Digital Life

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I was asked to speak about a vision for "Digital Life." Digital Life is the name of a research consortium at the Media Laboratory that explores a world of seamless connectivity. In a broader sense, the term reflects something about the quality of our life in the e-society; in particular, it emphasizes how digital networks provide connectedness that enhances long-distance as well as near e-communication. Digital Life enables constructionist learning, and delivers appropriately contextualized, computational augmentations of everyday activities.

Increasingly, the convenience of distributed communication through cell phones, e-mail, the World-Wide Web, camcorders, and wired households informs and affects the character of the e-society that we are discussing here. One theme of digital life has to do with extending the language of connectivity and storytelling. Before jumping into this and other appropriate themes, I would like to say a few things about storytelling and my own journey into digital life via documentary filmmaking. I will follow this introduction with some observations about emerging philosophic recognition of today's e-society. Finally, I will look at how these technical trends combine with social trends to create a more sociable interface for audiovisual storytelling applications.

Documentary film as a reconfigurable medium

The making, transmission, and reception of stories are social activities. In my mid-20's, I transitioned from being a sculptor to being a filmmaker. Looking through the viewfinder of a camera, I was able to look outward into society and ask: "why is this person doing what they are doing?" The intense activity of anticipating what action was about to occur, framing the camera view, and editing the captured imagery also forced me to look inward, to

reflect "what does it mean to me when they do something like that?" This way of using motion pictures was relatively novel and allowed the audience as well as the filmmakers to enter a social dialogue about meaning that had some immediacy with their everyday life.

A few years after I started making movies, I had the opportunity to meet and work with Richard Leacock (http://www.richardleacock.com). Leacock ran the MIT Film Section, which was reputedly the best-known documentary film school in the world at that time. Through his own practice, Leacock showed us how to reflect upon what we saw in a new way. My earlier filmmaking goals were transformed by the challenge of using the camera to discover something beyond the ordinary. The activity of observational filmmaking had the benign effect of requiring the filmmaker to reflect.

It is hard to convey the thrill of being in the field, discovering as frame follows frame the oddities that are inevitably embedded in a real life story. As the pursuer of some aspect of the "truth," you -- the filmmaker -- know more about the subject of your exploration than anyone else in the world. As an editor, your power is even more decisive. As you shape the story into a single-minded strand that your audience can easily follow, you are also communicating a story that has been simplified by sharpening the point of view. As much as I enjoyed making films in the early 1980's, I also despaired over the available tools for making, giving, and receiving the filmed story. To me, they appeared to be broken.

Convinced that we could do better, I focused my attention on the intersection of digital tools and new story forms. My early explorations in the digital arena allowed me to create an improved editing system as well as an early hyper-media framework that would let the audience experience a documentary with the intensity of the original filmmaking experience. In the 1980's, these ideas generated a great deal of controversy, not only among filmmakers but also among academics and others who habitually thought of artistic expression -- be it a book, a painting, a musical composition or a film -- as a fixed, immutable object of a certain size and with an identifiable author or set of authors.

What was so controversial in our early exploration of this new form of cinema that today we classify as hyper-media or hyper-cinema? From the perspective of traditional filmmakers, the idea of a

reconfigurable movie was difficult. The paradigm of movie as a continuous strand of celluloid was forever broken by the "randomly accessible" videodisc. Individual movie shots were mastered onto the videodisk and retrieved as needed, with a seamlessness which approached that of cut-and-pasted film sequences. The notion that a computer could access and sequence individual segments based on the perceived interest of the viewer ran counter to the patriarchal notion of strong authorial control by a single creative force, the filmmakers. The idea that sequences could be retrieved and presented in a different order for different viewers is a short psychological step from the idea that viewers can also be makers. By editing sequences and adding commentary, the audience was about to become a privileged co-constructor in a medium that was no longer presented as a fixed, immutable experience. While this democratization excited some, the handing over of what was perceived to be creative control seemed threatening for others. What would filmmaking become? What would happen when the skills that in some sense were "owned" by the filmmaking and television became popular and populist?

Arthur C. Clarke once said, "Any sufficiently mature technology is indistinguishable from magic." Even after 20 years of exploration, the integration of story and computational technology is not yet mature. It is not enough to engage the audience in a constructive experience; the medium must also be learnable and sociable. As we move into an e-society, we take note of three emergent trends in the story experience. First, stories will increasingly defy the traditional framework of the fixed expressive object; they will become dynamic, generative experiences drawing on a rich database of content and built through a conversational dynamic with the audience. Second, stories will become transactional entities, distributed in time and space through a process of sociability. Thirdly, stories will no longer be a cultural monolith or shibboleth; we will play with stories through affordances of the physical world.

