

DX Arts Commencement Address, Roger Malina, June 2008

Greetings and congratulations !

Congratulations to you, the students receiving their diplomas from the DX Arts program.

But congratulations also to you the parents and grand parents who supported their children as they embarked on a strange and passionate journey that connects the arts and sciences and the arts and new technologies today.

Congratulations also to the founders, faculty and staff of the DX Arts program and a university with a vision to create the conditions for the emergence of the New Leonardos.

You the parents and the university are indeed the New Medicis.

It is a pleasure and honor for me to address you today on this special day of transition, a day of looking back and of looking forward.

Today I feel the joy of making contact with new colleagues on the same song line as mine that criss crosses this planet.

A song line that connects the migrants from Africa that built the first cities in Mesopotamia, to the Avatars trying to invent a new kind of reality in Second Life.

That connects researchers and artists building sustainable systems in small towns of Brazil, to artists working in nanotechnology laboratories in the old dying industrial towns of northern Spain.

That connects a poor Columbian youth trying to get access to the internet in his dilapidated town library to the Japanese astronaut blogging overhead, awed by his act of balancing between earth and sky.

In this commencement speech, as is the tradition, I want to tell you a few stories.

These stories will illustrate some ideas that I am currently passionate about and that I have distilled from my encounters with friends and colleagues,

Friends and colleagues on the strange song line that connects artists and scientist , a song line that in our western societies we often associate with the emblematic figure of Leonardo Da Vinci.

REDESIGNING THE WORLD

My first passion is about the need to find new ways to train and encourage those among us that are dedicated to redesigning the world.

In particular the new professionals like you here that are using the arts to help us find new ways to think and do science and technology.

I think we desperately need to develop an new kind of intimate science, a micro science that is to the national science foundation what micro credit is to the world bank.

As we begin to fully understand the impact that we are having on our planet as a species, the triggering of climate change, the stress on our water systems , the impact of our industrial pollution on our eco systems, we know that we must assume our responsibilities not only on the scale of our communities but also find ways of assuming our planetary responsibilities.

In the 1970s at the height of the cold war and technological competition two California artists , Kit Galloway and Sherrie Rabinowicz launched the challenge :

“ We must create on the same scale as we can destroy”.

Kit and Sherrie were early pioneers in planetary networking, using primitive connections that were part of the cultural drive that became the internet.

They felt that if we could destroy the planet on a large scale, one response of artists was to knit a web of connections on a planetary scale to open artistic canvasses that spanned the globe.

With others in the art and technology community, from Buckminster Fuller and Roy Ascott among others saw the growing planetary connection systems new way to experience the world which needed to create aesthetic visions.

Now forty years later, we are indeed creating on the same scale as we can destroy= and artists like you receiving their diplomas today are working with scientists from Antarctica to the micro terrain of proteins and viruses, from projects for tourism on the moon to new ways of imagining how alternative energy sources change the way we see the world.

We are destroying species of life an accelerating rate, destabilizing the web of life. How as artists can you create on the scale that we can destroy in the Seattle eco systems ?

Nano technologists and genetic engineers are building structures and devices from the atom and molecules up, developing systems that both threaten and promise. How can you create art on the same scale as DNA ?

These are not simple questions and force artists to play roles that they have not often played before, to learn skills that are at the limits of the new technologies. And providing schools and teaching for the new Leonardos in this context is a daunting task.

In recent travels I have visited some of the new programs in India, for instance the Shristi School in Bangalore, which houses both a slum school and a Nokia R and D lab. There are saw artists projects on the disastrous condition of the water table under the city.

Recently I visited the Human Project in Sergipe Brazil, where a new science and art institute is working with barefoot artists developing cell phones as artistic platforms that also serve rural health needs, imagining new forms of eco tourism but also how to build sustainable economies in a small town where 90 % of the young people move to the nearby city.

I am resolutely optimistic that a new community of practice is emerging planet wide, and can tell the new graduates of the program that you are not alone, but that a generation is at work coupling the arts and sciences as different systems of knowing.

I encourage you to work with your colleagues both locally but also to reach out to colleagues in North Africa and the Middle East, South America and Asia. You must know the world and you cannot do this only from a computer keyboard.

