



REALTIME FILE

AVS

Museums and the Web 2019

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>> Okay, good morning, everybody! Is everybody enjoying this gorgeous weather? Who would have thought New England would grace us with sunny days one after the other. Welcome! Welcome, everybody. My name is Nancy Proctor. And I am co-chair with Rick Cherry of MW19. I would like to welcome you to our community's 23rd annual North American Conference.

[Applause]

Now as some of you may know, and I have the museum to thank for helping me enlightening me on this. This is the ancestral community. And indigenous people from many nations live and work in this region today. I was very interested to discover that Massachusetts was also the first New England colony to enslave and trade in people captured from Africa. In 1638 the first enslaved Africans arrived from Barbados traded for Indians from New England. But following the ratification of the Massachusetts constitution in 1780, enslaved people were able to sue for their freedom successfully, although it was not formally abolished until the 13th amendment was ratified in 1865. I would also like you to join us in honoring the communities, the elders of the past, and the future, and the present. And our commitment to dismantle the ongoing legacies of settler colonialism in this country.

In addition to the team who helped with this acknowledgment, I would like to thank the entire local committee for whom we have to thank for introducing us to our keynote, whom I'll introduce in a moment. It's been a real thrill to be back in Boston. We were all proud of our ability to do hyperlinks.



As many of you know Museums and the Web began in 1997. And it was a time when just putting those two words "Museums" and "the web" in the same phrase was a radical gesture. And over the past 20 some years, we've found that what our community is interested in is much more than just museums and more than just the web. We're finally going to own our new name this year of Muse Web in the hopes that it continues to carry a nod to the past, but also speaks to the present and the future, which is as much as inspiration, the muses and creativity, as it is about the web and networking and our community.

Do check us out at our newly redesigned. We need to take it through the web grit. I would also like you to visit another new site that we've recently launched on inclusive digital interactives. This is a project collaboration between the Smithsonian and the center for institutional design here in Boston benchmarking best practices in the field of inclusive digital interactives. A number of our advisory committee members are here at the conference today, and when you visit the Muse Web booth in the exhibit hall, you'll have a chance to learn more about the project. We would love to hear from you.

I also want to thank and introduce the MW team on whom I've been leaning particularly hard. I've been a little under the weather. Rick Cherry, and my partner in life in MW. And on the left Hiroko, who keeps everything running so smoothly. They are supported enormously by Allison, who you see on the right here, who oversees a team of over volunteers who it takes to run this conference. Can I just ask the volunteer team to all stand up please? So you can recognize each other?

[Applause]

We couldn't do it without you. And I really couldn't do it without the woman on the left there, Heather Shelton. She'll probably kill me for putting her photo up. She is our social media manager for MW. But you see her in this photo with her other hat on as digital curator of our digital storytelling projects Be Here in collaboration with the Smithsonian. Please meet these folks and say hi. And also the incredible social media correspondents team that Heather recruited to help us out with communications. Erin Canning, who you probably met a couple years ago. She's been coming to our conference regularly. Kate Meyers Emery. Mia Loving, who is new to the conference this year. And Seema Rao. Please say hi. They'd be happy to share their work. Did you know that we have over 100 sessions over the five days? You, the authors and the presenters, are the real stars of the show. I would like to give you a round of applause for all your hard work in being here.

[Applause]

Of course, you'll be able to find all of the papers, as well as all of the papers from MW conferences going back to 1997 online at MuseWeb.net/papers. It's a free and open archive if you haven't discovered it already. And I would also like to point you to toward the GLAMi Awards. You'll get a chance to see a preview of all the finalists. The whole process has been under revision over the past few years and the incredible visionary leadership of Jane and Steven, supported by Kelsey from the Cleveland Museum of Art. I want to give them a big round of applause because they've reviewed hundreds of amazing things.



[Applause]

I would like to thank the Boston -- New England Aquarium for hosting our reception. Did everybody have a good time?

And related formats and platforms. (Audio cutting out)

The ICA with site gallery. And also in terms of how -- in space and time. And the MW arcade. An incredible number of people. Most interesting immersive and participatory artists. A.I. David London will be doing his performance about P.T. Barnum the traveling show and museum. There will be lots of art and creativity to inspire your practice.

