



The internet at 40

Pioneers: Tim Berners-Lee

In 1980, a young software consultant called Tim Berners-Lee wrote a program called Enquire. It involved the use of hypertext – links that allow users to jump directly from one computer page to another. It sowed the intellectual seeds of an information revolution – the world wide web.

In the late 1990s, Tim gave several interviews against rather noisy backgrounds, for the Open University series TheWebStory.com.

Tim Berners-Lee

The Web is an abstract space of information. The Web is a space of pages, of documents, of pictures which are linked together and links are abstract links. Now in fact for the Web to exist all this information about the links and about the documents is transferred over the Internet.

Tim's pioneering idea for the world wide web emerged in 1989, when he was working for CERN, the European Organisation for Nuclear Research

Tim Berners-Lee

I was just frustrated with the lack of inter-operability, the fact that people were championing different documentation systems and help systems and I tried experimenting with actually taking all the documents in one system and making it appear as though they were in this help system. And so I looked at the mapping between the two and eventually I realised that this little hypertext programme I'd been playing with ten years before was in a sense the key in that if you made a global hypertext system, any of these systems could be represented in terms of it. And so suddenly this was the answer to making any system available without disturbing it even. That was the key thing – without putting constraints on somebody, forcing them to use a particular machine, forcing them to store their documents in a particular format. It just said all right. Let's not force any of those issues. Let's just second-guess them. Let's just step above them and let's say what ever format you put your document in let's say that it's part of the universal space and let's find a way of making an identifier for it. And once you'd had that idea it's really pretty unstoppable.

So when I said 'hey I think we should make a completely general global hypertext system' the very proper answer at CERN was 'well that's fine but it's not what we're here for'. So in fact it was only because my boss Mike Sandel, who had a sort of twinkle in his eye and thought oh you know I don't know what exactly this is about but I have a feeling it sounds kind of exciting'. And he said well why don't you spend the next couple of months – I won't complain if you just go and write the programme.' If Mike hadn't said that, if I'd had to go through the process of trying to get a formal project approved it would never have happened.

Tim's brilliant idea was to make documents located on one computer appear to be located in a window on another computer. It took Tim and his colleague Robert Cailliau two years to develop and refine the protocols that could make this happen.

Tim Berners-Lee

When you're looking at a Web page and you click on a hypertext link then hidden behind the actual text of what's written there is the identifier of some other page. When you click on it then the programme which shows you that page looks up the identifier.

The identifier is one of these things which starts with HTTP colon slash, slash. Now HTTP means if you want to get at this thing this is how you do it. You take the rest of the string, the rest of the characters, and the first bit is something like www.acme.com. And that is the address of the computer. It's a name of a computer in fact. So what the first thing you do is you go out to another computer you know which knows about the names of computers and says hey where do I find this? And you get back a computer number like 28.34.6.12. Something looking more like a telephone number of the other computer. And your computer then uses that to make to start communicating with the other computer which has got the information. And what it does is it sends a very simple message. It just says, "get -" and it gives the rest of all the other characters left. So when you look at something which says http - colon - slash - slash - that means use hyper text transport protocol www.something.com that means go to this computer, slash gobbledegook - gobbledegook - gobbledegook -gobbledegook you don't have to understand. All you do is you know that is what you ask for. So it makes the connection and it sends a very simple command which is get gobbledegook gobbledegook. And the response is that the - the information about how to put up that page comes back across the Internet, across that connection. So it's really very simple. It's just 'get me gobbledegook. Here's gobbledegook'.

To start with, the web was limited to developments within the CERN community. Then, in August 1991, Tim and his colleagues launched the first publicly available web site, a milestone in the history of the internet.

Tim Berners-Lee

A lot of people ask what was it like when the Web when it suddenly exploded but it didn't. It didn't suddenly explode. What happened was it was for the first two years a big, hard slog trying to persuade everybody that the idea of global hypertext was not too crazy or too complicated or too confusing or too expensive or whatever. And in fact that it was very simple and in fact it was saving time etc so with my fellow evangelist and colleague Robert Cailliau we went around to conferences and we went and talked to people individually within the High Energy Physics Community which was basically paying our salaries remember so to persuade them that this was important High Energy Physics and we at the same time sent out some email and news – articles to news groups and things. And it was not apparent that it was actually going to make it for a long time but the interesting thing was that when I looked at the logs of the servers, the first server was called info.cern.ch, and the load on that server which started off ten hundred hits a day when in the summer of '90 the load on that server went up exponentially during the next twelve months and then when I looked back and made a year after that made a graph of the second twelve months it was again exactly the same shaped exponential curve. So after a while I started plotting it on a log scale so that you could see it as it went up from the hundreds to the thousands to the tens of thousands. And the load on that server was just as the time went on from the summer of '91, the summer of '92, summer of '93, summer of '94, the load on the server just went on increasing by a factor of ten every year.

But the growing success of the world wide web only partially realised Tim's initial dream of what might be possible.

Tim Berners-Lee

The first part of it was wouldn't it be great if we had this universal information space and everybody could be in sort of equilibrium with it so they could exchange information very fluently through it. Wouldn't this do something amazing for human kind if we were connected through this information space? That was the dream Part One. And the other half of the dream was suppose you have a situation where anything which any idea which is worth typing in, worth clicking in with the mouse, is in the Web then maybe we should bring back the computers, the computers which have gotten out of the way. The computers which have hidden, made themselves scarce and just produced this information for us. Maybe we will be able to use them again. Maybe we will be able to write programmes, which can analyse what on earth our society is like, what on earth we are trying to do. That was the second part of the dream. And that's

not there at all. For that we need a whole lot more technology in the Web. We need machine understandable information. We need digital signature. We need a Web of trust. We need logical reasoning out there on the Web. That is going to be yet another revolution. I think it's going to be as dramatic as the Web Phase One if you like. And we haven't started yet. So really if you think everything's over you're completely wrong. This is just the start. We are just figuring out how to make these global revolutions using technology and how to make them be a good thing for human kind. So jump on board now because it's speeding up.