Who are we becoming: of networks and tangible interfaces

To me, the most compelling question that emerges as we enter the e-society is: who are we becoming? Historical understanding of our cultural evolution suggests that advances in technology can deeply affect who we are; witness: farm implements, weapons, the printing press, film, radio, and television. Today, as we adapt to the portable

computer and the cell phone, as we begin to communicate on a global scale with people we have never met, we seem to be gaining efficiency. Are we also losing dependence on rhetorical agility and the emotional attachment of face-to-face communication? Most of us spend a great deal of time reading and writing e-mail. Today, e-mail and even the WWW are essentially literary media, based on text and, to a very minimal extent, pictures. Are we becoming more literate at the expense of other forms of expression? How will the integration of moving pictures and sounds into these media extend our sensibilities? As computers bring increased access to knowledge, will we witness the transition of human learning from rote skills to a collaborative and emergent process of problem solving and social construction?

Who are we becoming as we establish the capability to collect vast amounts of data from our eco- and bio-systems? While this data will be meaningful to experts or expert systems, will it also be meaningful to us as individuals? With the advent of nanotechnologies, we will be able to store vast amounts of memory into a tiny implant. Will this implant hold redundant data or will this device uniquely store private information about the wearer? How we as individuals understand, make use of, and share this information becomes a measure of how we adapt our lives to the reality of this new resource. What stories will we tell our children and grandchildren to help them make sense of this information-rich world?

A related but critical question for the future is: who should know about us, and what should they know? Will the same data be available to our parents, our children, our government, our doctor? What about our car, our house, our toothbrush, and other computationally enhanced objects of the future? A computer system that pushes us advertising "we will be interested in?" Someone halfway around the globe? How much should they know about us? What do we have to say about who knows what? How does knowing about us change the nature of the interaction -- us with them, them with us? Today, we unlock our car with a key. The system is almost transparent, until we lose the key. How will we modify our behavior when our car recognizes us as we walk up to it, as easily as our dog or our child recognizes us today? Do you like the idea that your car will know you and the road you are traveling on? Are you ready to have your car chauffeur you?

The emergent trend in transparent two-way interfaces for information exchange is everywhere evident. The telephone is one of today's most mature communications technologies. The modern cell phone is a far cry from its prototype of a century ago; two tin cans and a connecting wire had no memory. Today, voice is transmitted via a small wireless hand-held device ubiquitous in Europe, South America, in many parts of Asia, and increasingly in the United States. The synchronous nature of the phone network provides users with a point-to-point sociable interaction. However, the very mobility of the device often generates a strange unsociable interaction with the neighborhood. We have all watched someone walking along the street, phone to their ear; the person seems oddly in another world. While the keypad interface is fairly straight forward, woe betide the mobile user who urgently needs to make a call using a number that has not already been recorded in the phone itself. For all the comforts of this device, it has its limitations. In the near future, I believe that the phone as an identifiable device will be replaced by embedded functionality of the phone in your clothing. The phenomenon of mobile conversation become less noticeable, but the phenomenon of person-to-person voice connectivity will not easily disappear. There is something about the sociability of voice that is still part of who we are.

In recent years, Media Lab researchers have introduced a broad range of new interface concepts. The composite image below shows four recent examples of work related to the transparent interface.

The clump of tennis-sized balls on the top left quadrant of the image represents a tangible instrument. Developed by Tod Machover's Opera of the Future Group, the "Squeezable" interface invites children or adults, who may be unfamiliar with the process of making music, to make sounds that they like while freely engaged in social play. In contrast to the violin -- which requires years of practice to learn the interface and make "correct" sounds -- this generation of Machover's hyper-instruments invite exploration and choice through discovery play and trading of sounds. The interface is obvious and at the same time surprisingly transparent.