Of course these meetings would not be possible without the support of our sponsors this year. I would like to thank in particular Microsoft who has been a friend of ours for a very long time, but this year has really been inspired to start a community of practice on A.I. And I'm sure you remember Katherine Divine from her years of the Museum of Natural History. So say hi to Katherine and get involved in this community. And our community of practices, and you might have seen one of these cards in your bags and envelopes, really are intended to continue the conversation even after the conference throughout the year. So in addition to the A.I. Community of Practice, we have one on immersive storytelling, which is headed up by Heather Shelton and Kelly. And we also introduced a new one on sustainable museums. So do join us for those conversations that will continue after this conference meeting in Boston.

I also want to thank Ticketure and Axiel and Piction. Crowd Riff, and Vimeo, and the Museum of Fine Arts.

And last, but not least, I want to thank Bright Cove, they've actually streaming this live keynote, which I find slightly terrifying. I don't want them to zoom in on my nose. We'll have remote participants who can enjoy live stream of our opening and closing keynotes. And we'll also have our lightning talks streaming.

And lastly, the ice cream. We want to thank them for helping to support that.

Now, I would like to introduce our keynote presenter for today, Professor Hiroshi Ishii.

Their goal is to invent new design media for artistic expression and for scientific analysis, taking advantage of the richness of senses and skills as developed through our lifetime of interaction with the physical world. Tangible Media has presented their vision of Tangible Bits and radical atoms a variety of venues emphasizing that the design of engaging and inspiring tangible interactions require the rigor of both scientific and artistic review. I think it really encapsulates what we're all here about today. The experience of engaging tangible interactions through live demo and interaction is hard to capture and replay globally. We're excited to have him here today to talk about his groundbreaking work in person. Thank you.

[Applause]



>> **HIROSHI ISHII:** Thank you for the kind introduction. Good morning. I love the name of “MuseWeb”. It's such a unique name. And also I love museums, because museums are the future. How do we keep all of our current great ideas and pieces for the future? It's something I really care a lot about. Today I would like to reflect on the importance of archiving in general, and also in the context of my research of human-computer interaction in the past quarter century.

So, remembering the future. The key idea is we have to learn from the past. That is fundamental and a very critical message. What we should really remember, what to memorize, is how we should recall this important information. This is a fundamental question. We have so many artifacts which tell stories about human history - ancient remains that tell the story of our ancestors. Also, the sad lessons we have to learn from those artifacts from the WWII.

I went to the Pearl Harbor Museum. This is a beautiful, amazing accomplishment to keep telling a story. Keep reminding people of what we should really think about.

I'm from Japan and remember the earthquake, tsunamis and the nuclear crisis in 2011 well. There are so many lessons we have to learn and keep talking about because people keep repeating the same mistakes again and again.

How to archive for the distant future is one of my interests. And I've been thinking a lot in the context of my research. So what do we archive? Why? For whom? How far in the distant future? For example, the internet may be a good means to archive, but the internet or humankind may be gone at some point. If you really think about the long-term future, we have to think about the new medium for the archiving. Also, how to tell the story is the key. The story is so important. So today I would like to experiment, telling a story of my research as an example. But how to archive the story or experience is quite an interesting challenge because it goes beyond that kind of stuff. The museum and library are separate. A library's focus is on books, while the museum focuses on artifacts. But it requires more to tell whole stories.

The nuclear crisis and tsunami made me think a lot. The company that owned the nuclear power plant stated the event was unprecedented. It's never happened. Nobody could anticipate these kind of things happen, but that's not true, because tsunamis hit the Tohoku area of Japan many, many times. Our ancestors built statutes stating not to build your home beyond this point, because tsunamis have affected areas in the high hills or mountains before, but the people today forgot and neglected the warning.

On Twitter, I'm following a lot of people as the bot. When I was thinking about 3-1-1, I got a message from Winston Churchill bot that said: “Those who fail to learn from history are doomed to repeat it.” That's a very profound message. So Tohoku area was hit by tsunamis and earthquakes many, many times, especially in 1866 and 1933.