LIMITS TO UNDERSTANDING

I have a second obsession. As we go about addressing the burning issues of our times, such as genetic engineering or sustainable development, we need to be at the same time humble at the limits of our understanding.

I am trained as a physicist and an instrument builder, and work as an astrophysicist. I work in a field called observational cosmology which seeks to study the universe on its largest scales and understand its evolution, understand the forces and mechanisms that lead to the formation matter, and of stars and galaxies.

Astronomy is one of the oldest sciences but it is currently undergoing several major revolutions that reveal the limits of our understanding in spite of thousands of years of astronomers studying the sky.

One of the major discoveries in astronomy of the last decade is that we, the kind of matter that we are made of, we are the aliens in our own universe.

We now believe that most of the matter in the sky is not made of baryonic matter (such as atoms and molecules) like our earth or like us, but is made of some other kind of matter, a dark matter that doesn't emit light, but is so pervasive that it is this dark matter that really determines how structure forms and evolves in the sky.

We don't know what this dark matter is made of, almost nothing about its physics. It is somewhat humbling to realize that in a sense for all the history of astronomy we have been studying the decoration in the universe.

A connected discovery is that we don't seem to understand how gravity works on the largest scales in the universe. We understand gravity on our earth, and indeed in our solar system. We can build machines that work in our homes and on the planet Mars, but on the largest scale gravity seems to work in a different way. There seems to be a kind of antigravity at work that causes matter to be repelled, as if you threw up a ball out into the universe and instead of falling back down it accelerated away.

The third revolution in astronomy is the discovery of planets around other stars. Over the past twenty years about three hundred planets have been discovered around other stars.

For all of human history we have studied the few planets in our own solar system, and indeed built up whole mythologies and religions, astrological systems of knowledge based on the small and few planets around our own sun.

What new mythologies, what new cultural frameworks will you create to understand our place anew among the hundreds of new planets we are discovering ?

We now have hundreds new worlds to study. We don't understand how they form, we don't understand what the conditions are for the emergence of life, and we have no idea whether life forms of different kinds have evolved in different places all over the universe, or whether we are an amazing exception made possible by the special conditions and history of earth.

Why is astronomy going through such major revolutions today? And I think similar situations exist in the cognitive sciences, and the biological sciences ?

It is for the simple fact that we have been able to change the human senses and thus alter the human mind.

There is a Chilean thinker, Humberto Maturana, who has written a great deal about complex systems and how they self organize. One of the things that he has emphasized is captured in the sentence;

“All Knowledge is conditioned by the structure of the knower”

He states the simple truth that to know something new you have to either change your internal structure, change your connections to the world or both.

For millennia we relied on touch, taste, smell hearing and sight provided by our senses.

We now realize that these senses rather than being windows on the world, are complex filtering systems that prevent us from knowing or having experience with most of the world that we inhabit. Our senses are designed to exclude all the world, except a little information we need to meet and breed.

Both artists and scientists are frustrated by the deep sense that there is more to the world that we can see. And in a way both artists and scientists seek to overcome the limitations of their senses to perceive, to be in contact with, to make sense of the bigger picture.

One way that we do this is by inventing new instruments that can access the world in different ways, and this results in changing the way we think and what we can know and who we are.

Our new instruments augment our senses, by increasing their range and sensitivity. For instance we can now hear at a distance using cell phones.

Our new instruments extend our senses by opening up our mind to other forms of light in the universe that our bodies are blind to. For instance with x ray microscopes we can study the internal structure of our bodies so that we are not limited to the surfaces of things .

Thirdly we have developed new kinds of senses that allow us to sense the world with forms of energy that our bodies just cant sense.

For instance with force field microscopes that sense electric fields, nano scientists can now navigate the world on the scale of atoms and form representations of nano landscapes, scales that are even smaller than the size of light particles.

These augmented senses, extended and new senses, are in a way leading to a new form of sensuality that we are only just beginning to develop.

And sensuality is the home ground of artists.

In the new worlds revealed by our new senses, the limits to our understanding are incredible. We don't even know how to imagine these worlds, to describe them. Words fail us. Things happen that just seem impossible from our daily experience.

