a simple study by filming with a super-8 film camera on a slowly rotating turntable, then replacing the camera with a small loop projector. The result, which we called "moving movies," retained the film's original directionality and appeared as natural as viewing a dark space with a flashlight.

After showing this to Nicholas I said "great, now I'm ready to begin" and he said "great, now you're done." I was interested in exploring imagery and he was interested in the technical process.

To confuse matters further, at that moment, we were just beginning a new project using one of the very first prototype laserdisc players. The idea was to film along pre-determined routes with stop-frame cameras and make an interactive system which allowed end-users some control over speed and direction. The project, called the Aspen Moviemap, wasn't intended to be an art project but dealt with some classic issues of visual representation. We all knew we were breaking new ground. I continued working on this project for the next two years, and since then made several other moviemaps.

But I also kept working on moving movies. I built various camera and projector contraptions to move the image with better control, but then felt like I had to decide: was I interested in building a new projector or in making an art statement? I opted for the latter, and over the next four years produced a series of installations reverting back to a simple turntable, but where I could concentrate more on the imagery itself.1

The Architecture Machine grew into the Media Lab and prospered, while CAVS increasingly struggled through the 1980s. I believe this split between the well-funded technologists and the struggling artists was microcosmic of what was happening in the United States during this period. But more on that later. The lesson at the time was that demonstrating a novel idea was different than using it toward artistic ends.

Atari Research (1982-84)
Everyone is not like us.

In 1982 the Atari Corporation, which was making an incredible amount of money on video games, decided to start a long-term research lab to look ten years ahead into the future of computing. They hired Alan Kay as Atari's Chief Scientist, who immediately went about rounding up a hundred mostly young people he thought would be "visionaries" for this task. Many of these young people were from the emerging MIT media scene, as well as a diverse group of others. Having already moved to San Francisco in 1980, I was brought in as well.

One problem I noticed is when you put a bunch of very bright people together to speculate about the future, they do just that: speculate. This can be dangerous, because it's easy to cut off the rest of the world and assume everyone is just like you.

After a year, one researcher, Bob Stein (who later co-founded Voyager, the interactive publishing company), did something noteworthy. He hired a local twelve year old boy to keep with him at all times a small portable tape recorder, and to record every question that came to mind over the course of several days. Bob's idea was to see what kind of questions everyday people might have, since we rarely remember most of them. This seemed like an important start if we were trying to understand how people in the future might use portable computers.

Bob chose a Palo Alto boy whose parents (both of them) were Stanford faculty. Virtually all of the questions he recorded were the sort whose answers could be found in an encyclopedia, straightforward educational questions. I wanted to respond in a way to both compliment and challenge Bob's work.

The evening after Bob distributed the transcripts I met with several anthropologist friends who after dinner, wine, and looking at dozens of maps and atlases, had converged on a plan. I would go to the remote northern mountains of the Philippines to visit a tribal culture called the Ifugao, a culture very different from ours, but where some people speak English. They are known for their ancient and spectacular rice terraces, for having been head-hunters, and for their strong belief in dreams. Two of my anthropologist friends had been there a few years prior, and wrote me a letter of introduction to someone they had met, a sixty-six year old Ifugao Shaman named Dionicio Immatong. I left the following day, and took with me a small portable tape recorder.

Several days later I had made it to Dionicio's hut, where he read the letter by candle light and took me into his family and his home as a son. We set out to find a child to ask him to record what was on his mind as if he was interacting with a machine, just like the Palo Alto boy. We found a twelve year old Ifugao boy from the village

of Paypayan named Patrick Tundagui. Patrick recorded every question that came to mind over the course of several days.

Patrick's questions differed significantly from the Palo Alto boy's. For one thing, Patrick made multiple use of the word "you," sometimes referring to anyone and sometimes to a particular person. He often questioned the certainty of hard facts, asking questions like "how do you *know* this is the smallest bird?" And he sometimes asked questions which were personal rather than encyclopedic, like "what is your problem now?"2

I'll admit this was a bit of a stunt on my part. And it was only a sample of one, so it's important not to read too deeply into any conclusions. But it did have the effect of shaking things up a bit back at Atari and reminding ourselves that not everyone is just like us.

Apple Multimedia Lab (1988-90)
Educators and artists are different.

Atari crashed in a big and ugly way in 1984. Many of the people resurfaced several years later at Apple and Lucasfilm. By 1987, a conspiracy of sorts was made between some of these people to convince both companies to start a multi-media laboratory. Neither company was willing at that time to commit to multimedia, but together they approved of the formation of the Apple Multimedia Lab, located in San Francisco, mid-way between Apple in Silicon Valley and Lucasfilm in Marin County. These were close colleagues of mine, and I was invited to help.