My favorite poet, Kenji Miyazawa was born in 1896 and then died in 1933. He is a poet who grew up in the Tohoku area. And one of my most favorite poems is titled, “The last farewell” lamenting the death of his young sister, Toshiko. The poem I read when I was a university



student was in a printed book, 9-point font. I traveled a lot using youth hostels and by train and backpacking when I was young, but when I decided to move to MIT, I really wanted to visit his museum before my departure to U.S. And what I saw at Kenji Miyazawa museum was his original handwritten manuscripts. That's a totally different thing from the printed stuff because of the natural sense of the beauty of poems. "So before the day ends, you will be far away, my sister. Outside there's a sleet and it's oddly bright."

This poem really captures his struggle to get over his sadness. The beauty of the paper alone - if you stare at it, you can start hearing the sound of his fountain pen scratching the paper. I can start seeing his hands and body, which is gone, but I can envision, I can dream, because it's written by his body. The process really captures his struggle to bring his lament. So the process of his struggle is beautifully captured in this paper. But today, all are publishing on the web instead of printing, and they lose the sense of human touch. I never heard artists really complain about such lost information (trace of the body) or readers like me who complain. In seeing this kind of manuscript we have to really think about what is an important representation of the art or idea which inspires people. I think that's a process, not the final product. So let me show one of the pieces I did.

(music Bottles video played)

>> So this is a kind of genie bottle. If you open it, music comes out. I wanted to make this for my mom for her birthday. I wanted to make this blue bottle that tells her the weather forecast of the day when she wakes up and open it. (Birds chirping). Today is a fine day. So instead of checking the TV or radio, she can just open it and know the weather of that day. She passed away in 1998, that's why I created the music bottle as a tribute. Also, she was a calligraphy artist. And that's why I etched it on her tombstone.

(Audio cutting out)

10 years later, when Twitter became popular, I made a simple twitter bot of my mom, and let the bot tweet her poems. But all of a sudden the bot that tweets her poem brings me her memory. Now I feel so happy thinking of her.

In cyberspace for many, many years, if you have some engine to remind you to recall. That is a starting point to think about archiving. This is my tomb in the clouds. I have somebody editing my bot even after I'm gone. This bot keeps tweeting some popular tweets. That is a very small experiment. But you can think about it on a larger scale. Everybody can leave their traces in the cyberspace. With A.I. engines, you can really make people think of you and your accomplishments. So the code name of this project is called "Epitaph." Poems etched into the tombstones.

Today everybody is using so many different machines. Notebook computer, laptop, tablets, and smartphones. Dr. Mark Weiser envisioned this Ubiquitous Computing vision in the '90s. And he was also a mentor of my research. He encouraged me when my first paper on Tangible Bits submitted CHI '97 conference, and rescued it when it was on the brink of rejection. So I have dedicated my paper on music bottles as a tribute to him. Technology



should be in the lives of everyone. It shouldn't be noticeable, it should be natural. And Bottles is one instance to represent his vision of "invisible technology."

I'm very excited about MuseWeb. It's a very diverse community that focuses not only art museums and libraries, but also archaeologists, curators and artists. It's very important because we find opportunities for each of these mediums, as they all have different systems. Breaking down the barriers between the principles to create the new archetype - that's something I've been doing for 25 years. And it's important to note that science is about logical reasoning and analysis, and art articulates the questions about the world. We have to **"be artistic and analytic"** simultaneously. And we have to be **"poetic and pragmatic."** That's something we push here at the MIT Media Lab. Let me show you an example through the intersection of music and technology. Dr. Xiao Xiao, who graduated from my group, designed this mirror Fugue. She is both a pianist and a computer scientist. Let's play this video.

(Piano music)

You can see the keys are moving. Nobody is there, but you can imagine the presence of somebody pushing down the keys. Also, you're sitting in front of the piano opposite of a ghost, or reflection.

So imagine your grandma used to be a concert pianist. She did amazing concerts, but she has already left this world. One day she can come down to the piano to play with her grandchildren.