So much of our knowledge of the world now comes through these new senses, mediated by technological instruments, that I believe that we are in the middle of a cultural revolution as profound as the one that took place during the Renaissance in northern Italy.

I am an instrument builder. And I like to point out that every instrument that I have built hallucinates. That is my instruments see things that on further testing prove to be things imagined by the machine.

I also hallucinate. I am a sleep walker and have a very active nightlife, or so my wife tells me. Sometimes I will sit up in the middle of the night thinking there is someone in our bedroom. I turn to my wife and ask her what is going on. She says go back to sleep Roger, you are dreaming.

But how do I hold this conversation with a machine that is hallucinating. We don't share the same reality, and it is sometimes difficult for us to agree on what is real and what is imagined.

The first scientific measurements of carbon dioxide in the atmosphere and the predictions of climate change were published by Arrhenius in 1896 over 110 years ago. If you back and read his paper, he described the coming climate change due to the greenhouse effect.

For 40 years we have been measuring in great deal, thanks to Keeling and others, the slow but steady increase in CO₂ concentration.

Almost all of the data on climate change has been available through instruments for decades, but the reality perceived by our instruments has been denied by us and our political leaders. Not until the glaciers began to melt did it become real.

We need artists to create an intimate science, to seize the instruments we create and create a sensuality that connects us to the world in new ways.

INTIMATE SCIENCE

My grandfather JJ Duckworth lived in the north of England, a region known for its changeable weather. In the morning after breakfast I would watch him leave the house and as he went through the hallway he would tap the barometer on the glass, and instinctively either pick up his umbrella or not as he knew whether it was going to rain or not.

How do we build this sense of intimacy with all the innumerable instruments that now connect us to the world around us, and on whose interpretation will depend on for our survival.

It seems to me that we need to rethink how science is done in our communities, we need an intimate science that allows us to build our instincts and intuitions and ways of thinking about the complex world we are living in. I think this is a project for artists as well as scientists.

In developing countries the microcredit movement has made possible economic development that could just not be carried out by large banking institutions. I think we need a similar movement of micro science that embeds since at all scales and locations of society.

There are many examples of this new intimate science, through systems such as BOINC and Innocentive.

Earlier this week I was in the city of San Jose where they have a large public art project to build a Climate Clock. As we reviewed the various art proposals we had a growing understanding of how even small cities now need town scientists, and that the system of science that we have now is just not going to be responsive to the emerging social needs.

How do we give people control of the information on their own environment. There are amazing artists projects that are beginning to do this.

Cezanne

I live in southern France in the hometown of a french artist called Paul Cezanne. Paul Cezanne was a landscape painter who worked in the 1880s.

As a youth he skinny dipped in the small stream by our home where our children played.

Cezanne used to go out every day with his easel and paint not what he saw, but trying to paint what his senses received. He tried to overcome the way his mind imposed certain ways of looking at the world.

He realized that the act of painting was not only an act of description or illustration, but above all a mental act that taught the mind to think in different ways.

Paul Cezanne by all measures was a genius in the art of landscape painting. In retrospect his artistic act helped trigger a cultural transformation that we now call Modernism, and shaped the way that we redesigned the world in the twentieth century.

We all know the work of landscape artists and their role in the exploration of the American West, the way they helped build the imaginary that carried generations of migrants to this shore of the Pacific.

One challenge then to the new artists graduating artists from the DX Arts program is to help us make possible the artists that will be recognized as Climate Artist fifty years from now.

We don't know what a climate artist does, what kind of art work they will make. But we know that the things we will have to do in our communities to confront the problems of climate change are not just the work of politicians and businessmen and scientists, but also of artists like you.

When Leonardo Da Vinci and his colleagues in Florence studied nature, developed new ways of perspective drawing and representation they helped change the whole way that people viewed their relationship to their environment, their communities and their social world.

The new climate artists need to help us build our intuitions, our ways of looking at and living in the world in ways that will be sustainable and in a different kind of balance.

We are just at the beginning of climate science, only just beginning to form our understandings and our intuitions, our descriptive systems and vocabularies.

