This year sees the tenth anniversary of the world wide web, and its creator, Tim Berners-Lee, admits that his original intention has not quite been realised. Rather fittingly, Michael Hewitt conducts an interview by email with the man who gave birth to the information superhighway.

Man of the world

'Who is Tim Berners-Lee?' many of you are no doubt asking. Well, you've heard of the world wide web? Berners-Lee invented it in 1989. Consequently, techies are usually full of gushing admiration for him. For instance, Eric Schmidt, chief technical officer of Sun Microsystems, says, 'If this were a traditional science, Berners-Lee would win the Nobel Prize. What he's done is that significant.' MIT's Michael Dertouzos says that Berners-Lee embodies the 'libertarian idealism' of the internet culture. Whatever that is.

Unfortunately, Berners-Lee himself doesn't say much at all. Then again, if I'd invented something that now seems to serve primarily as a conduit for girlie .gifs and which risks grinding to an embarrassing halt every other day, I'd maybe keep quiet about it, too. As such, what follows is not actually an interview proper; instead, it's his response to a set of emailed questions I sent — rather apt, I suppose.

MH: *Why did you call it the world wide web? That suggests something radiating from a central point. Wouldn't 'grid' have been a better description in the sense of, say, the electricity grid, where if one part gets knocked out, they can re-route?*

TBL: 'Web' mathematically doesn't have a central point; it can be just any directed graph. A 'grid' for me implies strict order along two axes — just ways of filing things from which the web allows you to escape.

MH: *OK, let's go back to the very beginning. Childhood, education, that sort of thing.*

TBL: My parents are both mathematicians. They met while working on the Ferranti Mark I, the first computer sold commercially. My mother has been dubbed the 'first commercial computer programmer' as she went with the machine when it was installed on the customer site. So we played with five-hole paper tape and learnt to enjoy mathematics wherever it cropped up. Later on, my hobby was electronics. When I left school, obviously I was going to do something in either maths, science or engineering. My school, Emanuel, was programmed to send people to Oxford, where the subjects are very narrow. I took physics, thinking it would be a sort of compromise between maths and electronics, theory and practice. It turned out not to be that but something special and wonderful in itself. Physics was fun and a good preparation for creating a global system. In physics, you learn to think up some simple mathematical rule on a microscopic scale which, when scaled, will explain the macroscopic behaviour. On the net, we try to dream up computer protocols which, when extrapolated to the macroscopic, produce an information space with properties we'd like.

MH: *Any particular Road to Damascus experience?*

TBL: No, I just enjoyed science and it went on from there.

MH: *After leaving university you founded a company called Image Computer Systems, and then you were principal engineer with Plessey. What then took you to CERN, in Switzerland?*

TBL: I went there in 1980 as a contract programmer and I played with programs to store information with random links. In 1989, while working at the European Particle Physics Laboratory, I proposed that a global hypertext space be created in which any network-accessible information could be referred to by a single 'Universal Document Identifier'. Given the go-ahead to experiment, in 1990 I wrote a program called 'WorlDwidEweb', a point-and-click hypertext editor which ran on the NeXT machine. This, together with the first web server, I released to the High Energy Physics community at first, and then to the hypertext and NeXT communities in the summer of 1991.

MH: *Do you ever get irritated when people describe the world wide web as the 'information superhighway' when, in practical terms, it's more like an information B-road? Do you, say, ever experience internet rage because of the delays and give the system a good kicking? Or would that be too much like kicking one of your own children.*

TBL: Children and computers are quite different.

MH: *So, no speed problems?*

TBL: I don't have any myself. But from your insistence I assume this is a UK-specific problem. Maybe with UK-US connections? It can be solved.

MH: *How?*

TBL: Someone has to buy more cable. I think the first thing is for some enterprising magazine (hint!) to take a large selection of ISPs and find out how they route their packets and where the bottlenecks lie. The result might make an interesting comparative list of ISPs. Or, you might find that all ISPs suffer overloads. A more constructive thing is to change your ISP to one which not only has 56K modems but also has them connected to something meaningful. The more technically orientated amongst you might run 'trace-route' tests to find out whose fault it is that your packets aren't getting through. You could also lobby your government to set up a telecommunications industry on the assumption that every home should have a cheap, permanent internet connection along with domestic utilities.

MH: *Apparently, you hardly spend any time simply browsing the net yourself. Why is this?*

TBL: I spend much of my working time using the web, as the W3C team uses it as its place of work. I don't surf for recreation. I use the web to achieve things. I get my quota of discoveries from the things people mail me which they have found.

