

Read-Write Material Culture

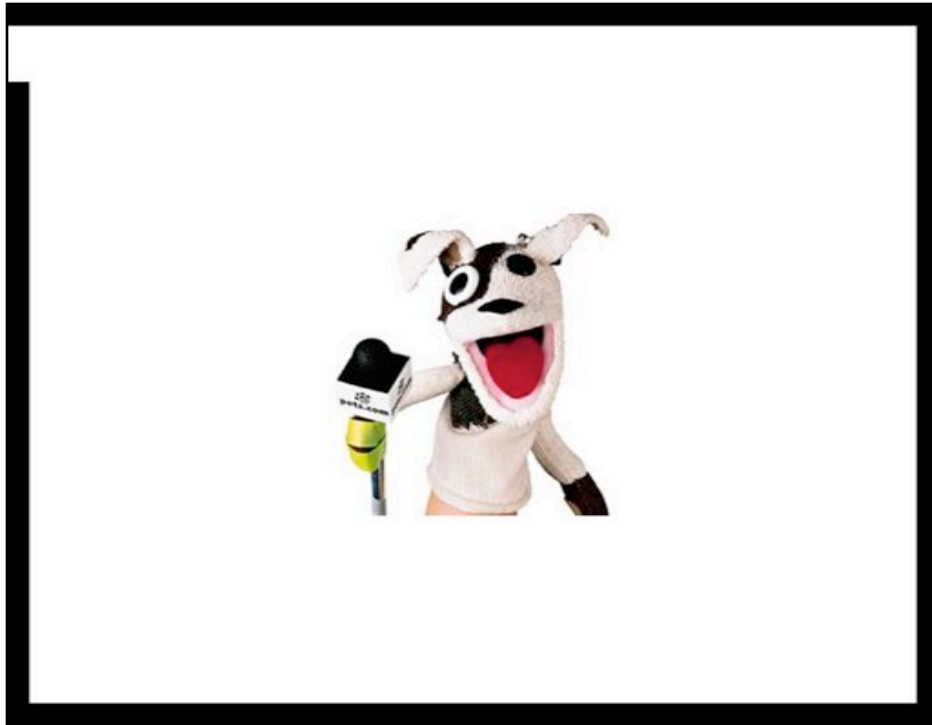
Mike Kuniavsky
Sketching in Hardware
July 17, 2009

Good afternoon! Welcome back from lunch.



Most of you know me, but let me tell you a tiny bit about myself. I'm a user experience researcher and designer. I spend much of my time thinking about how technologies and people affect each other from social, economic, historical and technological perspectives, and how the technological side of that relationship can be made better, or at least more interesting, for the human side of it.

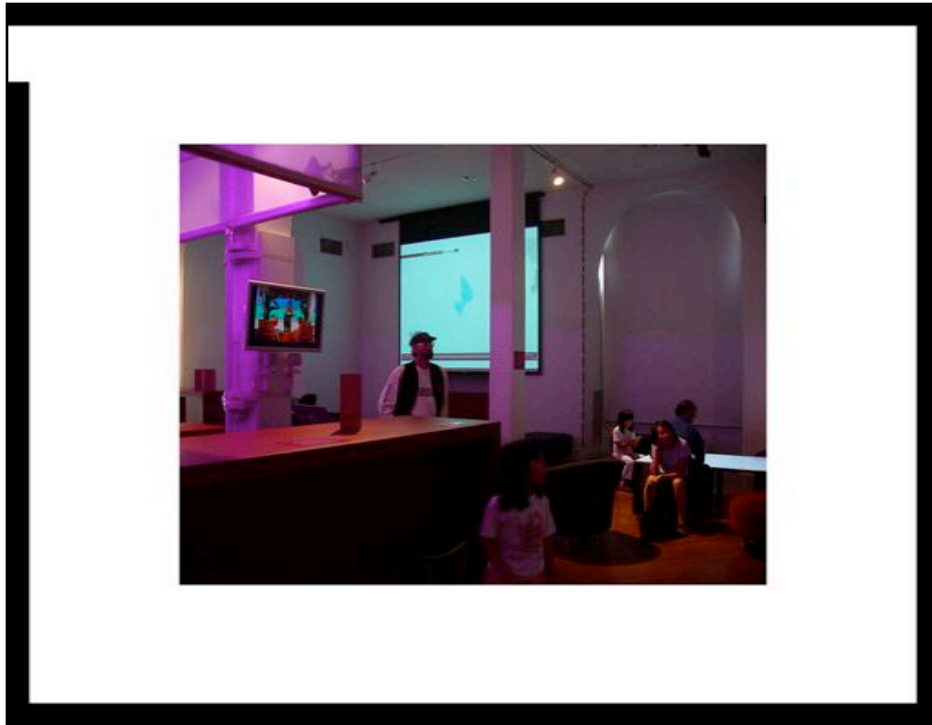
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I spent a little more than 10 years doing design and research for the web, and worked for many web sites that we've all forgotten about. In 2001 I co-founded a web design and consulting company called Adaptive Path. Things went very well, but I was interested in other ways that technology was changing society, other than through the Web.



