[Biography] Silicon Valley based Jan Hauser postures himself as a "high tech environmentalist" with an "invested interest in complexity science." In recent years he has given numerous lectures and has participated in many discussion boards to effectuate the trajectory of the complexity science and environmentalism cross-over. Since 1998 he has been seen at the Planetworks Conferences, the lecture series at the Banff Centre New Media Institute and at the panel discussions of The Society of Environmental Journalists. Before he developed these environmental affinities, Jan had already achieved major successes in the field of information technology backed by his profound knowledge of complexity science. After some early projects about emergent operating systems, his endeavor to bring the paradigm of self-organization to the field of computer science found its preliminary climax in the development of Sun's JINI technology. During his fourteen year career at Sun he held various positions in the areas of artificial intelligence, automated markets, electronic trade exchanges and high performance computing. Currently Jan is a Visiting Professor at the Naval Postgraduate School in Monterrey , California.

Joel Slayton: At dinner we were sitting at the far end of the table having this nice conversation across a lot of areas, some of which I want to come back to tonight. One of those had to do with the relationship between private identity and public identity which is an especially important concern in terms of network culture. In this context you used the sidewalk analogy. What is this piece of real estate that is caught in between the public and private identity space? To me it is neither nor, it is both. It is private property, but it is also public space.

Hauser: It is clearly in between. You know that the streets are public thoroughfare and you know that the building is private property and then there is this thing called sidewalk. The question I ask is which part of the sidewalk is public and which part is private.

Slayton: I was thinking about it in terms of the net. These kinds of spatial analogies do not hold exactly. They are not really in the

endgame perhaps as useful as we would like them to be. I am curious if you could at least start in that beginning place of talking about what are the kinds of criteria that we might look at--the criteria that would help us understand public identity and private identity on the net.

Hauser: The interesting thing about the internet is that it does not have a one to one mapping between real world space and spaces that we have traditionally organized around culture. Culturally it is all about geography for the most part. There is a location on the planet that is part of a city or a state or something and it has a set of rules that are ownership rights. We have tried to civilize the information space by trying to understand who would own or have the rights to own a domain name. For example janhauser.com is my property by some set of rules because I pay my $35 dollars a year to retain that. Who actually has the right to grant me that or deny me granting janhauser.com? We do not really understand even what the namespace property rights are on the internet.

We could in fact try and manage the internet by some geographic sense of organization, but no one is talking about that. It does not seem to make a lot of sense as of yet. But we actually have not tried to civilize the internet yet either. We have not for instance tried to organize the internet around national boundaries. There have been some attempts to regulate the internet around national boundaries.

The most current one is Mirror Google. Is anyone familiar with Mirror Google? Those of you who are not familiar with it; for whatever reasons I believe China found it egregious that anyone would be able to do Google searches for whatever reasons and they tried to regulate that traffic out of China. And quickly someone created Mirror Google which was not a mirror site. It was a site that would do Google searches for you, assemble it as a body of pixels, and then reflect everything in a mirror image and send it back to the searcher. All he had to do was to put a mirror at his screen at 45 degrees and he could read it. Since the firewall technology that was used to deny Google searches did not know how to recognize this pattern the ability to police that was quickly defeated.

This just shows us that it is going to be very difficult to police the internet as long there is not more emphasis on identity. The internet has essentially very weak identity. Identity on the internet is almost completely anonymous. One of the reasons a twelve year old script kiddy can go and take down amazon.com or yahoo.com is because there is weak identity on the internet. He or she can launch a denial of

service attack by flooding yahoo.com with sync requests and therefore filling up all the communication bandwidth and space that yahoo.com has to offer. The defense for that today is to essentially overprovision. People buy and maintain thirty percent more capacity than they need to satisfy their commercial needs so when script kiddies go launch an attack it barely slows the servers down. They just buy more bandwidth than they need.

Stephan Hechenberger: Isn't there a strong identity if you consider larger bodies like your domain or a magazine? If you publish something on the internet you start to become part of a larger body.

Hauser: Part of a what?

Hechenberger: A larger body.

Hauser: No, I do not think so. Today the internet protocols are basically about finding an IP address and a socket on a certain address. There is no way to strongly authenticate whether that is a real address or one which is spoofed. Today it is basically a good citizen behavior that makes the internet work. That is to say that internet service providers follow a set of conventions and do not violate the conventions, but if they wish to violate the conventions they can.

Hechenberger: What I mean is as soon as you go on the internet and you want to publish something you need to have an identity otherwise nobody will read your text.

Hauser: I see. I was not talking about the sociological phenomenon. I was talking about the ability of the technology to enforce a set of rules. For instance if I wanted to misrepresent you I could probably appear on the internet under your email address, and only a sophisticated person would be able to differentiate whether the email was from you or from someone pretending to be you. The internet does not have strong security, and it is fairly easily spoofed. Email addresses for instance can be spoofed by a moderate amount of technical expertise. Therefore I could not really trust those communications that I see that claim to be coming from janhauser.com. Those communications may not be originating there at all. They might be from someone who can copy me.

Hechenberger: Nevertheless you choose a certain online publishing mechanism to publish your work.

Hauser: Such as?

Hechenberger: Such as a magazine. You usually get a username and a password that nobody else can use because nobody else knows it. It is probably not possible to track you down as the real person but as your virtual alter ego. This ego has an identity on the net and if secured by password the identity can only be used by you. It is another kind of identity, but it is in your control. People cannot just go there and say or pretend to be you because you have the password.

Hauser: Right, once you have a username and a login password you have a somewhat stronger identity. Ok, so now you have ratcheted up, and you have a stronger identity. Supposing I was outside your door, and I had a little listening radio, or I had decided to attach some wires to your phone line, and I was listening in. Now when your password is sent to you I just have your password. I can get your password. Now that I have your username and your password no one can tell it is me and not you.

Slayton: What kinds of mechanisms do you envision that would help make for strong identity on the net, that would improve individual security but at the same time enable a higher sense of presence or self in that environment?

Hauser: The underpinnings of strong privacy and also strong identity in any electronic medium are those based on cryptographic techniques. The current chief security officer of sun Microsystems is Whitfield Diffie. Whitt Diffie along with Martin E. Hellman created *Diffie-Hellman* public-private key encryption back in the seventies. Public-private key encryption is a very useful form of encryption because it means that you and I can have cryptographically secure and private communications which are authenticated only by just one simple act. The simple act is we do not have to exchange any secret material to have a cryptographically secure private or secret conversation. All that has to happen is that I will receive some email. I will receive some material from you which can be an email or any other form, a string of abstract symbols. And all I have to do is be relatively confident that you in fact transmitted me that material. You do not have to be secret in this transmission. It does not have to be transmitted privately or in secret. I just have to…

Mays: …that is the big problem, trusting the origin of the message or the public key. The main point of weakness is the key servers.