The Squeezable Phone, an experimental design by Jocelyn Scheirer in Roz Picard's Affective Computing Group, measures the pressure and dampness of your hand on the phone. The idea is simply that by holding the phone, you convey information about your mental state to the system: you squeeze harder if you are more tense, and

your action will transform a patch of color on a computer screen (at the source or, preferably, at the receiving end of the call) from blue through violet to red. In demos, visitors initially expressed dismay at the idea that they would transmit their innermost feelings to the party on the other end of a phone line. In general, this reaction reflected their desire to control their revelation of feelings in a business situation; in most cases, this reaction reversed when the visitor considered communication with a loved one. The collection and transmission of affective information will generate a new class of semi-transparent interfaces in the future.

In the image at the lower left, Neil Gershenfeld demonstrates the transmission of business card information via a handshake. Today, we spend a great deal of time with our PDA's, our phones, and our computer notebooks. The use of these devices constantly distracts us in important face-to-face communication. As the computer interface becomes embedded in our clothes and in our homes, exchange of information becomes more invisible, more natural.

Hiroshi Ishii's lab is filled with tangible interfaces that demonstrate how information can be distributed in the physical world. Under these pinwheels sits a beautiful table designed by Hiroshi Ishii and Jay Lee on which you are able to "play" any of a number of bottles on the surface. In the original demo, each bottle represented a certain instrument of a jazz improvisation work. More recently, Ali Mazalek wrote a short non-linear story for this tangible interface appropriately called "Genie in the Bottle." As you lift the tops off of each the bottles, different genies tell you part of their story. If the tops are lifted off of two bottles, the genies talk to each other.

The breadth of these experiments illustrate the movement toward transparent interfaces and suggest that increasingly computational interfaces will be layered onto a diverse array of physical objects which are mobile, and which engage us in a more natural or metaphoric activity. As the interface becomes more mobile and ad hoc networks more powerful, there will no longer be a need to be in one location to receive a message or a piece of story. Rather, messages and stories will find you wherever you are.

Towards a sociable, engaged community?

In order to design for the future, we need to have some understanding not only of who we are becoming but also of who we want to become! A fundamental difference between the internet and the telephone has to do with the type of sociability the network supports. While the telephone network supports a point-to-point synchronous exchange, the internet supports group connectivity -- synchronous and asynchronous -- in several unique ways. Mailing lists in e-mail, chat rooms, and increasingly filtering systems for personalized e-commerce activities take advantage of addressing, interacting with, and learning from the combined preferences of groups. This feature of slicing, sorting, and reconnecting groups led us to ask: can distributed technology enhance democracy, learning, story sharing? What types of activity will be promote the sociable community?

Fifteen years ago, the Media Lab used three overlapping circles to describe the nexus of its work -- the convergence of print publishing, film and television, and computing. Most of the Lab's research lived in the central area of overlap but it also included the study of learning and of common sense reasoning. By the early 1990's this convergence was well underway in the commercial world and the world of the Lab had expanded to include researchers interested in perception as well as physicists who are creating material inventions that will change sensor and networking technologies. More recently, our community expanded to include researchers interested in understanding both human and animal behavior and how machines can embody this more lifelike behavior. Today we define digital life as having three vectors: connectivity, democratization of programming, and embodied computing. Each of these themes harkens back to the idea of sociability in distributed computing and communications networks.

Sharing, Trading and Co-Construction as a sociable activity.

My own domain, Storytelling, confronts the idea of co-construction in ways that can leverage peer-to-peer learning as well as peer-to-peer sharing. Moviemaking fascinates many people, old and young. The two questions that seem most relevant going forward are: how to extend creativity -- particularly in editing -- to a larger number of people? And, what structures and forms can be designed that a general audience finds most compelling? We build this work around

sociability and the three themes introduced above: connectivity, democratized computing and responsive media.

This work begins with the need to maximize the intimacy of the story experience for the perceiver and/or the constructor. This intimacy results from a combination of: the form in which the content or story is displayed, the way in which the system learns about and responds to the intentionality of the creator or perceiver, and the sociability of the experience.

Several recent visions for motion pictures of the future have been put forward at the Media Lab. Two general directions emphasize interaction with the audience while maintaining the sense of a unified, creative whole. In one approach, programs are developed in such a way as to make possible a personalization based on knowledge about the receiver's interests or intentions (HyperSoap, Viper). A second approach focuses on the sociability and mechanics of co-construction processes. The former emphasizes the consumer as viewer with access to a rather narrow backchannel; the later emphasizes consumers as constructors or co-constructors, and commands a substantial backchannel on the network for trading, sharing, and critiquing within the context of a community of interest (Shareable Media, Story Beads). In both cases, media elements are tagged through some amount of human intervention such that the system can attribute a metric for weighing the meaning of the segments.