I have always been interested in the creative potential of computers. For many years I've been involved in various art and technology projects out of personal interest. This is a robotics project I did with Jim Mason in 1999. This was a series of life-sized puppets whose movements were synchronized to world stock markets as a commentary on the first dotcom bubble.

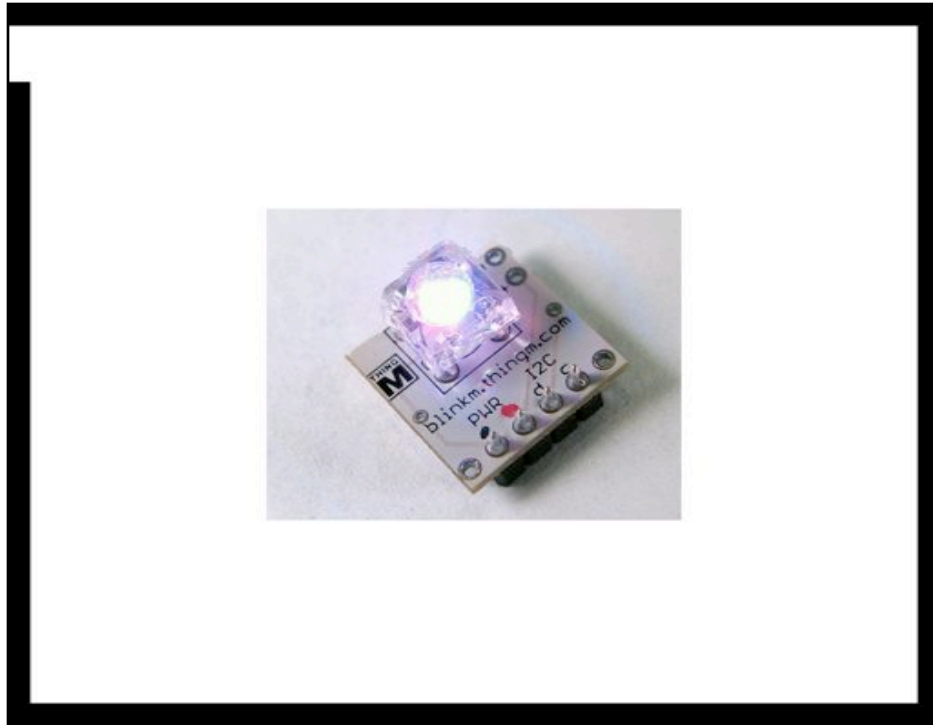


This is a café of augmented objects I curated for the International Symposium of Electronic Arts in 2006 in San Jose. Virtually everything in the café had been changed through technology.

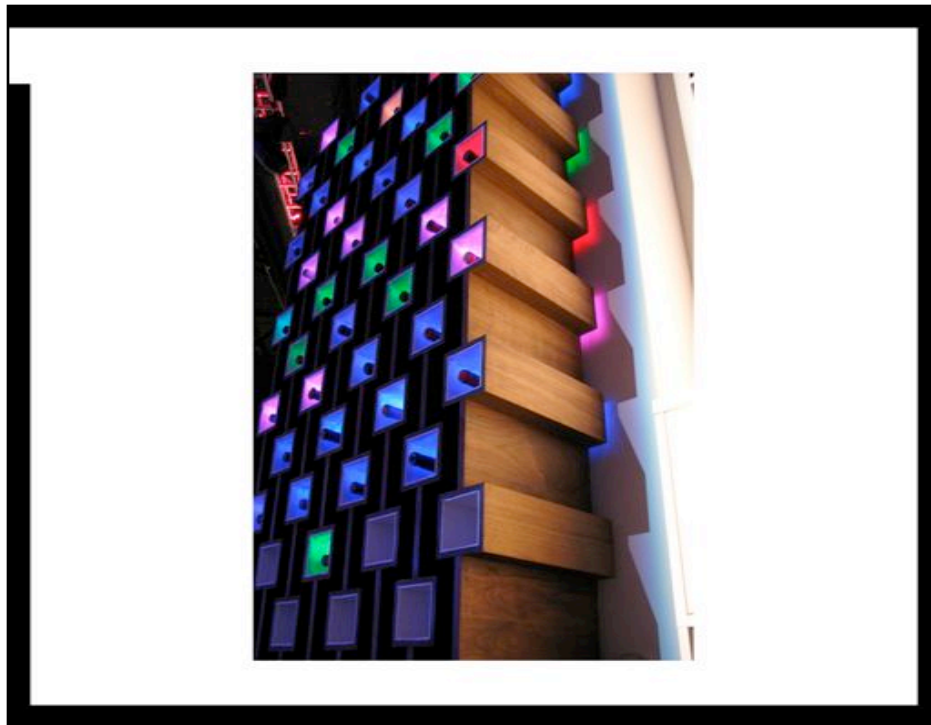
It's in working on this creative fringe of technology that I really came to appreciate the potential of ubiquitous computing for changing everyday life for the better.