Hauser: Well, to initiate the conversation, all I have to do is have a certain degree of confidence that the material I received was authentically transmitted by Joel or someone else. That is all I need. If I get a letter in the mail, it can be signed or whatever…

Mays: …or a fingerprint, you can say over the phone is the way they…

Hauser: You know, it could say, "Please contact me when you get this email." He can put a time stamp on it. I call him up, and he says, "What is the time stamp on the email, and he reports this time stamp to me. That is not to say it could not be defrauded. It might be defrauded, but maybe he sends me a letter through the mail with a code in it and sends me an email, and then I compare what I got in the letter. That means you would have to penetrate the postal service and you would have to penetrate the email service to defraud it. Everything is spoofable to a certain extent, but it gets harder and harder.

Mays: In theory, with enough computing power, it would be possible to exploit idiosyncrasies of the key generation process which could lead to holes in the encryption. One thing they talked a lot about at Defcon were these sort of new encryption techniques such as Mixmaster where you basically have a round robin passing to create a perfect encryption. What do you think the political implications would be if perfect encryption were developed?

Hauser: We do actually have perfect encryption. It has been around for a long time. But we should talk about the different aspects of privacy and security when we look at that. For instance, in the mixers, in the onion routers and so forth. That is a kind of privacy that talks about noticing patterns of communication. It is presupposed that the content of the communication is private because of the strong encryption. But then there is a noticeable pattern of communication that would be observing that Jan transmitted something to Joe or Joel or somebody else. And not knowing what we transmitted but knowing that we were in conversation of some kind. Mixes are good for that. In terms of strong encryption we have had a one time pad available for a long time which is purely random information that you mix in with your information you want to encode. You mix it only one time and you use it only one time and then you dispose it after that. One time pads are currently available. At the end of the day, the key problem is key distribution--the creation and distribution of keys. That is purely a sociological phenomenon. We have to exchange some kind of

authenticated information that we believe to be authentically transmitted from another person. Whether we exchange that personally like we meet face-to-face and exchange CDs with one time pad information on it or whether we do it through a network is part of the issue. Was your question, "What is the implication of totally private communication?"

Mays: The discussion obviously is: If there were perfect encryption would the government allow it to exist and allow it to be used although they could not intercept it. There is the question whether they can even intercept some of the available encryption. There is also some talk about the following: If we reach a certain threshold where you know it is not interceptable, what are the implications for the government for that. Would they even allow it to propagate or would it be…

Hauser: It is currently legal for any US citizen to use encryption of any strength that they see adequate for their own personal purposes including one time pads for our communication amongst each other. You are not in violation with the law if you do that. The laws apply to the export of strong encryption.

[turning to Stephan] You mentioned something about advising the Clinton administration. I was involved in the debate between private industry and the government about liberalizing the export of strong encryption. That is to say there are prohibitions to exporting strong encryption. It is actually controlled as munitions. The issue there has been the ability to survey, to deny access of strong encryption to our enemies--enemies of the US.

Hechenberger: I am not sure I understand you. For example if you take the GNU Privacy Guard. This is software that has been written on the internet by people from all over the world. How can it be exported or not exported. How does this law apply to open source software?

Hauser: Well, it is pretty interesting what the laws apply to and what is essentially policeable. These are two entirely different things. Let me give you an example. It was and is illegal to export encryption algorithms of a certain strength. A company in the US cannot export algorithms that encrypt beyond a certain strength. This was obverted by those of us who actually know how things work. A person on a browser anywhere in the world could touch some site with a Java applet and the Java applet might have 2048 bit encryption--the Java applet that would quickly fly from the client to the server inadvertently

under any web browsing activity. Someone would have inadvertently exported strong encryption and the exporter may not have known they would be exporting it. The importer may not have known they would be importing it. It would have just happened. The conclusion is that it is kind of silly because the law does not map onto cyberspace very well. A friend of mine who is a professor of computer security at the naval post graduate school commented that people do not really think about what bits are, what information is. We try and apply real world analogies to information and it just does not apply. We were conjecturing what information looks like. It looks like neutron energy after a nuclear explosion--neutrons, or maybe it is like these particles that pass freely through the earth…what are they called…

Audience: Neutrinos

 Hauser: Neutrinos, they are like neutrons, neutrinos. Once the information is released it just radiates in all directions. Nonetheless there is the idea of there being boundaries or barriers or places where it honors that it is not supposed to move anymore. That is not the nature of information, just digital information. It just flows freely.

Hechenberger: There is something I wanted to ask you for. I think it might be relevant for our further discussion. Can you define certain terms for us like information, entropy, complexity and self-organization?

Hauser: This is a terrific subject. You mentioned my interest in complexity and self-organizing systems.

Hechenberger: Can we start with information first? It is a very general question. How would you define information?

Hauser: I do not think we have done a very good job. Most people are very happy with Shannon's work in information theory, but at the end of the day, as useful as Shannon's work is, I do not think it applies so well to the human realm. There is a pretty big schism in how people try and conceive of their own existence as it applies to the phenomenal real world. I think the schism was really born out of Descartes and Cartesian production of science and some of the problems that scientists were having back in those days. You will recall that scientists were discovering things that did not gel with what the church was saying such as the earth was not at the center of the universe and some other problems like that. What science was doing, what the scientific method was doing was actually threatening the foundation of

the narrative of human existence itself because the church was in charge of the narrative about human existence. They said the earth is the center of the universe, which it was not. What they were doing with scientists is they were torturing them and burning them at the stake. This is a really bad time to be a scientist particularly discovering things that refute the foundation of life the universe and everything as given by the church.

Descartes sort of made a deal. His deal was: "Look, we are not addressing what humans are. We understand that the church understands why humans were created, what our intention is, what we are supposed to do before, during and after life. We are just studying phenomena. We are scientists. Apples fall. We have conjectures about gravity. We do mathematics, billiard balls, you know, light. We do not have anything to do with life. So actually we formalized a division between existence itself, the very act of being alive and existing, into a set of things which were material phenomena which we regard today as mechanism, and the phenomena of life is kind of off the table." Well, they tried to keep it off the table, but now you see the dovetailing.

Now science has gone to the point where science is getting into the biological realm or trying to. Some people say that science killed god. Well if science did not kill god it certainly did give the whole notion of what the church's narrative about what existence was, a run for its money. The problem is that western minds still are trying to take a mechanistic view of understanding the phenomenon of life. It does not take us very far. I mean we discovered chemical energy, and we learned how to substitute our own energy and our own labors with chemical energy and machine labor. Therefore machines do almost everything that we used to do ourselves. They dig up the ground. They make up our food. They transport us. All at the behest of the chemical energy that feeds the machines that keeps them up and running. We think that if we just understand more mechanisms we are going to understand something about life. But in fact, life, almost at every level is an emergent phenomenon. It is a contingent phenomenon. That is where we go wrong.