("twinkle, twinkle little star" on the piano) You can invite her to come down from heaven and play with you.

We do a lot of work for art and design museums as well as academic conferences.

Let me show you one of our pieces from Milan Design Week in 2014.

(Upbeat music)

This piece is called Transform, how to create new physical materials. Dynamic, physical, but computational. This is the antithesis of a picture on a 2D screen. You can touch, manipulate and hold with your body.

Design and technology also contribute to solve problems and find solutions. Science helps us understand the world, explain the world around us. And art encourages us to come up with new questions about the world. I think coming up with questions is something that we care about a lot.

Do you know the spiral stairs, do you know where it came from? Yes? The left side of the photo came from the spiral stairs of Sagrada Familia in Barcelona. They say the people built the Tower of Babel used to speak one unified language, but then it was disrupted. They lost



the common language. Now we are translating the ideas between these four dimensions in real-time, and building the new tower toward the sky.

Before MIT, I was in a telecommunications giant company where I designed a system to support people working together over a distance. Collaboration is very important across disciplines or over distance. So this is a drawing surface. Now you can see I'm drawing. Also you can see my gaze, my eyes moving frequently based on what I'm looking at. This is a medium to convey the gaze of remote participants in the context of a shared drawing. I love drawing. And I love to talk to people. How to integrate them together is one of my dreams.

In 1995, I moved to MIT, and started the Tangible Media Group. The web is great, being interactive is great, but fundamentally the representation of information is pixels. Then you understand visual imagery. Eyes are in charge, but hands are under-employed. It's obvious if you see kids playing with toys or clay or in a sandbox, hands are essential. So how to bring back the hands to the equation is one of my interests. So tangible and interactive, because embodiment is very important. And also, to inspire people there must be artistic components. Interactivity is also very important to engage people.

In a museum, it's very difficult to interact with an art piece or artist, because usually the artist is gone, and the art piece is so fragile or precious that you are not allowed to touch. How can you capture this interactivity is key. So to make it tangible is a goal to invent new tangible interactions that inspire and engage people.

So this orrery is an object that I'm sure you're very familiar with already. How many people have touched and rotated the handle? Usually you're not allowed to touch because it's such a precious thing. But people observed the sky and then came up with this model of the solar system. This interface is designed to grab with your hands. Once you grab, your body becomes a part of the solar system. The firing of neurons and muscles and movement is completely in sync. You have a complete understand the causality chain of the movement. When there is no coupling of our body, it makes it difficult to understand. You can understand what the teacher is pointing at. This is a beauty of real physical 3D representation. Current computer screens only provides a fake 3D, but no eye contact.

We take it very seriously. In the year 2000 we did our first big exhibition at NTT ICC, and we featured a bunch of Tangible Bits projects. We continued and moved to Linz, Austria in Europe. How many people went to Linz, Austria? The Ars Electronica Center in Linz is one of the Mecca of the media arts.

And they have an amazing collection of art works, which meets nicely with the spirit of the MuseWeb community. In this museum we have four-year exhibition called "Get in Touch" with those Tangible Bits projects to represent our ideas of embodiment and physicalities.

In 2016, Ars Electronica Festival picked up our new vision, "Radical Atoms" as an overall theme of the festival. 10-20,000 people, all working around the theme of Radical Atoms with nice subtitle: "The alchemists of our time". They use these materials to make art pieces for their artistic expression, communication, and design. I'm so happy that we could bring a bunch



of students to exhibit many of the pieces which I'm going to show, like biologic. The best part is bringing the students and having them work together for installation and exhibition. We learn so much because the museum attract so many different people, especially in Europe. It's good. Very philosophical. So this is all the stuff. This exhibition was extended two times, and these are the latest pieces. If you have any interest going to this museum, please think of how our descendants in 100 years can experience even 1% of these current experiences. This is one of my big questions.