Researchers are also working on video within the live teleconferencing situation. Again, we try to embed teleconferencing within a social context. We are using an application called ICOM to interconnect two research laboratories. Several ICOM stations have been sited in MIT's Media Laboratory and one is in place at the MediaLabEurope in Dublin, Ireland. In each installation, a sofa sits in front of the large screen with its multiple windows. Audio can be turned on and off in any one of the installations from any other. In the real-time connective environment, we continue to explore. How do we create a culture and an environment which supports unscheduled, informal meetings such as those which occur when you walk down a hallway at the Media Lab? How do we really connect disparate worlds? How do we conjoin physical places so that some very unusual level of connectivity and storytelling can happen?

Story Approaches

In the 1960's, new technologies allowed a new form of documentary moviemaking to come into being. The creators of "Direct Cinema" (or cinema verite) posited that the movies they made by recording in situ provided a close impression of what it was like to be there -- in that situation, with those people. As we push the limits of teleconferencing and combine it with the ability to share, trade, and comment on images and sound samples, we begin to redefine moviemaking as a medium for connectivity and co-construction, an intermediate object to think with and through.

As sensor technology and networks become part of our everyday surround, story elements can be delivered to many public and private venues. Here is an example of a very simple interactive movie experience designed for a casual pubic space. A flock of pigeons mills about until someone walks down the hallway and scares them away. In a recent piece that will premier at the deCordova Museum next month, we have expanded the analogy of carrier pigeons and networks. In this new work, visitors can release the pigeons and gain a new message, a message that has been edited by other visitors to the exhibition.

I want to show you another piece: a classical Indian dancer who is looking out from the wall, waiting for an audience. You walk in, sensors detect your presence, and the dancer starts to make up for you. In the meantime, the installation is communicating across the Web to people in India who are seeing something similar and are able to affect the background imagery. She finishes applying her make-up and begins to perform a dance of welcome for you. If you walk out at the middle of her performance, she gets angry and glares in the direction of the departing person, as rightly she should.

In another installation, called the "Cinemat," the input device is a special carpet which senses the coordinates of footsteps upon it, rather like an enormous graphics tablet where people's feet serve as the pen. This information is used to retrieve shots from a sizable database of movie and sound clips. We took this work to the Rotterdam International Film Festival, where it stood as an unattended kiosk in the lobby of a cinema. I was somewhat unhappy with it because most people did not seem to catch on to

the story we thought we were telling. People worked the machinery silently, clearly gaining some pleasure from it, but I didn't know whether they were really constructing a story in their heads.

Later, we took the Cinemat to Espacio '98 in Mexico City. To our surprise, our hosts had constructed a special theater for it, and every hour on the hour we had to put on a show for 100 people. And I said, how can you do interactive pieces in a theater? This is not known. But, I realized that one of the interns provided to assist us was excellent at telling stories and joking with the audience, so I made him the Master of Ceremonies and told him: take two people from the audience. One person will walk on the carpet, choosing images; the other person will verbally improvise a story for the audience based on the changing imagery. It was hilarious to watch people free-associating a story: her boyfriend just left her; she is gone to Paris; she has a dream about a fish; and on and on. And then an image wildly incongruous to the story being told would appear, the storyteller would falter, and the audience would erupt in laughter. The audience thought it was fabulous, of course, because you always like to laugh when something doesn't quite work. But we learned a lot from that about the idea of narration and how in a very distributed environment you could have narrators and actuators. So, we are starting to use this in some of our own work in digital storytelling for new media. One current project uses it in an entertainment system for automobile passengers who wish to while away the time during long journeys which are all too frequently accompanied by the frustration of the traffic jam.

Knowledge Curation

Can we push story further? Can we create a more compelling personalized experience out of bits and pieces that might be collected in a database around a particular subject? This challenge led us to consider how we might construct a Curator's Companion. When walking through a museum, how can a little wearable computer learn from your behavior such that it can orchestrate pieces of relevant information into a story for you? And more importantly, how can we take what you know about the art in the museum and use that as a context base for learning something new or perhaps helping to curate the story yourself?

The museum offers a good venue for our early explorations because currently available sensors will allow us to track a visitor through the spatially distributed story, to recognize whether and how the visitor follows the curator's ordered placement of artifacts, and to make some predictions about the visitor based on this information. The hardest problem will be to learn what the visitor already knows and to extend the curator's exhibition in ways that are engaging and relevant for the particular viewer.