There are many reasons for art science collaboration, but I believe that the work of artists working with scientists and engineers , that this is part of the tool kit we are going to need to survive the decades ahead.

THE NEW LEONARDOS

I work as an astronomer by day, and by night I work in the art world. I help run an organization called Leonardo, an organization which for forty years has promoted the collaboration of artists and scientists and of artists and engineers.

When Leonardo was founded by my father in Paris France in 1967, you could take all the artists in the world who had ever used a computer and fit them into this gallery.

Forty years later, we have whole industries based upon the use of computers to manipulate sound and images. Who would have thought it ?

Of course not all technologies prove to be fertile for art making.

One day I was driving through the town of Manchester in the North of England, one of the capitals of the industrial revolution. I happened to see a building with the name “Institute of Art and Technology’ dated 1882.

In excitement I stopped to visit the building. The plaque proudly proclaimed it as the center for the use of linoleum in the arts.

Linoleum art did not change our way of seeing and being in the world in the way that Cezanne or Leonardo Da Vinci did. And the same can be said for the steam engine art movement and the fax art movement.

But until artists appropriate new technologies we don’t know how that appropriation will change the way we sense and feel the world, what new intuitions they will trigger. Or in Maturana’s way, how that new connection to the world will change our minds and what they can know.

Yesterday as Shawn Brixsey walked me around the DX Arts facilities I was struck by the different kinds of equipment available to manipulate wood and metal, sound and images and movement.

As we look at the art works in this gallery, I can see a confidence and willingness to appropriate any technology any device which the artist feels is useful for their art making.

This sense of experimentation, trial and error is what Leonardo Da Vinci was all about as he moved from developing new kinds of paint application, to the design of water canals and instruments.

The Leonardo organization that I mentioned before was founded in Paris in the 1960s by a generation of artists and scientists traumatized by the second world war, and they were

determined to connect the arts and sciences in new ways to help build a saner world. We face similar burning issues today.

Over the forty years of our organization we have published, in our books and journals at MIT Press, the world of many artists and scientists who have collaborated, individuals with hybrid art and technology careers or artists invested in science.

As part of our fortieth anniversary we did a head count, and discovered that we had published of almost six thousand artists and scientists. If you took these people, with their spouses and children, you would have a small town of twenty five thousand people.

This is a larger creative community than fueled the Renaissance in Italy five hundred years ago.

The New Leonardos are alive and at work today.

They are artists who also patent technical inventions.

They are teams of artists working with scientists on ways of understanding complex data.

They are individuals with hybrid careers that are misfits in the structure of our universities.

They are engineers working in the basements IT companies of Seattle helping create the new sensuality that we need to expand the limits of our understanding in on line social networks and virtual spaces.

You the New Leonardos are above all born digital. And you will use any technology they can get your hands on to describe what you feel and see, to make meaning of their world. For the first time a very long time we find the same tools in the artists studio and the scientists lab. This means we share ontologies and epistemologies again.

I believe that the work of these New Leonardos is not only to use the new technologies to make art, but beyond this to work with scientists and engineers to change the way that science and engineering are done in our communities. To create an intimate science and a micro science that is a peoples science.

Pioneering telematic artist Roy Ascott has coined the aphorism

“Ask not what Science can do for Art,
but rather ask what the Arts can do for Science”.

If we are to redesign the world to survive, if we are to expand the limits of our understanding to confront complex phenomena like climate change, this is the work of artists working with scientists and engineers.

Two examples

I would like to close with two examples.

My father Frank Malina was a research engineer. He was born in a small farming community in Texas, son of two Czech immigrants. His parents had come to Texas in the 1880s from the Czech republic, fleeing the misery of central Europe of the time.

My grandfather was butcher and played in the Houston Symphony orchestra when Houston was still a cow town.

My father attended Texas A and M college and obtained a degree in mechanical engineering as well as played the bugle..

He went on to the California Institute of Technology where his Ph D advisor was the applied mathematician and aeronautical engineer Theodore Von Karman.

My father was obsessed by the idea of traveling into space, to the moon and beyond. He had read the science fiction novels of Jules Verne in Czech and it had fired his imagination. In one of his college essays he quoted Jules Verne's famous saying that :

“ What one person can Imagine, another can Invent”.