My research is a battle against the "pixel empire." On the left side you see the graphical interface. Today still everything is GUI and pixel. Under the water you can see the pixels, but you can't touch them because your arm doesn't reach the bottom of the water. Usually physical materials are frozen. It doesn't dance. It doesn't change into anything. It's kind of passive. I want the material to dance. So that's Radical Atoms. We always think ~~about how~~ the vision is very important. The reason is technology gets obsolete within one year. You're using an amazing smartphone, but you never keep using the same hardware, same model in three years. You trash it because obsolescence is already embedded in the design. The users' needs keep changing. We love music, but we don't use CDs anymore. The vision doesn't change. It keeps shining light. So that is something I started to think about what is an interesting vision.

Let me show a piece "I/O brush."

(Music)

How many of you paint watercolor or oil? Not so many. How many of you have kids who do amazing painting? More of you. So painting is very, very important. Drawing is very, very important. It's an important medium to get us thinking. Imagine, think, and draw are all together. Our hope is in the next era artists and painters will paint using their own ink and pigments. Emotional attachment is totally different.

So to make your own pigments, you may go to the seashore to pick up the shells of the color you want and then make your own pigment. Now this color has a story.

You can see the origin, where this color came from. We usually don't think where this tomato came from when we eat. How many farmers took care of it? You just consume. We don't think about upstream and downstream of the supply chain. But it's very interesting to think

about the past stream from where it came from and where it goes. The most creative minds interpret this medium beyond capturing origin or history.

If you're an artist or designer, a mom or dad, you know this is a very important moment. This is the best moment for interaction designers or researchers. She didn't listen to what I said. She just interpreted it in a new way. She is very proud of that invention. And the inventor of I/O brush, Dr. Kimiko Ryokai is a professor at the University of California, Berkeley. Once you use the I/O brush you start seeing the world differently. You're already wearing invisible eyeglasses. If you see color leaves in New Hampshire you can't stop dreaming about



the painting you can make using those color palette. That is the inspiration I want to give to my kids, students, and our descendants.

Dr. John Underkoffler invented this piece called "Up." You can put a building on a table that casts a shadow. It's a digital shadow. Now you can explore the building's tangible shadow, so you can actually grasp and move it to explore the conditions of the shadow. Also, you can control the position of the sunlight. This is actually a 22-year-old piece.

We made a landscape design tool called Sandscape, so when you sculpt in the sandbox, the change of shape is captured in real time, and the computer then casts the distant shadow about elevation or water drainage. When you have heavy rain ultimately showing how erosion happens. How much sunlight there is, and what kind of plant or tree can survive in these conditions? So this is a combination of the right side of the brain for being creative and the left side for being analytic. How can we combine both?

A sand castle, once it's destroyed you can't restore. Same as our life. That's why we created Radical Atoms to think about the material with kinetic memory. We invented a new representation of materials and also how to interact and collaborate with these media. This is a project Timescape. You can imagine the mountain building histories. You can explore the process in both a physical and graphical way. So rendering does not only mean to paint as a pixel on a 2D screen, but from now on the rendering can mean both physical embodiments with a digital shadow which can manipulate with our hands.

Our team did this inFORM project. Let me show the beginning of the clip.

(Music)

How many people saw this video? Oh, good. So being here and there is the dream. You're in Boston, but you may miss your home and your family. How can you be here and there is one of the examples of tangible telepresence. You can do lots of interesting things for design and communications. This project became very popular and it went to the Cooper Hewitt Design Museum in New York in 2015 and it's been on exhibition at Ars Electronica Center since 2016 till this summer 2019. So many people came and are excited about being here and also being there, manipulating the number of physical objects because that inspired them to think about the body, its presence, and communications.

We know what's interesting about new expressions. Don't ask me why. This is an art. If you enjoy it that's great. So anyway, we combined the three inFORM engines to make the TRANSFORM that I showed in the beginning. People put a lot of imagination into abstract dancing atoms. So the red ball represents all the materials. The coffee cup is frozen. It can't be anything but a coffee cup. White pins are dynamic and computational materials. The white pins can dance, but they're not really communicating with red balls at a deep level. That also represents inter-material interactions.