Our flagship project was called the "Visual Almanac," Apple's first interactive laserdisc made primarily for schools. I directed production of the laserdisc, which consisted of thousands of short sequences of still images, video clips, and weird stuff.3

I remember sitting in a meeting with several consulting teachers and listening to how they all tried to communicate so clearly. I became depressed: they were trying to communicate their ideas by saying everything in such an obvious and explicit way. This is not the way artists I knew operate; we seem to be more concerned with creating a feeling, an impression, or a metaphor.

This distinction came to a head on a little piece I was making for the disc, of a main street in Silicon Valley filmed by the State of California Transportation Department very much like a moviemap. They filmed one frame every 52.8 feet, or one hundred frames per mile, from a camera car throughout the state. And they'd been doing it since the early 1970s. I selected an interesting hundred frames and made a split-screen version of their earliest film and their latest film, a "then and now" comparison of how things have changed over this one-mile strip in Silicon Valley.

Several colleagues on the project wanted to add educational information about each of the buildings, but I refused, wishing instead for the visual impact of the material to stand on its own. Then they said "you can add it, and since it's interactive the user doesn't have to see it" and I still said NO. I felt this was a trap of sorts.

At any rate, I was left with the impression that educators and artists have different intentions. Maybe "intentions" is too strong a word here, since both educators and artists might say their intention is enlightenment. But even so, educators tend to spell things out in a more literal way while artists have less of a problem with ambiguity.

San Francisco Art Institute (1989-1990)
It's a small art world.

I may have been particularly sensitive to this distinction since I was also teaching at the San Francisco Art Institute, a landmark institution for contemporary art, a cutting edge place. I was teaching a class called "Virtual Environments" and asked the Apple lab if we could borrow a Macintosh, a laserdisc player, and one of the then-new little liquid crystal display video projectors.

The students produced an ambitious virtual environment of a restaurant we named "EAT," involving students performing as waiters and images of food (among other things) projected onto the diner's plate from a video projector hidden under the table. EAT was exhibited at various art venues, but it also showed at SIGGRAPH.4

The next year, my students produced a videotape parody of virtual reality called "Virtuality, Inc." It received a "Futures Scenarios" award at SIGCHI, the major computer-human-interaction conference.5

I realized that I was pushing these projects in the direction of the research community more than the art community, like making little "art bombs" and lobbing them over the fence into foreign territory. I must say I

was proud of that. It was also great fun. I very much wanted the art to have some impact on the research community.

But the fact was, almost no one at the Art Institute had any knowledge of these venues and saw little relevance. It was outside the art world.

Things have changed a bit since then. As the Internet, multimedia, virtual reality, and the Web have become trendy to the mainstream culture, they have become fashionable in the arts community as well. Nevertheless, making art for communities outside the art community felt like an uphill climb.

Banff Centre for the Arts (1991-1993)
Local support for global activities is vulnerable.

The Banff Centre for the Arts had the most remarkable program for art and technology I'd ever seen. For one thing, it's in the Canadian Rocky Mountains, a most beautiful place. It's a large complex, complete with swimming pool, health club, and bar as well as food and lodging facilities. But most important, it's an art center, with hundreds of music, performing, and visual artists from all over the world together in residence. Inside this art center was a tech-based lab called the Art and Virtual Environments program which opened in 1991. It truly was a unique program.

The following year I began a project there called "Field Recording Studies," to explore turning real-world imagery into 3D computer models. That summer I was committed to exhibiting at SIGGRAPH, and I literally flew into Banff 10 days before I was to fly out to Chicago with something to show. I had a simple idea and they had a superb team of technologist helpers as well as state-of-the-art SGI computers and video post-production facilities.

We produced a 360 degree panoramic computer model of a nearby landscape at dawn. The concept was to make one contiguous panorama by "tiling" together slightly overlapping still images. I collected these images with a small consumer video camera on a tripod, using traditional surveying tools like a compass and level. Back at the lab, the Banff Centre technical staff had prepared software to allow hand-positioning of the forty-two images we digitized off the videotape. The result was a three-dimensional model of a panoramic dome.6

Everything worked out well. The Banff Centre was, in my opinion, the perfect place for art and technology work, particularly because of its international multi-cultural diversity. So what was the issue? The program no longer exists. A couple years later, the conservative party won in the Banff region, and funding cutting-edge non-traditional arts programs was among the first to go. The local conservative community didn't appreciate the fact that the Banff Centre was known and active on a global scale.