In doing these projects, I became both entranced with the possibilities of embedded information processing and frustrated that the technology was so difficult to work with. In 2006 I founded a company with Tod E. Kurt called ThingM to do something about it. We're a three-person ubiquitous computing consumer electronics company.

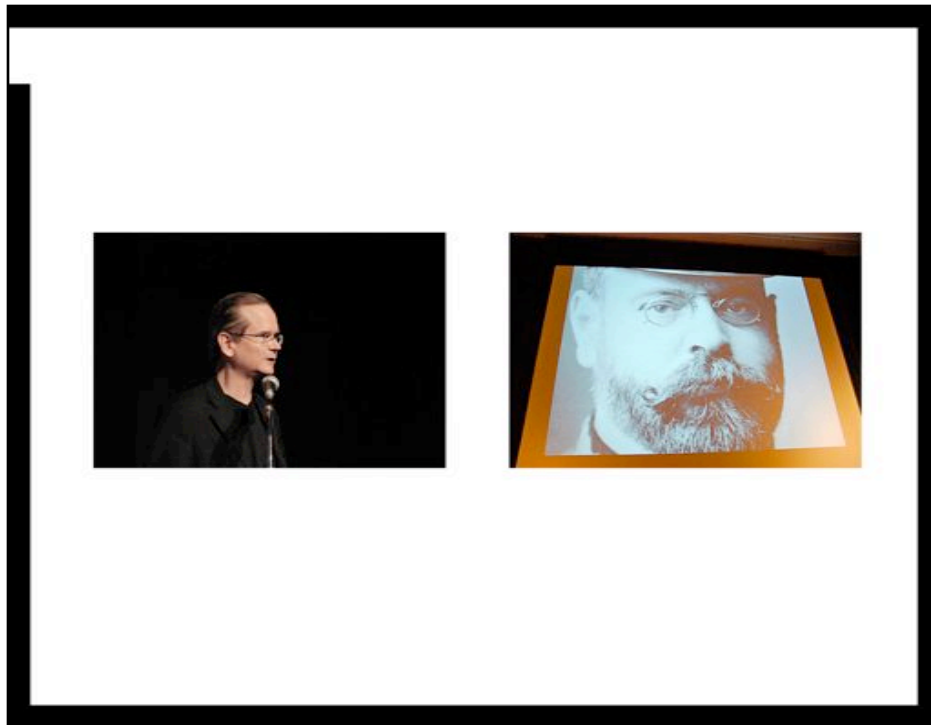


We design, manufacture and sell ubiomp hardware. Some of it is created for designers and artists to make it much easier to sketch with hardware This was our first product, called a BlinkM. Many of you have seen it. It's a smart LED that uses a ATTiny microcontroller that is controllable through I2C. It does arbitrary color crossfading and color space transformations in firmware. None of it is revolutionary, but for someone who knows nothing about electronics, we feel it gets them to Hello, World that much quicker. Thanks to Sparkfun, these have sold pretty well.



We also have bigger plans. Here's an RFID wine rack prototype and we hope to have an actual consumer product next year.

Today I want to talk about what happens when bits and atoms collide, and how that changes the incentives beyond making electronics, but making things in general.