Scenario: a tool for product development

So far, we have discussed stories that have emerged from and require new technologies for their delivery. In contrast, scenario needs no technology but can be very instrumental in developing radical new applications for industry today. Scenarios begin with imagined stories, stories about particular people in particular situations. These stories provide a way for designers and developers to critique a new product or product idea. Why do you need this product? How is it going to work in human life? The flip side of this scenario is observational ethnography which allows us to look at how a sample pool of people use technology. Ethnography is starting to become a much bigger deal again as corporations try to understand how digital technologies are being used and how they are affecting daily life around the world. What can we say about the people that use them? Why are certain designs popular other ones not? One of the places I am currently using scenarios is to imagine the future of entertainment in the car.

Conclusion

In conclusion, what can I communicate about e-society from my perspective as a storyteller? First, the connectivity of the network will change what we know as story form. Digital story forms will range from small-scale and intimate (such as stories you would share with a lover, or your children, or your grandchildren) to large-scale immersive extravaganzas (such as Disneyland). Characteristic of these new forms will be an audience which is connected to both the content stream and to each other.

Innovations in computational presentation engines, in sensor and display technologies will allow new forms to emerge. However,

these forms need makers and writers as well as technology. Strangely enough, writers are now the biggest bottleneck to the emergence of new form. In my experience, writers generally do not believe in multithreaded or reconfigurable, let alone distributed narratives. Writers are still comfortable with traditional single threaded story forms. If asked to work on something new, they are likely to say: "Well, we know how to write a book. You introduce the main character, have something happen to him, and build to a resolution." They simply do not believe in a more flexible form.

Currently I am collaborating with various broadcasters to develop a writers' method workshop for digital technology. The idea is to take writers and free their minds from traditional restrictions of beginning, middle and end story, to let them grasp what writing for interactive multimedia requires. The younger the talent, the better. Young people who are comfortable with computers and have played video games often have a very good feel what is possible in a computational story.

Digital life and its multiple technologies will generate new, fun stories. However, it is very important for the entertainment industry to realize that the game has changed. While stories have always been a way for the culture to learn about and define itself, today the major issues we need to learn about have to do with responsibility and personal choice. This is the extension of much of what we understand about a democratic society and is fundamental to the e-society. We no longer live in a world of the larger-than-life hero who does wonderful things; the world is not about being Superman; it is about making a difference in an ecological network of forces. This true for a 16 year old girl or boy who is facing a very complex world of adolescence. It is also true of somebody who has just had a great business idea and they are going to form the newest, hardest technology company at age 22. Beneath the surface, these are the same problems.

As we move forward into a world that is very risky economically -- not just because of the stock market -- entertainment will no longer be based on the goal of creating huge, mass-market "hits." Audiences of a thousand, or a hundred, or even three people will emerge and be rewardingly served. I think that this is a huge opportunity for the entertainment industry. It is also a very long road, and there will be many mistakes made along it.

Today, the manufacturers of content aren't interested in small audiences, and they don't want to risk the hundred elements, the hundred tries that it takes to get one big hit. A big hit is about the convergence of great talent, the culture being right, lots of things; only a fool would say, "this writer is great and this person is great and all of a sudden we are going to have a big hit." Often, test screenings and focus-group interviews are used to do a "quick fix" of defective cinematic products, but in this regard success is a fast-moving target. The culture right now is changing; it is becoming more global and interconnected. The technology is changing. The actual physical interface, the content, and the ways that we make, use, share, and re-purpose content are changing.

Having digital information, embedded transparently through out home, work place and public space, will result in changed consciousness. Design of these interfaces and systems will affect the health, security, and creative well-being of society. Access, participatory design, and embodied presence will be essential interface features that will promote story exchange on a large scale.

By democratization of access we mean, how do we make it easier for more people to get involved in Digital Life? Many people are immersed and function within sociable constructs. Particularly in less affluent, non literate societies, people will ask how does this technology improve my quality of life? Today, the expanding field of nano-technology appears to hold answers for digital technology that will be an order of magnitude cheaper than the current generation

For those of you who are communicators in the audience of the sort that broadcast magazines and so on, I offer this vision. The medium is the message. The content is your souvenir. We are trying to make new media that will deliver very exciting, personalized messages. Thank you.