Of course the Banff Centre still exists, and in many ways is still thriving, but the Virtual Environments program is gone. I'm hopeful this is a temporary situation. For one thing, the explosive growth of the Web is making all activities potentially global, and institutions will have to adapt if they have strong parochial views.

Interval Research (1992-)
Can enterprising technologists deal with independent artists?

Funding for the arts, like most social spending in the United States, had been very heavily cut back by twelve years of Reagan and Bush conservatism. By 1992, the US arts community was underfunded, heavily politicized, and to some extent, angry. During this same twelve year period (and for some of the same reasons) much of the high-tech community prospered. The cultural gap between high-tech entrepreneurs and independent artists had grown large.

In 1992 I was offered a research appointment at Interval Research Corporation, a new independent research lab wholly owned by Microsoft co-founder and billionaire Paul Allen. It's charter was to look five to ten years ahead into the future of computing and media, in a most general way. Unlike other tech labs I'd seen, this one seemed to really believe in having artists and other diverse elements as members of the research staff.

I'd been completing the last phase of my Banff Centre project on field recording, and Interval's head David Liddle assured me that art will be an integral component in this new lab. I could continue to work as I was and make something exhibitable. The result was called "See Banff!," a stereoscopic moviemap (the first ever) about landscape, tourism, and growth in the Canadian Rocky Mountains. It was filmed with twin 16mm cameras and displayed as a single-user experience housed in a cabinet resembling a century-old kinetoscope, with a crank on the side for "moving through" the material.7

One particularly fruitful collaboration that came out of the Interval community was with the computer vision

researchers. I learned they were also interested in basic elements of visual perception, perspective, and presence, and together we nurtured a symbiosis. The footage I produced for See Banff was also made with them in mind. They were amused, I think, to have an artist-type supplying them with material which they felt was unique and valuable. The fact that it was not simply "views of the parking lot" was gravy.

Over a two year period, we all did pretty well. Working with my Interval colleagues, we designed an experimental camera system. I had several weeks of filming as I like best, open-ended and with participation by local community people, and made an installation. My computer vision colleagues got some unique footage and made some striking new imagery. It turns out we also got a patent out of it, something totally unanticipated when we began.

So beginning the next year, in 1994, I proposed we try it again, this time working with representing "looking around" the way the Banff project represented "moving around." We put together another experimental camera rig, this time using two 35mm motion picture cameras for stereoscopic 3D, running at sixty frames per second for unrivaled fidelity. Like my earliest work, the cameras would rotate on a motorized tripod to capture the entire panorama. And I'd work with local community people, but this time in collaboration with the UNESCO World Heritage Centre based in Paris. With their endorsement, I'd take the camera system around the world to film in endangered places. Finally, the footage would be shown with the viewers standing on a slowly rotating floor, which rotates in sync with the imagery. The effect is illusionistic, like the feeling when the train next to yours pulls out of the station and you think your train is moving. The final installation is called "Be Now Here" and was produced for the Center for the Arts Yerba Buena Gardens in San Francisco.8

Again, I had managed to produce an art installation. And again, my colleagues got unique footage for their research. And it turns out again, we also got another unintended patent application out of it.

It also turns out that we had inadvertently helped another cause. One of the endangered places was Dubrovnik, the medieval Croatian town near the Bosnian border. It had been heavily bombed and was still in a state of war. Dubrovnik had just opened a Web site, created by Enver Sehovic, a professor and former President of the University of Zagreb, as an example to show his government. Professor Sehovic helped me get in and out of Croatia during the fighting with my five hundred pounds of film gear.9 Shortly after the installation opened in San Francisco, Sehovic emailed me that he was coming to see it, to help convince the Croatian government that he's not just a "dreaming professor."

So what is the problem now? History. After more than a decade of technology entreprenuers profiting while the arts community has been almost strangled, new bridges need to be built.

And perhaps the timing can't be better. The tech world is realizing that consumers don't buy technology for its own sake but for the experiences they afford. The word "content" has only come in vogue recently (and indeed, has entered the vernacular of the Media Lab and its sponsors). The toaster-makers are finally realizing that people don't want toasters, they want toast.

So, can enterprising technologists deal with independent artists? I don't know for sure. There are potential problems, including issues of tolerance and compromise, of intellectual property and secrecy, and of artists being true to heart about their motivations. I may be critical but I'm hopeful. Some of us believe the stakes are high.

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