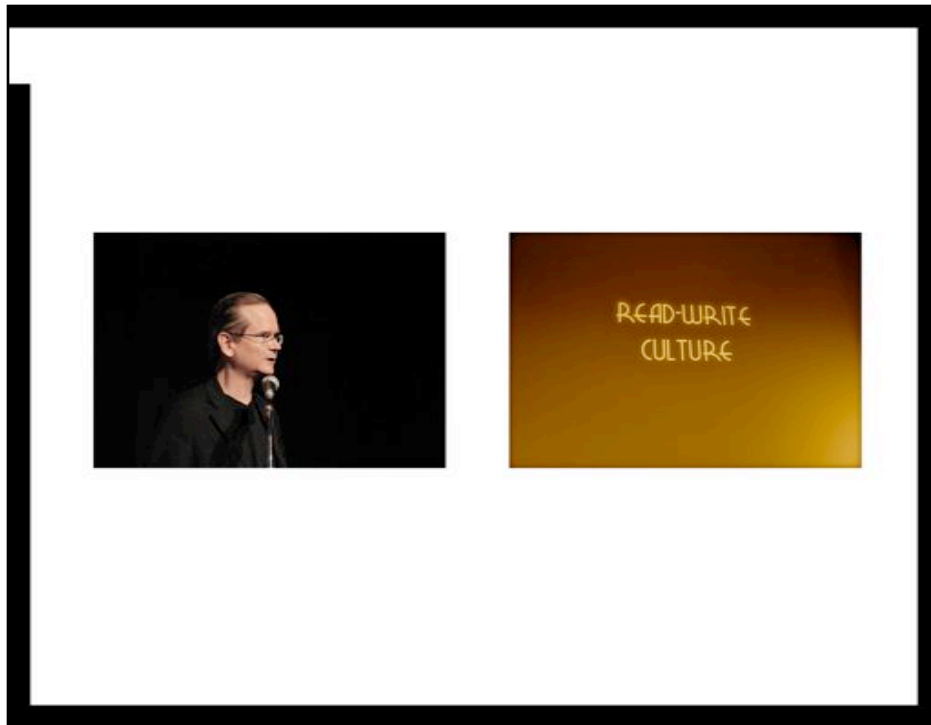


I'd like to start by talking about the recent work of Lawrence Lessig, who you're familiar with as the inventor of Creative Commons. In the last couple of years he has been talking about Read-Write culture versus Read-Only culture. In this discussion, he quotes composer John Philip Sousa, who complained to the US Congress in the 1890s that before recorded music many people, average people, nonprofessionals played music. He was worried that people's musical abilities, and thus an important source of creativity, would disappear because recorded music would stop average people from expressing themselves musically. Moreover, from a cultural perspective, he felt that this was a significant loss of innovation. As people played musical instruments and sang for each other, they changed and reinterpreted the music. Some of these variations would then become popular, and were reinjected back into culture, creating a virtuous cycle that generated rich, flexible cultures all over the world.

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He calls this a Read-Write culture and contrasts it to the Read-Only musical culture of recorded music. In Read-Only culture, self-expression is limited to selecting among pre-packaged options and according to Lessig, it's an abnormality in history. Every century, except the 20th century, is Read-Write. He suggests that digital technology has made the 21st century a Read-Write culture again, but that our 20th Century laws and organizations have not yet recognized it, so he's fighting for the legal recognition of the fundamental nature of this relationship.

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I want to talk about how his point applies to all manufactured products, not just music.

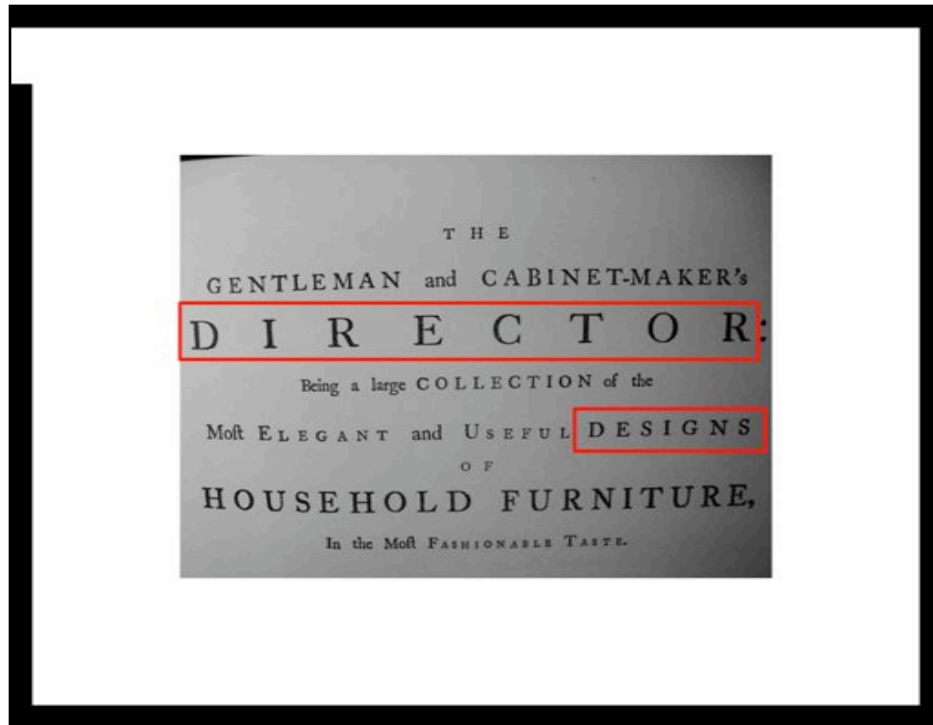


I'm not a historian, so please excuse me if I make some generalizations about the history of making things. Before mass production, the basic materials of most technologies— wood, stone, metal, plants, animals— were widely available. Transportation was expensive, and except for some esoteric objects such as rugs and spices, what mostly moved around was knowledge, communicated through word of mouth and ritual. Villages had blacksmiths, carpenters and stonemasons who took information they heard and localized it for [click] the local population and materials. This was Read-Write material culture.