The TRANSFORM is like a white canvas and paintbrush and ink that were just invented and are waiting for Picasso. Would you like to be the first artist of this new medium? That is a



question I ask young artists and designers all over the world. This is a story of TRANSFORM. I also mentioned collision is very important. Design at the border between the stillness and the motion. This was born on the border and the collision between bits and atoms. It is also nice to work with all the great students and travel to Milan together. Now they are all professors at the University of Colorado, Stanford, and Israel. It's nice to see these former students go to the next level.

Also many people say that it's too artistic. So what? They want to see the potential practical value. What can they do for my business tomorrow. So my students created this video to describe the scenario of the near future. Now your table is frozen, but it can be a dynamic display and you can do many creative things. It's a bit scary. To come up with better ideas on what's kind of interesting stuff you can do with these new materials, this video is stimulating the discourse and conversation. It's just a demonstration of the future.

So now you can get an idea that video prototyping is very important to stimulate people to think about the future. So there is a lot of interesting stuff.

We came up with a project called the bioLotic using natto bacteria as a means of sensors and actuators.

So if you look at the image, there are millions of living bacteria in this garment. They also work as actuators to control ventilations. So we are lucky that we are at MIT so we have access to really great bio-chemical engineering researchers and facility.

Also, using a microscope, you can see the performance of the shape change of the bacteria. So we can use this data to calculate how to put an accurate amount of bacteria to the garment fabric. So we created the bioprinters in 2014 to put the solution to the target. So this is a fashion design by Oksana who joined my team from RCA. And she designed this beautiful garment. So please take a look. This is her heat map and sweat map. Each dancer has a different performance. So measuring her heat map and wet map, then compute optimized air flow. This is a simulation. And then once you understand desirable air flow, then we can determine how much bacteria we should put on each portion of the back. Then how to inspire people is very important. It's empowered by natural bacteria for ventilation.

So Bio is a new interface, is our message. To convey this message, we did this exhibition in 2015 to celebrate the 30th anniversary of the Media Lab. So this is bioLogic changing its shape based on the steam. So this is the bioprinter. These are bacteria nature grew in the lab. And this is a symbol of a human wearing biologic skin. People wear new skin that breathes. Of course no battery, no computers. But it's beautiful. The most beautiful components are the people who dance wearing this garment. Then a glass of champagne. Perfect combination. Also, the dancers told us they can feel the flow of the air changing. They felt as if they are dancing with bacteria. It's metaphorical, but I like these comments. This bioLogic project got a lot of nice awards. Now Dr. Lining Yao who led this bioLogic project is a professor at Carnegie Mellon University.



To envision & embody the future, you have to know technology and science. But also you have to speak the art to inspire people otherwise people forget and don't care. I think that is very critical for envision and also inspire. For embody, definitely design and science technology is critical. That means we need all these kind of perspectives.

People observed the universe with naked eye in the beginning, but people invented the telescope which allows people to see the world in an accurate way. Then the Hubble Telescope allows "our eye" decoupled from earth, and to fly to the deep space and look back. Now you can see the totally different world.

And also Voyager. Voyager went to far away. It brought back an amazing view of the universe and the earth. I think the problem is people can only see the world from their own perspective. Our challenge is how to enhance, expand, and escape. I think point of view is important. We have to have holistic view. Everything is changing. Internet, autonomous vehicle. But what are the most important things we should focus using the rest of our life?

So to summarize, our technology and design inspires us is an important key engine.

I would like to thank you for this amazing conference and listening to my talk. I appreciate. I have a plan to go to different place soon, and also all together in 2100. I tell my students, what do you want to pass onto those living in 2200? How do you want to be remembered? What do you want your legacy to be? If you keep thinking every day you understand what is the most important things we have to do now to leave something for the future. So 2200 is the symbol of far future. The future is never ending. And that is the future which we are responsible for as a designer, educator, archivist, or curators. And also technology soon becomes obsolete. But true vision is everlasting. So this concludes my talk. Thank you very much for your time and attention.

[Applause]

So questions?

Also, if you're shy, please tweet or send me a Facebook message. I want to hear your feedback. So Twitter accounts, also Facebook address are here. Or you can take any photos to distribute. Also, I did appreciate streaming. That is great to make it open. So any comments or questions or critiques?