Do not underestimate the power of art !

My father went on to do the first PhD thesis in America on rocket propulsion. With his Ph D advisor, they founded the Jet Propulsion Laboratory, JPL now run for NASA, and my father was its first Director.

JPL of course was responsible for Explorer 1, the first successful american satellite and the martian rover that is digging up martian ice today as we speak.

When he started working no one would fund rocket research. His fellow students, who were all going into the new start ups in aeronautics, told him he was in a dead end thesis. Little did they know that ten years later he would help start up an aerospace company, Aerojet General that still builds rockets today.

I found in his archives a film script that he shopped around Hollywood to raise funds. His first funds came in a brown paper bag from an artist friend of his who was a photographer and recorded their initial experiments.

After the War, my father quit the rocket business and moved to Paris to help the reconstruction effort of Europe. He helped set up UNESCO , the united nations educational, scientific and cultural organization in 1947.

In the early 1950s he lost his passport and his job during the Macarthy years, and turned to working as a professional artist in Paris.

One day he came home from art school disgusted with his art teachers. He was tired to imitating Cezanne, of painting apples, and dead fish.

He used to say that there is more science and technology in my kitchen than in all the art museums of Paris.

I might note that this is still true today as we eat genetically modified foods and the computers in kitchen appliances talk to each other.

He started trying to build installations and constructions that used electric lights and motors but gave up when his wooden constructions would burst into flames.

One of my earliest memories as a child was one Christmas. The year that Christmas tree lights had just become available, and our Christmas tree was wrapped in a garland of blinking Christmas tree lights. My father had a eureka moment realizing that this was the technical solution to his art problem. To my brother and my dismay he took down the Christmas tree early, ripped out the string of lights and installed it in his art contraption.

He went on to create some of the first interactive art works where lights would respond to ambient sound.

My father became a founder of the kinetic art movement in Paris in 1950, using electricital devices in his art making. He filed patents for art systems.

He tried to imagine the new world that integrated everything he knew and felt not only through his own senses but through all the scientific instruments of his time; he started a company to try and commercialise his inventions.

But above all, he tried to develop a new sensuality that would allow him to invent what he could imagine, claiming for the artists all the landscapes now accessible through scientific instruments and not just those accessible to the naked senses.

SECOND EXAMPLE

My second example is the work of sound artist David Dunn and Complexity Scientist James Crutchfield.

David is a sound artist, his compositional practice is to go out into the world and record things his ears cannot hear and then use this sound material in his musical compositions.

He has a well know musical piece based on the sounds recorded on the bottom of a lake, the sound of fish and shrimp and bottom feeding insects.

David was doing sound recordings in the Arizona forest where he lives. One day he asked himself the simple question

“What sound does a tree make as it grows”

There were no established tools to listen to the sound of trees growing. So he developed a kind of ultrasound microphone that could.

Indeed he discovered that trees do make sounds as they grow, and that dying trees or water starved trees make particularly interesting sounds as the cells in the cellulose collapse.

Working with scientist James Crutchfield at the Santa Fe Institute they discovered that the bark beetle that attacks the dying trees are in fact sensitive to those frequencies of ultrasound.

They are convinced that one of the mechanisms that accelerates forest decay and forest fires is the acoustic ecology of bark beetles attacking dying trees attracted by the sound of trees growing.

If you go to David’s web site you can listen to his musical compositions based the sound of trees growing and interacting with insects in the forest .

If you go to Jim Crutchfields web site you will find the scientific papers they are writing together trying to demonstrate that this new kind of acoustic ecology is an important element in understanding the impact of climate change on the forests of North America.

I don’t know if David Dunn and James Crutchfield are Climate Artists, but I think they are feeling the right questions.

CONCLUSION

We face many burning issues in our societies today.

I am convinced that the work of the New Leonardos graduating from DX Arts today are part of a cultural movement that is part of the tool kit for our survival.

You will help us redesign the world, knowing the limits of our actions.

You will expand the limits of our understanding by helping us build new intuitions and new sensualities.

You will help us change the way that science and technology is done in our communities.

So congratulations to you.

I look forward to meeting you on the song line.