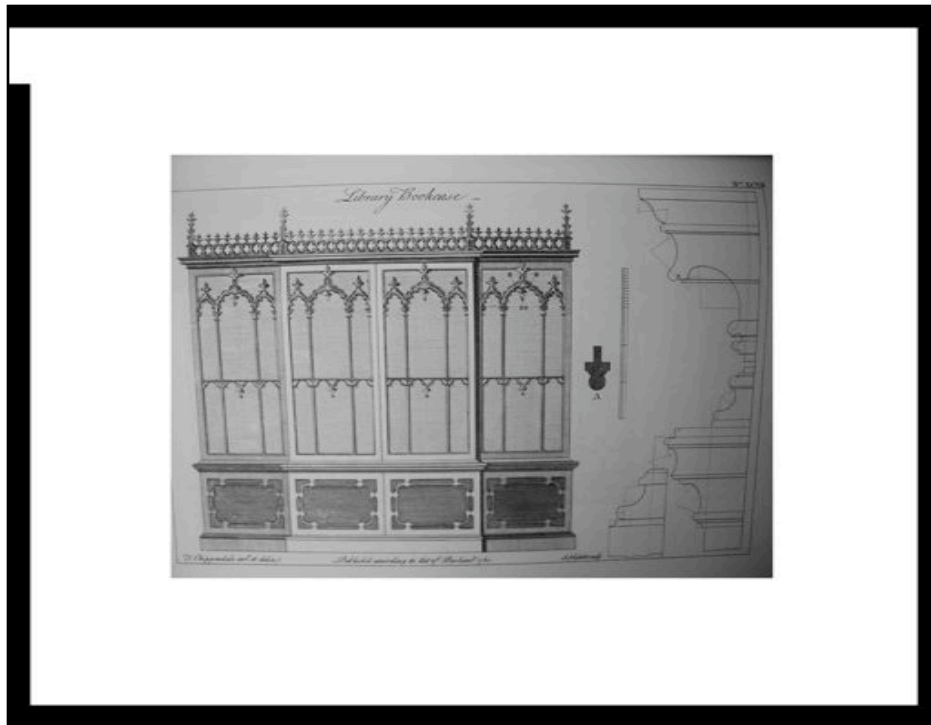
Photos CC by Mike Kuniavsky



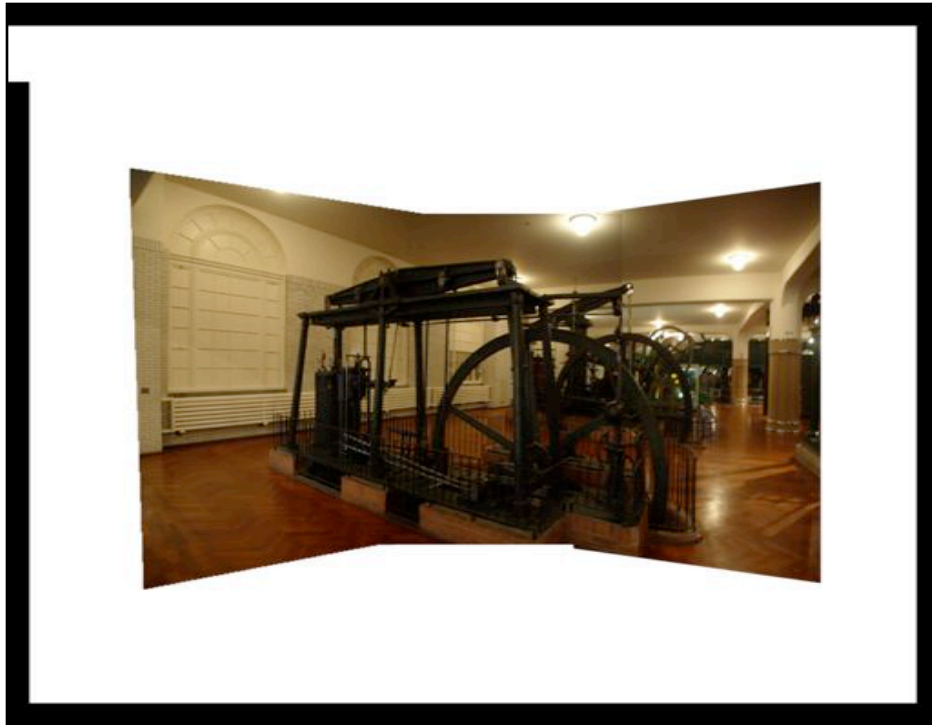
Let me give you a specific example of how this culture worked from just before the Industrial Revolution, just before everything changed. This is Thomas Chippendale. He was a well-known furniture maker in 18th Century England. There are probably pieces he made in this building. You know chairs with legs that end with an eagle's claw that's holding a ball? I believe he invented that. But that's not where most of his fame or fortune came from.