>> I have to come to the mic to say this since I have so little voice left. There are two microphones in the middle of the room. Please avail yourselves of them. We have at least 15 minutes for Q&A and then we'll have coffee after that. But feel free to continue the conversation offline, as well.

I guess I would just like to ask looking forward to a couple other plenary sessions we'll be having tomorrow and then on Saturday, Professor, when you're observing -- and looking at the future across platforms into distant future generations, do you also think about what is lost in that translation across media and platforms into the future? My question is inspired here by



the work of someone who will be speaking with us tomorrow evening. And he recently published a podcast called "Disappearing." What gets lost when we kind of clean up sound digitally and we lose the white noise and we lose some of these analog artifacts. Is that also part of your project to preserve white noise and transmit that to future generations, as well?

>> HIROSHI ISHII: I think what we lost is very important questions. I already showed a few examples. But poems I read when I was a university student was printed book for mass production, which already lost all of the traces of the body and also the struggle of the artist. Another example is the orrery. When people learn astronomy I'm sure they have a nice YouTube video or computer model that you can control using mouse. No embodied and engaging interactions.

But we seldom heard the question about what we've lost for exchange for standardization and mass production? What has to be restored? What should we really archive? I don't have any answers to those questions.

They have a different understanding. So we have to invent some new environment or medium which comes a bit closer to those kind of inspiring moments. So I hope I can continue to think and ~~also continue to interact~~ with this amazing community.

>> I'm Claire and I have a more prosaic question. On the table where you write and you're writing with somebody else, how does the mirror image work? Do you flip it the correct way and does that mess people up?

>> The table.

>> Yes, the big board that you write on.

>> HIROSHI ISHII: We flipped the video, but people didn't notice because our faces are usually symmetric. Only if you wear "I love MIT" T-shirt, they notice the mirror-reversing of the video. So this is an idea we invented 30 years ago, but it works beautifully. So please believe me. Also the patent expired. So you can implement this one to sell.

How to present. It's another important feature we lost. You make a Skype call, but you have no idea where your partner is looking at in the shared document. Seamless media is our vision of the design.

>> Thank you.

>> You talked a lot about creation of interest in mixed media experiences. I'm going to put a point on it, which is do you have examples where you used modern technological approaches to preserve and archive -- lost art. In my own life, I was confronted with this idea to put up a camera and you film dance. So you have to create almost a new art form to capture, you know, cross media archiving of things. I just want good examples of really smart people who are trying to truly archive existing well known sort of art.



>> HIROSHI ISHII: I think it's really important questions. First of all nobody can perfectly capture anything. You may recall some of the phrase or image but you might be very busy and you forget. But at a certain point of the moment, if you see something that brings back the memory from your brain. I think it's a powerful medium. And this can bring back so many memories. So using the technology is a long way. But there is a limitation.

Also forgetting is beauty. Certain painful memories we shouldn't forget like a nuclear power plant melt down, or a nuclear bomb, for example. What we forgot and what should be forgotten. Any other comments?

I'm here also through this afternoon. So if you can grab me and give me any feedback.

>> I was very moved by some of your examples like the mirrorFugue piano.

>> Thank you. That's good.

>> And I would love to see them actually out in the world in some way. Do you have any plans for making technology which is already historic more available? And the second question is, most of the things we saw today were things that were embodied. But what about knowledge space? In the development of multimedia, how do you recommend preserving the essence of past -- when these experience spaces are no longer available to us.

>> Okay. That's also a very good question. And the first question is crossing the river to MIT Media Labs, many pieces are still running. For example, you can see the music Bottles singing. So if you have an interesting chance visiting MIT is one good case. But also we are very active to show in exhibitions.

Please think about MIT. MIT is close. I wish I could study at MIT when I was younger, but I grew up in Japan. I came to MIT when I was 39 years old. It was too late. But if you grow up in that kind of environment, you can keep inventing things like the eye brush and seeing children's eyes light up in amazement. These boys and girls could be your sons or daughters.

Thank you very much! Thank you.

[Applause]