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Visions of a wired future

Hillis: We're constructing a reality inside computers

Inventor and engineer Danny Hillis is often described as one of the great spirits of the computer industry. He pioneered the concept of parallel computers. BBC Go Digital presenter Tracey Logan met him in Los Angeles recently and asked him to peer into the future.

Q: You are a bit of Renaissance man because you think about the philosophy around technology and you have said that you think we are at a crucial moment in human evolution in relation to technology as well.

A: I think that there are moments in evolution where the rules of the game change. So for example, the invention of DNA.

Q: The invention of DNA?

A: Well, the emergence of DNA. There are these moments like when DNA first emerged on the earth and another moment say when the nervous systems developed or when language

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developed. They are moments at which the very process of evolution changes and speeds up somehow and I think we are at one of those moments right now.

Q: What makes you think that?

A: Well it is a combination of what's happening in computers and what's happening in biotechnology. We are beginning to construct a reality inside computers that is affecting our real reality. I am not just talking about video games but I am talking about the very objects that we run into every day or existed first inside a computer.

Q: So they were designed for instance on computer-based designed packages and then they are made out of metal and fabric and the rest of it.

A: That's right. In a way we are just living in a kind of computer printout - a three-dimensional printout of the computer's image of the world. Our views of science are often mediated through processing them through a computer and so on.

More and more our reality is connected with something created in a computer and at the same time we are beginning to get the tools for manipulating our own genetic material.

Danny Hillis biography

Co-founded of Thinking Machines, the leading innovator in parallel computing and RAID disk arrays
Former vice president, research and development at Walt Disney
Chairman of research and development company Applied Minds
Designer of a 10,000-year mechanical clock and co-chairman of the Long Now Foundation

I think those two things come together. Evolution in the future is going to be very different than evolution in the past was. It is going to be much more about wilful creation, computation, figuring things out.

In a very real sense I think we are the last of

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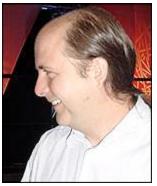
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the old kind of people and we are just beginning to be the new kind of people and we still get to create what that is.

Visions of the future

Q: Just as you hazarded a guess about the microprocessor, all those years ago, can you hazard any kind of guess as to what the new kind of people will be like in the far future?

A: I am not necessarily sure it would be very comfortable. If I described to somebody in the Middle Ages what I do today - designing computers - and I said well, what I do is I work out a pattern in some special language and I etch it onto a piece of stone and I etch this shape and I talk to it in special language and I ask it questions - they would burn me at the stake. It would be incomprehensible because it is that much of a change. I suspect that if you described people, it would be very hard for us to understand and appreciate it.

I think that they will be a continuous product of us. They will be our children or our children's children and so on and there will be a sense of connection. They still will be human, they will still love and care about each other and get angry at each other and so on. But it may very well be that they physically look very different than us. They will live in a very different kind of world.

Hillis: Computer visionary

Q: Does your vision apply to everywhere in the world? Are things going to change?

A: Technology is going to apply to everywhere in the world. In some sense, I think technological development is even more important for the poorer parts of the world than it is for the richer parts of the world.

There are many people here in this country right now who would like to stop technological development and say ok let's just freeze things as they are. I think that's fundamentally a very unfair thing to do. Things here are actually pretty good. It would be ok to freeze them.

Q: You mean in the United States?

A: In the United States and in Europe and in the more developed countries. But there are a lot people in the world - in fact most of the people in the world that things are not so good for - they don't have clean water, they don't have enough to eat because of the food distribution systems, they don't have access to the same kinds of education and information systems that we have.

The only way for those people to get even the standard of living that the developed world has now is through some real technological developments. In fact the only reason that they are not starving right now is because we have had some significant technological developments.

So I think that continued technology development, while it may bring some problems, is an imperative - we are going to have to do it - it is a responsibility to do it.

Impact of the internet

Q: If you were going to invent a device for a poor country where there's relatively little communication and little access to computer technology, what kind of thing would you want to invent?

A: I would have invented the internet. I didn't invent the internet, but I think the internet is going to make a tremendous difference to that differential between rich and poor. All of a sudden we're all part of the same system. So that a kid in India has

> **The internet is going to make a tremendous difference to that differential between rich and poor**
>
> **Danny Hillis**

access to the same information as a rich kid growing up in Los Angeles and a vendor in India can participate in the same system of commerce and transactions as someone here.

I have a friend who is a very wealthy technologist who was one of early people in Microsoft. He is building a house in stone. He found the stone by looking on the internet and he found a stone vendor in India that had the best kind of stone. And he bought the stone directly from the Indian stone vendor. Now there are two people together that would never exist in the same world without the internet and yet now they are doing business together because of the internet.

The 10,000 year clock

Q: You have invented a 10,000 year clock. Why?

A: I have been very interested in watching how people's sense of the future has been shrinking. The technological change is so rapid that it is hard for people to even imagine next year much less 100 years from now. This is probably more of a problem in the United

A monument to time

States than it is in Europe but here in Los Angeles, which is the extreme version, we don't think about even five years in the future normally and anything five years in the past is ancient history.

We live in a very short "now" and I think we have really cheated ourselves by doing that. So what I wanted was a project that lasted beyond my own lifetime - like the people who built the great cathedrals of Europe - starting something that their grandchildren would finish.

Q: I can understand 100 or 200 years but why 10,000 years?

A: Well, 10,000 years is an interesting period because it is the amount of time that basically we have had civilisation technology. So for instance we actually have artefacts that are 10,000 years old. They're pots, they're baskets, they are very simple artefacts. But since artefacts have lasted 10,000 years, it is believable that we could build an artefact that will last 10,000 years.

If I'd picked 100,000 or one million, it is really not very plausible. So I wanted to stretch out to encompass this period of technological development because I am a technologist and I think it is believable that we will be in that period at least for the next 10,000 years.

> **I am making a Stonehenge for people thousands of years from now**
>
> **Danny Hillis**

Q: So you have bought a mountain and you're going to stick this clock on the top of the mountain in Nevada.

A: We have bought a 10,000 flint limestone mountain in the middle of Nevada which has got some mile-long tunnels going through it and the mountain is covered with these 5,000 year-old pine trees, called Bristlecone pines, so it is a perfect setting for it.

People who want to visit this clock will really have to want to because they will have to go a long way and climb a mountain, Kind of make a pilgrimage.

I am working on designing the clock right now and in fact the prototype of the clock is sitting in the London Science Museum right now. It is an entirely mechanical clock, people will have to wind it once a year and it displays on it the sun, the moon, the stars plus the calendar date and that's all.

Q: Let's say this future human that you've been talking about arrives in this place where you have buried this clock in 10,000 years' time and they find the artefact. What do you hope they will see in it?

A: Well, first of all I think they will be able to understand that it's a clock because of the way that it is constructed. It is kind of obvious and mechanical and I think they will be able to tell from its construction what time it is. They will be able to set it by setting it to the stars and what time we thought it was. They will find in the clock, for instance, an artefact that is a kind of modern Rosetta Stone, which has 1,000 different languages on it.

It will be literally a kind of Rosetta Stone with parallel text in a thousand languages. So I hope what they will find is a sort of sense of connection to us and they will connect backwards with us.

Just like when we walked to the Pyramids or Stonehenge we feel some sense of continuity and connection with those people. In sense what I am doing is I am making a Stonehenge for people thousands of years from now.

Go Digital is webcast on BBC News Online every Monday at 1500 GMT and then available on demand. It is broadcast on BBC World Service radio on Tuesday at 1905 GMT, Wednesday at 0105 and 1405 GMT and Thursday at 0905 GMT.

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