MH: *What's W3C?*

TBL: The World Wide Web Consortium. Between the summers of 1991 and 1994 the load on the first web server [info.cern.ch] rose steadily by a factor of ten every year. In 1992/93, first academia and then industry were taking notice.

▲ **The many faces of Tim Berners-Lee, founder of the World Wide Web and latterly W3C. He's still chasing his 'original dream'**

I was under pressure to define the future evolution. After much discussion I decided to form W3C in September '94, with a base at MIT in the USA, INRIA in France, and now also at Keio University in Japan. There has always been keen competition to come out with the best web technology. This has followed from the fact that the standards, being open, allow anyone to experiment with new extensions. This produces the threat of fragmentation into many webs and that threat brings companies to the W3C to seek agreement on how to go forward together. The Consortium is a neutral, open forum to discuss and agree on new common computer protocols.

MH: *Shouldn't W3C consider setting up the equivalent of a standards committee to grade material that's on the net? At the moment, 99 percent of it is garbage. Some sort of kite mark is surely required to grade sites. Then, perhaps, people could set up their browsers only to accept sites which have that kite mark. Or is this something W3C is working on?*

TBL: What constitutes 'junk' is subjective. Yes, we have a lot of common understanding about what is junk, but there are different criteria. It would be awful to have one central body assigning 'quality' kite marks to material — this would not be in the spirit of the web at all. Nevertheless, it would be great for bodies to set up their own endorsement systems. W3C has designed technology which allows these endorsements to be encoded and transmitted. There isn't a social system at the moment for paying for this work, but it will have to come. Then, you will select as you browse, or search, which endorsement systems you want to use.

'Censorship, whether it is by government or ISPs, IS AN AFFRONT TO HUMAN RIGHTS AND SHOULD BE FOUGHT by all those of good will'

MH: *Where do you stand on censorship of material on the internet?*

TBL: Censorship, whether it is by government or ISPs, is an affront to human rights and should be fought by all those of good will. This doesn't mean that all communication is good communication. Things like libel and child pornography are illegal whatever the medium — if it's illegal on paper it's illegal on the web. I also think parents have a duty to select material for their children just as they help them select books. But that's something which should be left to parents, not governments.

MH: *Does it irritate you that the internet has become a major conduit for junk mail and porn?*

TBL: The web and mail are distinct. On the web, you only browse what you want to see. If you find yourself reading junk, consider where you found the link and don't trust it again. So if you are browsing web sites with junk or porn, that's your choice, your problem. Email spam is a separate problem. I don't know the solution.

MH: *How many junk emails do you get each day? You're probably in a better position than most to get back at the spammers; are you ever tempted?*

TBL: I don't know how many. I have good filters and only one or two slip past. It's very difficult to get back at spammers. Yes, I am tempted, but I have no magic method. But for those reading this, then you're hereby notified that I charge a $50 handling fee for spam!

MH: *You decided to make the world wide web an open system so as not to impose constraints on its expansion. Do you ever wish you'd arranged things whereby you now got a percentage on, say, every internet commercial transaction?*

TBL: Nope. It would never have taken off if I had.

MH: *Does the internet risk polarising society — the world, even — into the 'information rich' and the 'information poor'?*

TBL: Yes. This is a serious concern. The wealth gap is a concern in many ways, and just one is the way in which the internet can accelerate the difference.

MH: *And what are the risks of not jumping on-board the internet bandwagon?*

TBL: If your connectivity is as bad as it sounds, you won't have long to wait to find out! The answer, though, is that the main risk for an economy which *doesn't* make use of the net is that it will move more slowly and not compete with the one that is actually working, rather than sitting waiting for its mail to arrive.

MH: *You're quoted as saying of the world wide web that 'There are many parts of the original dream which are not yet implemented.' For example?...*

TBL: An intuitive collaborative environment, in which people interact through a common world of shared knowledge. The web data should be arranged in a way that allows programs to analyse what's going on, and therefore lets computers help us manage ourselves.

MH: *When you're reading a newspaper, or travelling, and you see the proliferation of web addresses in advertisements and so forth, do you ever get a feeling of pride and think, 'All this is down to me'?*

TBL: No. There have been a huge number of people all working together.

MH: *Where do you call 'home' these days?*

TBL: I live in the United States. I like many aspects of it but am quite nostalgic for the UK. I also miss France and Switzerland, where I lived for ten years.

MH: *If you could travel back to 1990, what, if anything, would you do differently?*

TBL: I would make http://www.w3.org/TR be written as http:/org/w3/TR, instead. □