One of the big lessons from complexity science is not that complexity science explains to us how things actually work. What complexity science and chaos theory brings us is that our mechanistic view of how the world works is not correct. It is incorrect. It is insufficient. In removing the notion that a mechanistic view is sufficient it creates a vast space to reinvestigate what is going on with life. What is the real

phenomenon of life?--which is really rather mysterious. Life is not just a big bunch of gears and cogs and a mechanistic apparatus. [Pause] Information theory

Hechenberger: The next one would be…

Hauser: I think that Murray Gell-Mann took a--I am being recorded and filmed, hi Murray!—
Murray Gell-Mann took a stab at trying to talk about complexity and information theory in his book *The Quark and the Jaguar* and I was really unhappy with what he did in that book. Who am I, a nobody, to argue directly with the noble laureate, Murray Gell-Mann? And who I am is to say that Murray's attempt to wrestle with this in that particular book was very inadequate. In that book the question was, "How can you measure complexity?" What he used was a mechanism called algorithmic information content. Algorithmic information content is if I give you a string of bits with a pattern in them or maybe no pattern that you can perceive at all. What is the shortest possible program that I can write that will run on a Turing computer, the simplest possible computer, digital computer known to people, that will reproduce that string of bits.

Hechenberger: Isn't that futile to try since the Gödel theorem implies that you never know if you have the shortest possible algorithm.

Hauser: Yes, I would come down on the side of Gödel; however, this is what Gell-Mann put down in his book. The amount of information in something is reflected by the shortest possible program that can be written that will reproduce it. I looked at that and I said, "What is the relevance of a Turing computer?" Is a Turing computer something that does Boolean operations, you know, And/Or, True/False. Is a Boolean computer a Turing computer? Is it really anything that can be used to represent anything in the phenomenal world?--In our real world? The big schism is, there is a whole bunch of people that actually believe that anything can be represented by a string of bits. I do not believe that to be true because I do not think that the very ground--this is my opinion--the fundamental underpinnings of the universe are not a digital computer or modeled by ones and zeros. I found Gell-Mann's attempt to approach information theory and complexity to be completely lame. I felt it was not at all adequate. In fact at the end of the day, complexity, I believe, will be in the mind of the beholder. I think complexity occurs at the boundary of something that generates information and something that processes it. It exists at that boundary.

Hechenberger: There is this problem with the Turing machine that it is only capable of doing deductive reasoning. What if you imagine a machine that does inductive reasoning what a quantum computer might possibly be capable of? Maybe it changes the whole field of complexity. What do you think about that?

Hauser: I think that is an interesting thought. But I think that the very notion that we are reasonable creatures, that life is an outgrowth of reason, is false. I think that enormous amounts of life have nothing to do with reason whatsoever. At the end of the day, a very large part of us is created by simply conditioned response. Are you familiar with a campy branch of psychology called neurolinguisitic programming or with Skinner's experiments on operant conditioning? You can basically cause someone to learn a stimulus response kind of behavior that has nothing to do with reason whatsoever. A well reasoned person would never do the behaviors that they are subjected to if they go through a Skinner Box. So it is not a matter of reason. It is a matter of something else.

Hechenberger: I called it inductive reasoning, but you could also call it intuition. It is like what scientists do all the time. You come up with a hypothesis, somehow, who knows how? Then you look at whether it is true or false--whether you can prove it with an experiment. This kind of step, which is often called educated guessing, is not really reasoning. It is…

Hauser: I think the intuitive part of it--I think we can do a lot with that. It is a very large field to be explored. A number of the people I hang out with have asked the question, "Is there such a thing as artificial intuition and could we create artificial intuition." I think it is a great question. It is probably the right kind of question to be asking because certainly brute logic, True and False, And/Or and all of that is arguably not sufficient to the complexities. A lot of people will argue that. Marvin Minsky asserts that a human brain is a computer made of meat. I do not believe that at all because if you look deep into biology you find that food and information are inexorably intertwined and that entropy and existence itself are intertwined. Let me give you an example. A lot of people think that we eat in order to get energy. We eat for energy. That is not the case. And in fact a brilliant scientist by the name of Schrödinger wrote a very thin book called *What Is Life*. Schrödinger said that we all eat to gain energy and that is part of the reason we eat, but that is probably not the main reason we eat. We eat to acquire negative entropy. If we just needed energy we could

drink a cup of sugar water every day. We would get all the energy we need because there is plenty of energy in sugar--glucose. It is not why we are eating. We are eating to acquire negative entropy. There is a lot more going on. If you drill down to look into the mechanisms inside a cell you find a little fragment of chemical material that is food at one time and information the other time. It is a transmitter of information and it is food and it is information again. Where do you pull things apart? It is the western mind's compulsion to view the world as a mechanism that takes us in the wrong direction. The daughter of a friend of mine who is getting a degree in genetics is trying to figure out what the counting mechanism is that causes the branching of the stomata on the spinal column to occur. The stomata in the spinal column always occur in embryogenesis at a certain place and a certain number of them and so forth. She is getting into an argument with her dad because what he says is, life is not a mechanism, it is a generative grammar. Life is a generative grammar, not a mechanism.

Slayton: In my afternoon class, this subject of intuition comes up, and as you might imagine it comes up frequently in art school. It often comes up in the context of an individual being able to enact some sort of action or express themselves in some way without full knowledge of where that expression comes from. This always strikes me as something quite naive because it would seem that intuition requires expertise--expertise that is based on having enough familiarity with a scope of information or knowledge--expertise that is required to be able to recognize patterns in that information, to be able to take action upon them, to be able to emerge some action upon them. So this relationship between intuition and expertise, to me, seems very fundamental…

Hauser: It is. It is deeply fundamental. Actually, it reminds me of some arguments I had with artificial intelligence people when I was making the decision to get out of the AI business. I worked in artificial intelligence for four years. As I was deciding to leave or not leave I decided there were two fairly clear branches of AI that you could identify. There were the people that followed Marvin Minsky and Piaget that wanted to study how humans are born and how they learn. They did this to try and figure out what intelligence was by studying human development from birth on up. Then there were the people that followed symbolic processing, Lisp, McCarthy and all the rest. They were basically of a linguistic school that said that intelligence is our ability to create symbolic representations and transmit and receive them. The Lisp people, right? There was a clear division in the school.