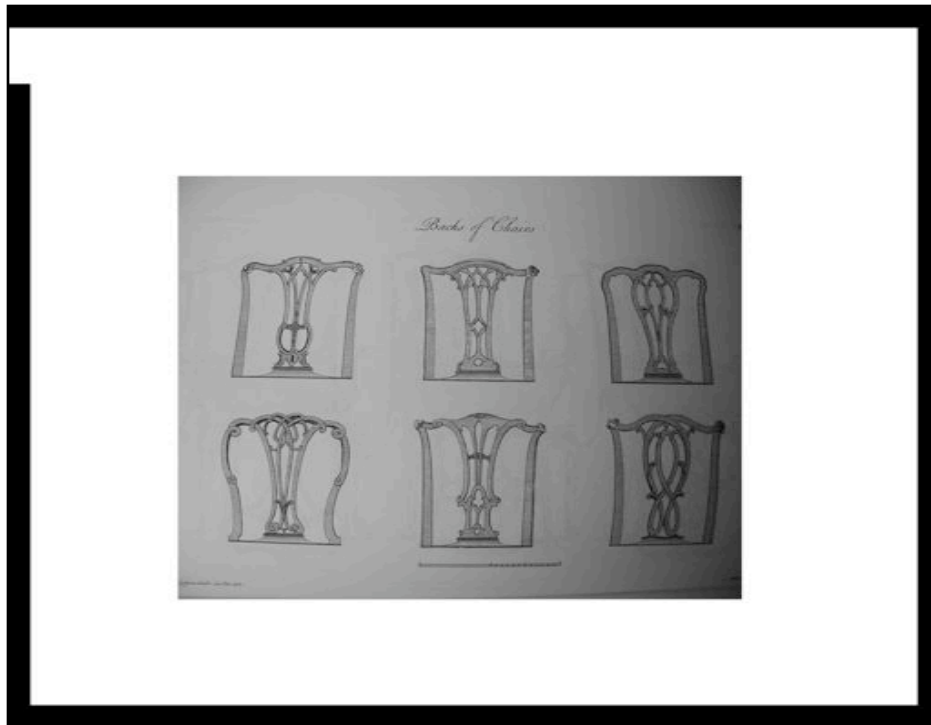
It came from this, a book he published in 1754. Notice what it is: it's a book of DESIGNS for furniture. Information. Directions. It's called the Director because it's full of directions. Now why would he do this? Why would he give away his unique secrets?



Because he was working in a Read-Write culture. He knew that he wasn't going to sell much of his actual furniture in Boston: wood furniture is just too expensive to ship across the Atlantic and his workshop can only put out so many pieces, but by publishing the Director he would profit from the designs' publication and his reputation would benefit because he would have a lot of influence. And he did. The Director was a big hit in both England and its colonies and an entire style of furniture, whether he designed it or not, became known as Chippendale furniture. He was the first person who wasn't a king to have a style of furniture named after him.

