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Davies – who back in the 1940s was said to have found a number of errors in Alan Turing’s work, much to Turing’s irritation – based his work on the idea that computer network traffic was chatty, marked by long silences followed by sudden bursts of data, as opposed to the always-on nature of telephone traffic.

It was Davies who coined the term [packet switching](#) for the concept of dividing this data into little packets that could be sent independently, and not even necessarily over the same path, to their destination. His work at the NPL, along with that of other pioneering computer scientists such as Len Kleinrock and Paul Baran, fed directly into the creation of the US military-owned [Arpanet](#) at the Advanced Research Projects Agency (Arpa).

ONE IDEA, MANY INTERNETS

Cisco fellow and engineering and network scientist Fred Baker takes up the story to walk us through the net’s early days in the 1970s, when a number of research scientists worked on competing protocols, giving rise to something of a problem.

“A whole bunch of work went on in that context developing the concepts and decided what in the world this internet thing actually was,” says Baker. “Guys like [3Com founder] Bob Metcalfe worked on similar concepts at Xerox and came up with Ethernet, for example. Everyone was trying to come up with a network architecture that would allow them to lock in their customers, so that, for example, if you wanted a Xerox workstation, you needed a Xerox network. This was actually kind of amusing to watch,

› *The future of the internet is at risk from multiple scenarios, and quick action is needed to protect it.*

because whenever anybody came up with a good solution to a problem, suddenly everyone else would need to solve it, too. It was just a whole teetering, tottering mass of features.”

Although Arpanet was switched on in 1969 – famously falling over midway through transmission of its first-ever message – [Vinton Cerf](#), another of the fathers of the internet, holds that the internet itself really only got its start in 1983, when his work on the [transmission control protocol](#) (TCP), which he first showed to the world at Sussex University in 1973, came to fruition.

TCP was developed jointly by Cerf and colleague [Robert Kahn](#) in an attempt to solve exactly the problem described by Baker: that there was no common language and too many communications protocols, which meant there was no easy way for different networks to talk to each other.

INTERNET PROTOCOL

Further down the line, Cerf split TCP into two parts, one of which was named [internet protocol](#) (IP), to facilitate the transmission of real-time data. It was the joint TCP/IP standard that was eventually to become the base on which the 400-odd Arpanet hosts would be migrated. This [switchover](#) occurred on 1 January 1983.

“When the day came, it is fair to say the main emotion was relief, especially among those system administrators racing against the clock,” Cerf wrote in a 2013 blog post marking the 30th anniversary of the TCP/IP switchover. “There were no grand celebrations – I can’t even find a photograph. The only

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beginnings of commercial use as it started to expand outside of academia, saw it come to dominate and supersede the Arpanet. If one must settle on a final date, it was probably in early 1990, when Arpanet was switched off, and [Vinton Cerf wrote its eulogy](#):

*"It was the first, and being first, was best,
But now we lay it down to ever rest.
Now pause with me a moment, shed some tears.
For auld lang syne, for love, for years and years
Of faithful service, duty done, I weep.
Lay down thy packet, now, o friend and sleep."*

BRITISH INNOVATION

But the Americans didn't have the development of the internet all their own way. Back in Britain, and back in the 1970s, Post Office engineer Sam Fedida developed a video text system that, in many ways, predicted exactly what the internet would become.

The system, called Prestel, consisted of a TV set connected to a dedicated terminal that received information over a copper phone line. Sounds rather familiar.

Prestel also enabled users to access Telecom Gold, an early BT-backed email service, to which Prince Philip was an early subscriber. In 1985, his emails

were famously hacked by two technology journalists, Robert Schifreen and Stephen Gold. However, as there was no actual law against hacking at that time, the two men were charged under the Forgery and Counterfeiting Act of 1981 with forgery that deceived a "non-human target". The conviction was later quashed by the Court of Appeal on the grounds that the "false instrument" crucial to Schifreen's conviction had technically been made by a computer, and not Schifreen himself. Ultimately, this led to the [Computer Misuse Act](#) of 1990.

Unfortunately for Prestel, despite finding a ready and enthusiastic audience among travel agents, which used it as a booking system – it bombed among consumers, mostly, according to BT archivist David Hay, because it was overpriced and under-marketed. It was shut down in the 1990s.