I was studying something called neurolinguistic programming which was studying hypnosis and how to use hypnotic patterns to influence others while not invoking a complete hypnotic trance. I was trying to understand how to make smart computers. And I became aware of how deep the rift was between the Piaget, Marvin Minsky side of the AI world and the McCarthy, Lisp side of the world. It turns out that the people on the symbolic processing side actually believe that the logical component of the human mind is the intelligent part. That is where the intelligence is--in our language, in our ability to create new symbols. But where would that part be if it did not have a substrate to sit upon. I claimed as the NLP people claimed, that all human knowledge is grounded in sensory based experience. I knew how to put it in their face. I would say, "Well, all human knowledge is grounded in sensory based experience, isn't it?" And the *LISPies* would say, "Oh, no! That is not true. There is another whole realm of knowledge that is of its own. It stands outside of sensory based experience. And I got into an argument and she said, "Well, there is mathematics and all kinds of mathematical knowledge which has nothing to do with all that." It was sort of a challenge. She was actually managing all the artificial intelligence stuff for SUN, a job that I did not really want.

I got to asking myself the question, "How in the world do I know that two and two is four?" It took me a couple months and eventually I actually recalled. It took me a long time to bring back the memories of how I knew two and two is four: There was Ms. Lewis in her 1950s dress holding up those flash cards. "2 + 2," blank below, she would invoke the class, flip the card and everyone would say, "Four!" I could see her. I saw the classroom. I listened to the class answer in synchrony what the answer was for that arithmetic operation, and I had recovered the original experience where I knew that two and two is four. That is how I found that out. I think that people get lost in their intellect. I think they get lost in this enormous intellectual scaffolding that we build up. We forget about the grounding of it because it becomes deeply unconscious. All of our formative experiences or many of them are lost in our unconscious, and it is very hard to drag them out.

I was going to get into the business of so-called knowledge engineering, but actually before that it was called *expert systems*. When we wanted to do expert systems it turned out the hardest part was getting the expertise out of the experts to put it in the computer. Most of the experts knew that it was correct, but when you asked them how they know it is correct they would say, "I don't know. It is just something I have learned over my life and I can't really explain to

you how I know that is true." I would like to explain expertise as the act of making certain competencies unconscious. Think of what happens when a novice driver is learning to drive a car. S/He got all these rules, such as: If this is a car with a clutch do not move the stick in your right hand until you have pushed down the pedal on the left, the clutch, then move the stick, then let the pedal out, then push on the accelerator. You have got all these rules and it is really hard to make a car go around the corner and shift at the same time. You are probably going to screw it up a lot of times. Then there are traffic lights and stop signs. The person on the right has the right of way--all these gazillion rules. Later on you can get up in the morning and you will not be conscious of a single thing you do including dunking the donut and putting on your mascara. [pause] From door to door, you are not conscious. You are an expert at driving a car. This means that you have made everything that you do unconscious. You are completely unconscious of it.

Most of what makes us in our society is not even the formal things that we are taught, it is the informal things that we get. You know what we learn from the radio and TV and from our parents, aunts, uncles and others. We are all experts in this stuff. We are experts because it is unconscious. We do not have to consciously reason every act out as we commit it. We are kind of getting off track here I think.

Slayton: It is okay. We can just bring it back.

Hauser: We were talking about information.

Hechenberger: Information, entropy--next, could you talk about entropy?

Hauser: I think, at the end of the day, information, identity and privacy are going to be inexorably intertwined. Let me tell you what information is…I forgot your name.

Hechenberger: Stephan

Hauser: Stephan, you come to me and you happen to know that I am a guy who is interested in sky. You know me well enough to know that Jan is interested in sky. One day you look up and notice that the sky is starting to fall. So you run in doors and you say, "Jan, Jan, I was looking at the sky it is starting to fall!" I go, "Stephan, great! I am a sky watcher. The sky is starting to fall, thank you very much." You go back out. The next day you are coming down the road and you notice

the sky is still falling. You come on in and you say, "Jan the sky is starting to fall!" I say, "Stephan, I know that. You told me that yesterday." The second time you tell me it is not information. It is only information the first time you told me. I already know it.

Hechenberger: Therefore information depends on the level of surprise?

Hauser: Well, not only a level of surprise, but if I am going to have a system bring me information I have to reveal myself to that system. I have to tell that system what I am interested in. I have to tell that system what I am not interested in. And not only that, the system has to have a record of what I already have found out, what I have already been exposed to because if you expose it to me a second or third time it is not information the second or third time. After that it is just noise because I already know it.

Hechenberger: Why does information depend on what you are interested in?

Hauser: Why is it dependent on that? Because if I get a lot of material that I am not interested in, it is not information. It is just clutter. It is just noise. It is stuff that is impinging on my consciousness that I do not want. See, our conscious minds have a very low bandwidth. What is the bandwidth of the human conscious mind? It is like 7 bits per second or something like that? It is very low. I can only process, let's just say 7 bits every second here. You give me 15 bits per second and I have to start throwing bits on the floor. You know, that is work for me. I have to start putting that stuff down.

Hechenberger: I would argue that what you are talking about is meaning and not information. For example, it can be directly deduced from Shannon that there is more information in what a monkey writes down than a famous author. In the case of the monkey you do not have an algorithm to make the message any shorter but in the case of the author you have.

Hauser: If I do not have the algorithm to make it shorter I have to do something with that. Any of you guys get spam mail around here? I get spam mail. I get a lot of spam mail. I own my own domain name, JanHauser.com. It is like putting a target on your forehead. You know what? It is a lot of work for me to process all that stuff and decide whether I am going to hit delete or not hit delete. I have to decide on every single thing that hits me. Is this an important piece of email from a friend or a job offer or something that is really important to me

or is it spam? I have to look at every one and make a cursory decision. On those that I am not sure of I actually have to open the email to decide whether it is really authentic or not. That is work. This is a part of my bandwidth. This is my life. It is taking my life away. It is impacting on my life.

Michael: Are you saying information has no intrinsic value outside of your interest in it?

Hauser: My belief, my intuition is that information only occurs at a boundary. My intuition and what I believe we are going to find out at the end of the day is that information occurs at a boundary condition. You cannot independently make a measure of information. In other words, information is a relativistic measure. It will always be a relativistic measure. There is no absolute measure for information, as much as Shannon would like there to be one.

Slayton: I kind of want to swing our conversation back. I am going to come back to where we started--The issue of the boundaries of public and private. This is, of course, related to the notion of privacy and security. Coming back to this criterion, I am trying to understand how identity is shaped by this contextualized meaning or information within a particular context. Let's stay specifically to the net in terms of this discussion. It would seem that the blurriness is at an extreme in network culture. The relationship between what one would think of as private identity and public experience merge almost into something new. In a way perhaps even, talking about this kind of terminologies is misleading to some degree. Is there really such a thing as privateness in network culture or is there only publicness. The security that we should be concerned about has nothing to do with preserving the identity of an individual. It has to do with preserving the identity of publics or cultures or communities.