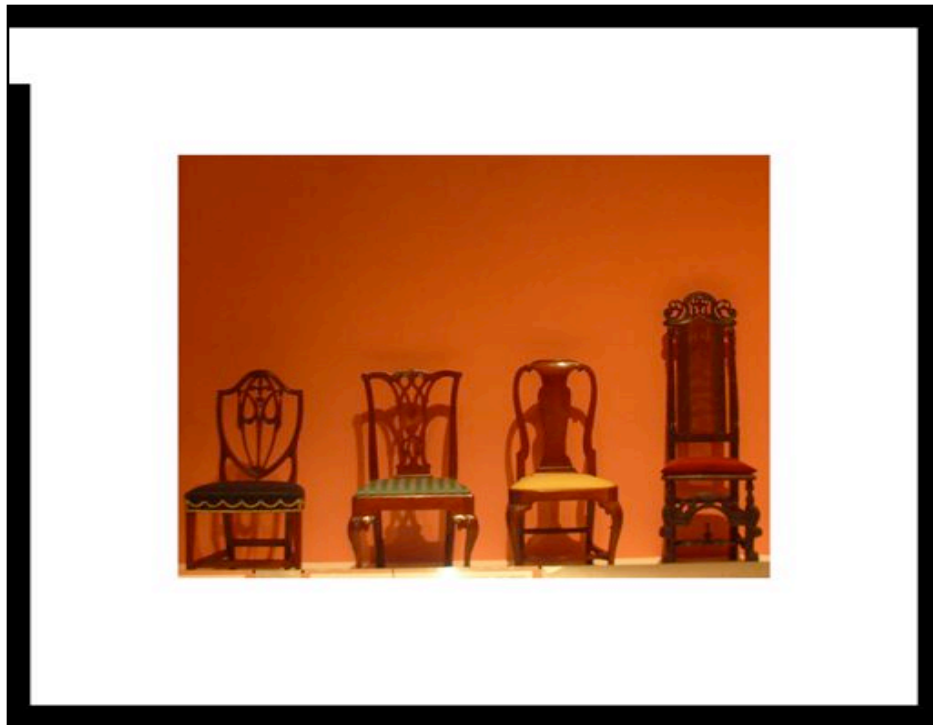


Soon, however, the environment in which the Director was successful changed. The mechanized tools of the Industrial Revolution, such as this steam engine, could make manufacturing much more affordable. These tools made Chippendale's furniture designs, which was reserved for the upper class, for gentlemen, more affordable, but that affordability came at the cost Read-Write culture.



If you look at the Director, it's full of variations. Chippendale expected that each piece was made individually. By showing all of these variations, he's essentially saying "I am defining a design space for you, each piece is a collection of parts that you can mix and match. They all work together because I've created a standard interface and standard components. A kind of furniture description language." The system is Chippendale's, but the specific pattern is up to the individual craftsman.

In fact that's how people treated it. There's actually little Chippendale furniture from that period that looks identical to what is in the Director. Moreover, cabinetmakers were free to add to the language, to change, improvise and then distribute their designs themselves, as many did in their own pattern books.



However, after mechanized production, consumers' choices became limited to choosing between a limited number of prepackaged combinations. You couldn't design your own Chippendale chair back, you couldn't write in Chippendale Furniture Language. You could just buy the one that the factory made and everyone got the same one. The was not totally bad, the new low price was very important, but it came at the expense of the flexibility of ideas.

And thus, the beginning of two hundred years of Read-Only culture was born.



Fast forward 200 years. The end of Read-Only material culture, as I mark it, began in 1985, with the release of the Apple LaserWriter. This was the first mass market device that merged the flexibility of bits with the tangibility of atoms. It had all the precision and control of Industrial Revolution tools, with the pre-Industrial Revolution flexibility of making each finished product individually. It did this by making the instructions, the language that described every part of the finished product changeable, while the end result was completely consistent.

Now, someone can buy the tool, have it produce great results without any intervention OR they look at the knowledge that's embedded in it AND change it to suit their needs.

Until desktop publishing, typesetting was very expensive. Now, what was an expensive process reserved for special occasions is nearly disposable.



The idea of the LaserWriter is expanding to virtually every kind of manufacturing.

This is a home digital embroidery machine made by Brother. Ten years ago, a commercial embroidery machine cost about \$30,000. Today, you can get a home one for five hundred dollars. It comes with a selection of patterns and software that control a needle and multiple threads to make a elegant, flat, clean image. This is knowledge that is embedded in the tool, but knowledge that you can manipulate using a piece of software communicating to it through a USB cable. Software makes retooling much easier, without losing any of accuracy of the process.



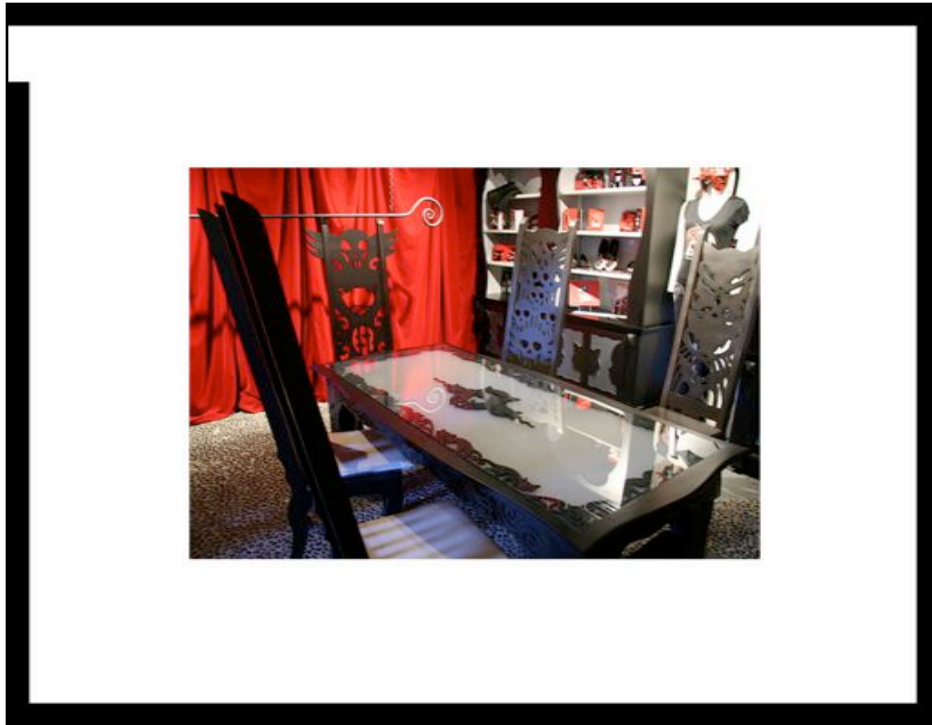
Because of this capability, communities for selling and sharing embroidery patterns have been created and have become very active. It's just like desktop publishing was in 1988 and it's pure Read-Write culture. Thousands of embroidery Chippendales are competing to have their designs dominate.