However, its influence was to rear its head again 10 years later, when Prestel became the subject of a court battle over the intellectual property (IP) rights to hyperlink technology. "We still had the patent rights," says BT's Hay. "In 2000, the patent was still active and BT tried to claim IP rights to hyperlink technology in the US on the back of Prestel. In the event, it wasn't successful, but had we won. In theory, we could have claimed a royalty every time a business or an ISP [internet

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service provider] – not a consumer, because we always said we would never go after consumers – used a hyperlink, which would have made things a lot easier for BT.”

And, of course, as we have already touched upon, the internet was given a massive boost by the work conducted at CERN by Tim Berners-Lee when he created the World Wide Web, gave it to the world for free, and made possible the online world we know today.

We all know what that world looks like. Together, the internet and the World Wide Web have enabled a whole new economy and driven disruptive and innovative business models, caused an economic boom and an economic crash, and, from a social perspective, have brought together people from around the world in shared enthusiasms (and shared antagonisms), and even forged new marriages and families that would never have happened without them.

Talking of marriage, there is another aspect of life that the internet has changed.

THE INTERNET IS FOR PORN

One often overlooked trend in the evolution of the internet has been the impact of the adult entertainment industry.

Sex and technology have long gone hand-in-hand. Almost as soon as the Victorians perfected the camera, people were taking their

» Find out more about the internet of things (IoT) and get advice on how to manage explosive growth in connected devices and objects.

clothes off in front of its lens, and just as video recording medium Betamax failed in no small part because pornographers backed the rival VHS standard in the 1980s, so this powerful, lucrative industry helped dictate the evolution of the internet. After all, as the cast of hit Broadway musical *Avenue Q* sang: “The internet is for porn.”

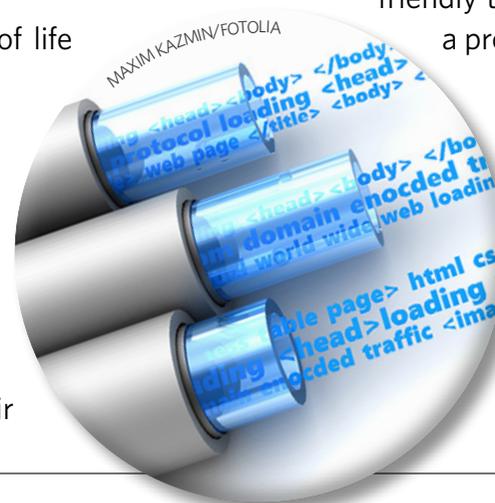
Actually, the adult entertainment industry is an excellent gauge of just how far we have come. Consider the 1990s, when it allegedly took whole minutes to download one indecent image, and compare that to 2016, when anyone with a superfast broadband connection can stream high-definition pornographic video with no problem whatsoever – something that was barely imaginable in 2000, let alone 1966.

CREATIVE DESTRUCTION

Adtran CTO Ronan Kelly sets out this trend in more family-friendly terms, describing the evolution of the internet as a process of “creative destruction”.

Just as faster internet brought easier access to pornography, forced much of Soho’s sex industry out of business, and helped kill off VHS tapes, so it played its part in the decimation of the music industry and the rise of services such as iTunes and Spotify, says Kelly.

Alternatively, consider its impact on the publishing industry. As the internet comes to dominate, we have seen a frantic search for new



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business models by the owners of venerable newspapers such as *The Times* and *The Telegraph*, the rise of clickbait “infotainment” websites such as BuzzFeed, or even Computer Weekly’s [transition to an online-only title](#) in 2011.

FAMILIAR BACKGROUND NOISE

And so we come full circle. As mentioned above, the network has become an essential, pervasive element of all of our lives. It has, to paraphrase former Cisco chief executive John Chambers, become instrumental in how we live, learn, work and play.

Will this continue? Without a shadow of a doubt. The internet was transformed by the web, then later file-sharing, video and voice. The latest transformative trend, says Cisco’s Fred Baker, is the [internet of things](#) (IoT).

During the course of his career, Baker has seen the internet move from a niche element – he recalls describing his job in the 1980s as “teaching computers to talk to one another” in an attempt to demystify something most people found frankly baffling – to something with which we can all interact with ease. The internet is both pervasive, and very familiar to us all.

“If anything,” concludes Baker, “the internet will become like background noise.”

But as we know, familiarity has a tendency to breed contempt. The internet, and the networks from which it sprang, are a source of immense power in the world today. A force for good, indubitably, but capable of immense harm in the wrong hands. The [internet needs careful stewardship](#), and protection from those who want to control it. We forget this at our peril. ■