Hauser: I am a visiting professor at the Naval Post Graduate School in the computer security department. The people who have worked there and in that area for the last three decades deal with the whole notion of, "Can there be such a thing as a secure and private computer system, or not?" The answer is yes, there can be such a thing as a secure and private computer system or a secure and private network. It is entirely possible. Linux is not this, Windows is not this. The Palm OS in this devise is not this, but it is better than Linux and Windows.

Slayton: …because of isolation?

Hauser: …because it is isolatable and simpler. We can construct, and we do construct highly secure government systems, very secure digital apparatus. Let me assure you that the guys that build up the electronic mechanism that are capable of detonating a nuclear bomb, or not detonating a nuclear bomb, take computer security very seriously. They build the things to be extraordinarily simple with just a few functions that cannot be spoofed. These things are separately evaluatable, separately auditable and provable. You can prove that they do what they are supposed to do. So we can do that but in practice we do not. In practice they hairball all of a complicated CPU architecture such as an Intel architecture or a Spark architecture with a complicated operating system such as Linux or Windows or some version of UNIX. These things are so complex that it is very difficult to say with a high degree of assurance that these things operate flawlessly and without any vulnerabilities. In fact they have hundreds of vulnerabilities and then you layer something on top of it like Microsoft Outlook which is known to have 3000 viruses. So the answer is, yes we can have that. It is possible to do that. It is within the realm of technical feasibility, but from a practical standpoint we do not bother.

Slayton: Where I was trying to lead this has to do with the relationship of publicness to privateness. I think from your comments thus far, one of the inferences I have made, and I actually believe this to be true, has to do with how identity is achieved only through public interaction. The levels at which that can occur, the strata at which that can occur, are many. The net is perhaps an environment where certain possibilities of that realization are unique and distinguished from anything else.

Hauser: I gottcha. I am talking to a bunch of artists, right? Cool. Ok, artists…

Slayton: And where we are leading is, "What is the responsibility of the artist."

Hauser: I think I would like to ask a "teasy" question here. The question is, "What is an artifact? Because at the end of the day, it really is what is an artifact? Let me give you an example of where I am going with this. Most of the systems that make up all of the infrastructure that has brought our species up to the point of where we are today--by the way I have an opinion of where we are today our species is the missing link between apes and humanity…

Slayton: That is pretty broad.

Audience: Can you repeat your statement please?

Hauser: Our species is the missing link between apes and humanity. Most of what we have done today is we have constructed a bunch of artifacts that we trust. They are trusted artifacts. The idea of identity and the artifact is all tangled up in trust whether we trust something or not. It is really because humans trust their artifacts that we are able to become so successful as a species. As measured by our numbers we are six billion human beings and growing exponentially. We have created all kinds of artifacts. One of our artifacts is a transportation artifact. We can transport all kinds of materials around the world. Another artifact is our economic systems. Money itself is an artifact. It is a trusted artifact. These artifacts, as they become trustworthy, serve us and serve our common purpose of helping us to be successful, reproduce and shelter us from the forces of nature. Identity is the foundation of trust and anything that is not trusted does not typically endure for a long time. I think that things that are not trusted can come up and can, through the strength of force, endure for a while but at the end of the day, the trusted artifacts are the ones that survive. The untrusted ones, although they may endure for a while, generally collapse. Identity is at the foundation of trust. In fact sociologists defined trust as an emergent--I will define trust as an emergent property that results from repeated transactions with a persistent identity. Repeated transactions with a persistent identity; that is how trust comes about.

Slayton: Maturana talks about something very similar in terms of consensuality and consensual domains. Is that the same thing?

Hauser: Yep. It is in fact…

Slayton: So it could be physiological even or biologically based, perhaps.

Hauser: I suspect it is. If you look at Piaget, one of the interesting things that he observed, and this comes not from my studies of Piaget but from a friend of mine who studies him, is that humans have a unique ability to empathize with objects that are not themselves. He believes this has to do with the ability of our mind to do eye/hand coordination in my imagination without moving my hands. This means that I can imagine the position and shape of an object behind my head. You can describe it to me, "Jan, there is an object behind your

head." You can give me some information and I can reach about it, grab it and manipulate it. I can in fact form a full cognitive model of something, which does not exist in reality, in my mind and I can go and rehearse the manipulations of that something with my mind. Piaget speculates that because we have this ability I can actually put myself in your position and reason from your point of view how you will relate to something. I can get outside of myself and I can get into another self. All of a sudden the human species collectively becomes a kind of self organizing system, much more beyond the herding phenomenon or the flocking phenomenon which are very simple kind of self organizing systems. Something can extend into our collective shared identity.

Audience: Are you on the side of the argument that would say that third order systems are autopoetic?

Slayton: Could you do a little quick synopsis of what a third order system is?

Audience: Third order would basically be on a social level. First order would be singular/cellular and I do not know if people are familiar with autopoesis? It is a biological theory about self organization on a cellular level. There is some debate on whether it applies to social systems and whether that would be a third order system.

Hauser: I find the works of Varela, Maturana and Lorenz to be very informative mainly because they abandon the mechanistic model. They invite the notion of meagerness into the realm of our thought and do not think of things as linear cost-effective machines. Nevertheless this is a vastly popular way of thinking today. In terms of trying to organize things into orders I have a problem leaping in there in a very cavalier way for two reasons: I like the notion of us trying to understand how order emerges from chaos. We often go into this phenomenon somewhat blindly in somewhat cavalier way and we talk about self-organizing systems without challenging the very notion of what "self" actually means. At the end of the day if you say, "There is a cell" you got to say, "What is this cell." The problem with this is that this is a slippery slope. When you are trying to say what self is it tends to slip through your fingers. Particularly if you are actually honest, you will find that the whole notion of the self is a rather ephemeral thing. It is very hard to find the self if you look really hard. In fact the very noting of anything being "itself" actually is rather an illusion. For example I am "self" but I am not really a "self" because I exhale. All the carbon dioxide in my breath goes out of my vascular system and

to some plant out there. While plants inhale carbon dioxide it takes in some photons from the sun. It synthesizes carbon dioxide in its chemical apparatus and expels oxygen. I inhale that oxygen. The oxygen is a really important part of my metabolism because if I do not have oxygen I cannot metabolize.

Hechenberger: What if you talk about your consciousness and not about your substrate your thinking is based on?

Hauser: Where does you consciousness start? Would you have consciousness without oxygen?

Hechenberger: Theoretically yes!

Hauser: I doubt it. You may have an imaginary consciousness, but that imaginary consciousness is probably in your brain. If I cut off your brain you will not have any oxygen and consequently you cannot have that imaginary consciousness any more.

Hechenberger: Basically you are saying that there cannot be any consciousness without oxygen.