The Sears CompuCarve is a milling machine that works like a printer.



Rapid prototyping equipment is the laser printer for 3D nylon.



Because We Can, an Oakland company, uses a CNC wood cutting machine that costs about the same as the original LaserWriter. Their stuff is all made locally, sustainably and exactly to the specifications of their customers.

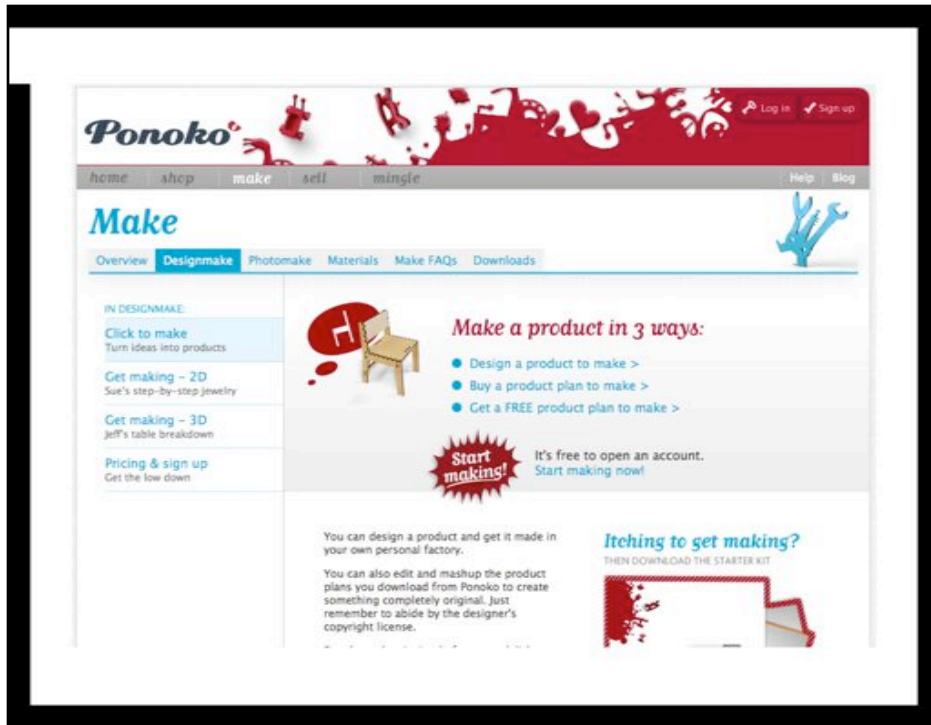


An alternative energy generator created by All Power Labs, another Bay Area company. It converts burned trash into a gas you can drive your car with. Their components are made of steel that has been cut using a CNC plasma cutter that also costs about the same as the first LaserWriter. They have open sourced the design so that you can download the design and make your own generator if you have your own plasma cutter.



And, of course, the FabLab, which is taking Read-Write material culture to today's kids, so they grow up knowing how to read the languages that describe things and change them so that the descriptions match their view of the world better. This is one in an Afghan girls' school. Here's the laser cutter.

Photo CC by Todd Huffman, found on Flickr: <http://www.flickr.com/photos/oddwick/3452098090/>



And just like laser printers and photocopiers created new service businesses such as copy shops, these technologies have also created new business models. Ponoko, which many of you have probably heard of and some of you may have used, is an industrial design social network disguised as a laser cutting by mail company.



Energy for moving atoms is only going to be more expensive, while moving and manipulating knowledge is continuously dropping in price. Digital Read-Write culture started with the LaserWriter and the MP3 and will expand to every other kind of making because the coupling of bits to atoms is only going to make more economic sense as time progresses. And just as the economic and energy situation of the 18th Century England created the conditions for the Industrial Revolution and Read-Only culture, today's conditions will dismantle the thinking of the last 250 years about how things are made and how we, as consumers and producers of culture, relate to it. It will change the shape of objects, how they're made, how people relate to them and how we buy and sell them.

In other words, embedded information processing technologies give us the capability to change the language in which objects are described, which, in turn fundamentally changes the entire incentive and motivation structure for buying, selling and making them.

Photo CC by TechShop



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Thank you.