Hauser: I am just saying that the world is much more connected than most of the humans would want to admit it is. Let's be a little bit more honest. In the early stages of evolution the Earth was a fairly boring place because it was occupied with blue algae--vast oceans full of blue algae--boring. Multi-cellular organisms have not been discovered. The Cambrian explosion had not happened. Organisms made of a variety of different cell types living together had not happened. When the main explosion happened, all these experimentations started to occur and it is really remarkable if you think about what happened. Remember all the energy, more than 98 percent of all energy that drives all living things on this planet, comes from the sun. Chlorophyll is what allows us to run against entropy. Eventually a cell type decided to break out. A break out occurred. Cells that did not have chloroplasts and could not synthesize solar energy directly into useful energy broke off--the animals. All animals are parasites on plants. Plants convert solar energy into useful chemical energy which virtually fuels everything on Earth.

Hechenberger: Hofstadter would probably argue that what it takes for consciousness to occur is a "strange loop" and it does not matter how it is implemented. It does not matter whether it is implemented on a carbon-based human system or on some other system.

Hauser: You see that, if you think of consciousness as a mechanism, you are talking about carbon based systems as they were sitting in a box. Here we have the box. I take it out. It is a carbon based system. I ask it, "System are you alive?" and it comes back to me, "Not unless I get some energy, Jan." Where does it get its energy from? Nano technology makes a photocell. It can run off photocells. Ok, I will just grow photocells. When I see a life form that can make a replication of itself, grow photocells and convert the photocell into whenever it needs to replicate itself, then I will know that there is another life form. But right now that mechanism is chlorophyll.

Slayton: Coco the gorilla uses human sign language to sign to her handlers. Are we hearing Coco's self?

Hauser: I think so. I think the whole thing of it is that we are going to discover along the way that life is a process not an event. I think that Hofstadter is right. Life can exist in a non-biological way as it exists today, but we do not have the slightest idea how. We do not have a slightest idea…when I first discovered autopoetic systems it was during that time when a couple of guys discovered the double helix in the DNA. They had the audacious claim that they discovered the secret of life. People decided to give them the Nobel Prize for that. And today we still have the audacious idea that because we know how the double helix hangs together we know the secret of life. It is the stupidest thing I have ever seen.

Slayton: Coming back to Coco, how do we know that we are not simply witnessing the mechanistic programming of ourselves? How do we know that we are not looking at it or watching an algorithm? And if it is an algorithm, is it ours or is it of Coco's self? I know you have the answer.

Hauser: I have the answer, but you are not going to like it. It is forty-two. Forty-two is the meaning of life. You are not going to like it. [pause] I want to start with our buddy Al. Do you all know Al Jabar, a Persian guy. He was responsible for Algebra and he was doing algorithms. An algorithm is a formulization which is a way to formally note, on a piece of paper, how we do a sequence of operations to manipulate numbers and later on symbols. This is a branch of mathematics which provides a way to abstractly represent the processing of numbers and symbols in an abstract form. My friend Coco does not know any mathematics. Coco is a living organism and we are trying to take something that does not fit into our

mathematical models and stuff t into he mathematical model. It is a force fit because life is not a mechanism like that.

Can I continue with my DNA? My point is that they discovered the fact that there was DNA. It can expose pieces of itself to a super cell and that would cause proteins to be synthesized. They said, "We have found the secret of life." Actually only one of them said that. Crick actually did not speak much about it because he knew they had not discovered very much at all. Crick was quiet about the whole thing, but Watson went on and everyone said we discovered the secret of life. Our question in 1970 at UC Berkeley--where I used to work in organic chemistry under Melvin Calvin, who got the Nobel Prize for photosynthesis--was, "Where do long chain molecules come from?" There are three billion base pairs all strung together. Was it Hofstadter who hooked them all up? Where do they come from? Thirty years later people are going to say, "What was the chemical mechanism that caused this nuclear chain to latch up together?" Thirty years later millions of Dollars and lots of bright people say, "We still do not know how those things came about." We don not know what made them. The autopoetic phenomenon is not known. It just happened.

It turns out that Crick was starting to believe in panspermia. He made calculations to figure out the likelihood that life could have happened in the soup of the sea on earth three billion years ago. And he went, "Oh shit, there was not enough time for this accident to occur." Crick said: "This is easy. The long chain replicating stuff that is here on Earth came from somewhere else." He did not explain who or what made it, in just came from somewhere else. What we do with Cartesian scientific thinking is that we take whole mysterious phenomena of life, we chop it up into these little tiny sections and we put firewalls in between them. Then we study something like economics. People in economics say, "With morals and ethics the economics system cannot really work." And some student might say, "What about the influences of morals and ethnics on economic systems which seem to function really well?" And the professor says, "Oh, that comes from somewhere else. You learn that in sociology 506." We just break it all apart because it makes it easy when you break it all apart. That is the only way we get complicated systems down to seven bits. The size we can get in our mind. You really need to reduce things down a lot. Complexity sciences are honest about that.

You know that there are really strong interactions between sociology and anthropology and economics, and you cannot break them apart, put them separately and understand how things work. Nor can you

take life and express it as mathematical algorithms and really understand what it is all about.

Hechenberger: How can somebody think about this like that without being philosophical?

Hauser: The payoff is wonderful. Like for instance one of my payoffs is that I actually begin to understand what process generates Republicans and Democrats. I am quite serious.

Slayton: There are several other areas that I would like to make sure we have a chance to talk about. You told me a story about how banks came into existence. So speaking of belief systems, let's talk about banks.

Hauser: Thanks. Actually, in my work on global sustainability I was following my instincts. My instincts told me that money, economics and human beings sustain themselves on the planet. My instincts told me that money and economics were really important. So I set out to discover where risk, insurance, banks, money, and economics come from and how they work. It has been a blast, so let's just talk about where the money comes from. Actually I found that the most useful reading was by an Austrian economist called Friedrich Hayek. He is of the Austrian school of economics. The Austrian school of economics starts off by noticing that currency comes into existence as human beings begin to live in villages that are interacting with other villages. What is the first currency that the humans arrive on? Can you guess?

Hechenberger: Attention!

Hauser: No, I tell you it is not Marlboro cigarettes because they did not have Marlboro cigarettes. No, it is cows. Cattle is the first currency. When people are in small groups, like open source people, you usually have a gift economy. In a gift economy, before we invent money, Alice knows how to get salt and Sam knows how to get fish. Alice comes back with ten times more salt than she needs. She notices that Sam is desperately low on salt. The first thing she does is giving Sam a little bit of salt. Then she runs to Fred who got lots of fish. She gives Fred most of her salt because she knows that Fred can use the salt to preserve the fish. This is a mutual benefit of everybody. Everyone is really attentive to what everyone has to offer and what everyone else needs. This succeeds up to the point the body of people becomes very large. People become forgetful so they need a way to remind themselves on agreements to repay what was given. They start using

rare things. If you are in the middle of the United States and you cannot get sea shells you start using sea shells. Initially this was more a notation system: Here I have six beautiful preserved fish and I give six sea shells which means you owe me six ears of corn, or whatever. You may also use rare bird feathers. Sea shells or feathers being used for money was pretty much a social contract. I noticed that the money is not only a reminder of an agreement, but it is also a store value. Feathers are to remind me that on the next growing season I owe you something. You can call me on that debt. So money is at least a social contract and a convenient way to store or withdraw value.

A friend of mine who is a money theorist has argued that it generally has psychological and spiritual content as well. Economists understand the shell and feather concept, but they deny psychological and spiritual values. I think economists should get over that. I can cheat with feathers and sea shells. They are rare, but I can still cheat. Therefore people go to precious metals because it is really hard to make gold and silver from nothing. It is hard to extract, metals also survive fire, and they are ornamental.

When money becomes precious metals the bank system emerges in northern Italy, perhaps in the 12th century, or around then. You have the Medici in northern Italy and they have a lot of gold. They store and keep their gold in Medici palaces. Unfortunately the servants could see where they are hiding their gold and steal. The Medici also trade with another north Italian family that happens to posses some vineyards. They decide to buy some grapes vineyards which they decided will be thirteen ounces of gold. Now it turns out that the gold is not 100 percent safe because you can cheat with gold. You can actually dilute gold with other heavy metals like lead. What emerges is--and that is where Maturana is looking at self-organizing systems, noticing important initial conditions here.

It is important that there will be just the right number of goldsmiths. Goldsmiths have two functions. They can assure the purity of gold so you can be assured when you are making a gold trade and they can convert gold to and from ornamental things. Now when the goldsmith has the custody of gold they have to protect it. The goldsmith knows how to store gold safely so robbers are not able to steal it, so the Medici start to store their gold with the goldsmith.

What happens one day is that the Medici goes down to buy this vineyard. The Medici shows up with the gold. He withdraws the amount of gold from his goldsmith to and hands it to the vineyard

owner who happens to have the same goldsmith. The vineyard owner hands it back to the same goldsmith. The goldsmith goes, "Wow, this is interesting. Maybe there is business in this?" So the goldsmith comes up with some nice paper and ink and a smooth writing surface and he goes into business of making notes of gold transaction--gold that is stored in his safekeeping. So the Medici comes in and probably writes on three pieces of paper a note of the vineyard ownership transfer for these thirteen ounces of gold. They all sign the three notes and everyone gets a copy. They do not speak English in northern Italy. They speak Italian. The smooth writing service is not called a bench, it is called "banco", and the paper they used to write on was called "banco note". "Banco" literally means bench. That is where the modern banking system began to emerge.

Slayton: Popularization of banking of course spread like wild fire and brought us to a point where the symbolic referent to the bank note was always this valuable commodity as gold.

Hauser: I might add a trusted symbolic referent.

Slayton: …trusted symbolic referent. When the gold standard was abandoned, money became code.

Hauser: Money became a greater abstraction of trust.

Slayton: …a greater abstraction of trust? There is no referent. There is no gold behind the money.

Hauser: Almost, there is gold behind the money in some Asian cultures, but generally none behind it. We have been out of it since 1972.

Slayton: …so the bank preserves its role as a transaction conducting mechanism. The transaction is based purely on code because code can move at much more accelerated rates than paper or goods. The belief system shifts, doesn't it?

Hauser: The belief system has potential to shift as fast as the trust can shift.

Slayton: So what do we trust in?

Hauser: That is pretty interesting. There is a company called *e-gold* that has stores of gold in England, Canada and the US in which I can

own a chunk of gold. Basically I give them whatever they are going to accept from me. I can send them real gold or, at some market rate, I can purchase a share of their gold with a currency such as Dollars. Now I own that gold. From that point out the only information I transmit for purchase over the Internet is cryptographic information backed by that gold I purchased. We actually got bids backed by the gold with no intermediary nation state or nation as a governing body on it. It actually exists today. Thinking of this, it could be a tip of the iceberg that could have the potential to dis-intermediate the nation state. Without a central banking system, without the fed and the treasury we do not have to trust that system. What I think is noble about all of this is that we have invented the bank and put it out there for the people. No one ever intended for the bank to come about. No one designed it. No one made it. It has just happened--just emerged. Wouldn't it be stupid if each time we look up we see "Bench of America" and "Wells Fargo Bench"? That is what it literally means.

Slayton: In that harvest that is based around simulated money--it is money that pretends to be money or acting as being money--is that a precursor to the fall of the nation state? Are we looking at the collapse of the complex system of the nation state?

Hauser: I think we are well into it. We are into a whole different regime today. It turns out that corporations do not suffer the vagueness of the nation state. One of the cool things about corporations is that they do not have to exist in any given nation state. Corporations today can have fragments of itself in France, Germany, the UK, Japan, Australia and China. Depending on how things go with our notion of civility, whatever that means today, the corporate state will probably be the one that will replace the nation state--depending on how things go. I think we are definitely on the cast of a new era.

Slayton: Are the sidewalks in front of the White House and the sidewalks in front of Cisco different sidewalks?

Hauser: Yes, they are definitely different sidewalks.

Slayton: You were talking about the gift economy being open source. How does that affiliate to boundaries of the nation state? Do you think that can have an effect on it?

Hauser: What is interesting about banks is that nobody came up with a theory about them from where they would go and build a prototype. Nobody deployed a prototype bank to see if society would use it. That

never happened. Banks just happened accidentally and not intentionally. Is it theoretically possible for us to have a multi-party exchange in which we actually do not have money? We have the mathematics, the algorithms, and the computing power to come up with a multi-way exchange where somebody wants a digital camera and the person who has the digital camera wants a refrigerator. The person who has the refrigerator wants something else and so on. We can actually arrange a multi-way exchange where everybody gets what they want without the exchange of money. Multi-party barter systems are based on a direct exchange of goods without them to be in notation of depth or any other kind of social contract. Gift economy of course is not barter. Gift economy is simply a society where everyone observes everyone else to contribute or not to contribute to the common good.

Audience: You have also mentioned the spiritual value earlier. Can you explain that?

Hauser: I can explain that. Bernard Leitaer is a currency designer who has written two books. The first book was called *The Future of Money* and the second, which has yet to be published, I think is going to be titled *Beyond Greed and Scarcity*. Spirituality is a useful platform for conducting morals and ethics. If you think in terms of an economist you would imagine two different societies here. Imagine a society where a set of rules is established by a state as the law. We know that we are bound by these rules because we would be in violation against the state. It has the power to punish us either by taking away something of value or by imprisoning us. Now we have a set of rules. Imagine what it takes to make that work.

We have to have surveillance. Everyone should be surveyed by the power called the state. Any violation of the set of rules should be detected. Then we have to go through the judicatory process. We have to find them in violation of the rules and then punish them. From an economic point of view this is called a high transaction cost. It is extraordinary costly to survey everybody, observe the violations, apprehend those violations, administer justice and punish them.

On the other hand we can have an autopoetic system under which useful rules were brought forward and cast about the participants of the society. We follow the rules for what reasons? Maybe for no reason…or maybe for the reasons that escapes the very platform of reason itself. In other words these rules we refer to are morals and ethics. We just do them because they are right, not because the state

says you are going to suffer a particular punishment. That is much more efficient.

I think the reason why we have the psychological and spiritual aspects to money is that things which are either religious or spiritual in their nature are a much more useful platform to conduct morals and ethics. We are not talking about being fair, and we are not talking about any violations of the law. We are talking about a different set of things. I think that the spiritual component is there because it is a good way to conduct morals and ethics, and societies that are run on a good set of morals and ethics work more efficiently than the societies that work through surveillance, apprehension and punishment.

Slayton: This sounds like the society can be easily exploited by someone who can go in there. How can you know whom you can trust?

Hauser: When Winston Churchill talked about democracy he said that it is the worst possible system of government except for all the rest. I think democracy has a lot of rough edges. It has a lot of failings. In contrast the hybrid of democracy, in particular the one that we have constructed here is pretty interesting. In fact I think that is where Republicans and Democrats are coming from because Republicans and Democrats are focusing on one piece of ideology. A significant part of the economic theory that is taught in economics classrooms has been recently proved to be completely wrong. The whole thing about people acting selfishly on the market is just not right by recent social tests.

I think the very idea is a dangerous thing. I think that is why we have a hybrid system. I think that we have components in our system that guard against going too far one way or the other. But I do agree with you, it is subject to manipulation.

Audience: What do you see as the similarities between the corporation and the feudal state?

Hauser: There are many theories why corporations have done so well. One of the theories is that they lower the cost of coordination. I think this is certainly true. The corporation, which is at the end of the day a hierarchical command control system, lowers the cost of coordination. Everyone can be told what to do whenever they are at dispute. It also allows a vessel that people can share a lot of information. They are inside the corporate vessel. You would not normally think that

corporations are that bad. In fact they are not. I believe that people who study these things find that corporations have fatal flaws.

There was a trial (in California) and it was found that a corporation had certain rights--the right of an eminent domain. It was also determined in terms of the law that corporations had the rights that equals those of an individual. There is nothing wrong with corporations having the same rights as individuals except that they do not have morals. They do not have ethics and they are not held to any kind of accountability like individuals are. We are living things and corporations are not. Corporations are just an artifact of human intent. I think we took a turn for a worse there. It is a real dilemma.

In his book *Future of Money* Bernard Lietaer simplifies things into a cartoon. It shows a two dimensional graph where the horizontal dimension is "individualistic" to v.s "collective or socialistic", and the vertical dimension is "money collapse" to "no money collapse." Bernard, who I think is being a little bit too dramatic, is a co-designer of the Euro. He was the early guy who figured out about the technical mechanism of integrating all central banks of Europe into one single monetary system, so he actually does know about the theory of money. He estimated that the probability of the failure of dollar is one in two within the next 10 years. We have fifty-fifty chance of the dollar not being worth much in the next ten years. That is a pretty dramatic statement, isn't it? The Yen went into the tank. We tried to pull the Peso out but were not be able to do so. Then there is the national crisis in Argentina. Nobody noticed the Turkish Drachma--it tanked. Well, it never happened to the Franc and could not happen to the Pound Sterling and it will never happen to the Dollar?

Currency traders do not see it that way. To them this is all a statistical game. The confidence in any currency will be kept or lost. If we really did not have an integrated system right now anything could happened. Lietaer says that if there is a money failure and people are highly individualistic he calls it "hell on earth". If there is not a money failure and people begin to understand that there are social things that are important he calls it "sustainable abundance". If there is no money failure and people are highly individualistic he calls it the "corporate millennium". If there is an economic failure but a social function, he calls it "careful communities". They look like 14th century Europe-- little tiny communities with no way for people or goods to move from one community to another one. We are actually going back to that model if there happens a monetary failure and people will be socially minded.

Audience: You also mentioned the spiritual value of money. Do you see any connection between the rise of the church and the rise of the bank system?

Hauser: I do not know. I do not have the slightest idea.

Audience: It would seem like you can also make that connection between the fall of monetary system and the fall of the church on those countries.

Hauser: I am not really sure about his. I have a friend who is a mathematician. I have known him for a long time. I put down a dollar bill aside as if it were a tip. A perfectly natural act, but it was not a tip at all. We were talking about money theory, and I explained to George the psychological and spiritual aspects of money. He said, "That is not what economics is! Economics has nothing to do with psychology or spirituality." He almost spit at me. And I said, "Is that so? What is this?" showing him a dollar bill--A big pyramid with an eye on it. "What does it say? In god we trust? What is that George?"

Slayton: We are sort of coming to the end here. I have one last question I would like to ask. Could you describe your ideal social technology? What would it look like?

Hauser: First of all, my ideal social technology is a holographic room in my home. It is a 3-dimensional full color holographic thing. When I go to the holo section of my house and you go to the same holo section of your house we are together in that room. You look at me and I look at you, but the moment I want to touch you, my hand passes through your body. I actually think that humans are capable to do so outrageously and unreasonably cerebrals. We actually believe that the stuff we construct in our mind is real and you know it is not. Our media makes us. I think that when we started to use lots of broadcast media like broadcast radio, newspaper, TV we actually started deconstructing culture and deconstructing our society. And we have been doing some horrible deconstruction. I think the telephone was partially a reconstruction of that because the telephone is an interactive medium. It is a living thing. There is a feedback in it. The telephone is pretty good, but it is auditory only and it is almost always one-to-one. It begins to reconstruct culture and society but not very strongly. The Internet is another step in that direction. Graphics begin to come into what looks like telephony, and it can be many different things. It can be a narrow casting. It can be ten different people

talking together or something like that. Graphic components are there. I can scale them up. I can see the richness of the media. The reason I favor that is because it is interactive and there is a feedback in the system. Every living system is a hierarchy of feedback like you would not believe. I mean there is just feedback at every single level from individual atoms all the way up to us. When you take feedback out you do not have the living system anymore.

Slayton: Thank you so much for coming and spending this evening with us. It was really enjoyable. It was great, thank you.

[applause]

[Transcription Editor: Stephan Hechenberger]