



Legends

Sasha Cavender, 10.05.98

NEW YORK - RAY TOMLINSON CREATED SOMETHING BIG, but he is known for something very small. Sitting in his compact office in a bland building in Cambridge, Massachusetts, the inventor of email smiles at the idea that his name seems destined to be linked to the @ sign, the symbol used to introduce an email address. "I thought about other symbols, but @ didn't appear in any names, so it worked," he says.

That was then. Now the sign is fast becoming a pop icon that signifies the hyperlinked communications of our time, ubiquitous on billboards and ads, company names (@Home), and even works of art, such as the ballet F@ust. Currently, more than 125 million people use the sign in their electronic addresses, an identifier that now means more to many of them than the numbers on their homes.

Considering how profoundly Tomlinson's invention has changed the way we live and work, its beginnings were modest. After graduating from MIT in 1965, the young computer engineer spent two years working on a doctorate, then went to work nearby at Bolt Beranek and Newman (BBN), a company that had a government contract to work on the Arpanet, precursor of the Internet. "We were building an operating system to run on bargain-basement hardware," recalls his longtime friend and BBN colleague Jerry Burchfiel, "and Ray came up with a 'Send Message' program. It worked only on a local system at first, but then he took it further and created cross-Arpanet mail."

Unlike Alexander Graham Bell's famous first call to his assistant, Watson, the content of the first email message -- from Tomlinson on one computer to himself on another -- is forgotten. Tomlinson didn't make a big deal of his breakthrough. "When he showed it to me," Burchfiel says, "he said, 'Don't tell anyone! This isn't what we're supposed to be working on.'"

That worry ended when Larry Roberts, a director of DARPA, the government agency that ran the Arpanet, jumped onto the system and began doing all his communication by electronic mail. That, in turn, forced researchers dependent on Roberts for their funding to get online, and the system quickly went from being a convenience to becoming an essential tool.

Like certain other pioneers of the information age, such as Tim Berners-Lee and Vint Cerf (both profiled in previous Forbes ASAP "Legends"), Tomlinson has changed the world and made a lot of others rich without cashing in himself. "Innovation is sometimes rewarded," he says with a laugh, "but not this innovation."

BBN was bought last year by GTE, and today, at GTE Internetworking, Tomlinson is helping develop the company's CyberTrust software, which will make e-commerce more secure by issuing certificates that vouch for the identity of customers. "It's better than an electronic signature because it can't be forged," he says. "And certificates increase the level of anonymity, so you have greater assurance your privacy will be preserved."

Email has changed the way business -- from huge corporations to mom-and-pop shops -- does business. It's altering the way millions shop and bank.

It's become the new "kitchen table" for far-flung family members. To some it's as intimate a medium as the scented ink and writing paper of the Victorian era. But not all of this change and growth makes Tomlinson happy. He reminisces about the collegial chaos of the early years, and hates the flames, spams, and schemes that abuse the system's open nature. As email becomes rooted deeper and deeper in modern life, a certain structure -- for better or worse -- is an inevitable part of its explosive growth. Tomlinson acknowledges this without resentment. "But," he says a little wistfully, "I miss the anarchy."

<http://www.forbes.com/asap/1998/1005/126.html> (consultado a 05/07/2005).

BBC NEWS

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H@ppy birthday to you

E-mail is 30 years old this month

To most of us, electronic mail is a relatively recent phenomenon. But the first e-mail was sent 30 years ago, after a programmer came up with the "@" symbol format for e-mail addresses, writes BBC News Online's technology correspondent Mark Ward.

Can you remember the first e-mail message you ever sent? Unless you are a very recent convert to the internet, then probably not.

If the subject and content of that first electronic epistle escapes you, don't worry, you are in good company.

Ray Tomlinson can't recall his first e-mail either but, with due respect to yourself, it was certainly more significant.

Mr Tomlinson has been called the father of e-mail because, back in 1971, he invented the software that allowed messages to be sent between computers.

He didn't invent e-mail itself. That had been around since 1965 when Fernando Corbato and colleagues at the Massachusetts Institute of Technology developed a program to let the individual users of the institution's Compatible Timesharing System (CTSS) swap messages.

But that program only let people using one machine communicate with each other.

Message log

Ray Tomlinson made it possible to swap messages between machines in different locations; between universities, across continents, and oceans.

At the time Mr Tomlinson was working for Boston-based Bolt, Beranek and Newman, which was helping to develop Arpanet, the forerunner of the modern internet.

He had been working on a program called SNDMSG, which, like that developed for CTSS, let all the users of one machine leave messages for each other. At the same time, he was refining a method of transferring files from one machine to another across a network. Putting the two together Mr Tomlinson came up with the first e-mail program.

Just as important as the 200 lines of code that made up the e-mail software was Mr Tomlinson's elegant way of organising the addresses of people and the computers that held their e-mail account.

The Model 33 Teletype keyboard connected to the computer Mr Tomlinson was using only had about 12 punctuation characters. Out of this limited pool he plumped for the @ symbol which has since become an icon for the internet age - as well as launching a thousand naff company names.

The advantages of using this symbol are manifold. For a start, it makes mail addresses much easier to remember than any scheme based on large strings of numbers. Its separation of the person getting the mail from the machine they are using also helps organise the addressing scheme of the whole internet.

First address

Mr Tomlinson's e-mail address was tomlinson@bbn-tenexa. BBN was his employer, and Tenex the operating system used by machines at the company. The more familiar .com, .co.uk and so on came much later.

But even though a lot of details of those first mail systems are known, the text of the first message has been lost. Mr Tomlinson sent this historic message to himself from one machine to another sometime in October 1971. He said the text of this first message was "completely forgettable" but suspects it said something like 'qwertyuiop' or 'testing 1-2-3'.

As a harbinger of a new epoch in communications this does not compare well with the first telegram which read: "What hath God wrought!"; or even with the "Mr Watson, come here; I want you" uttered by Alexander Graham Bell over the first phone line.

Despite this, e-mail soon proved its worth and it swiftly became the most popular application on the fledgling net which, at that time, linked together computers at just 15 sites. Today, there are tens of millions of computers and e-mail is still the most popular application.

Experts think it will keep on growing. US Market research firm IDC predicts the number of e-mail addresses to grow from about 505 million in 2002 to 1.2 billion by 2005.

Change for the worse?

The internet, with its multimedia websites and sophisticated electronic commerce, is very different today to its incarnation 30 years ago.

Not all these changes are for the better. Anyone with an e-mail account has probably received unsolicited commercial e-mail, or spam, offering them pornography, get-rich-quick schemes or dubious herbal remedies.

But the popularity of plain text e-mail messages, which make up the bulk of those sent, show why the net has been such a huge success. They are convenient and leave a record that they have been sent; and now many of us can't live without them. It clearly answers a primal need to communicate, to keep in touch and socialise.

And that is one message coming through loud and clear.

http://news.bbc.co.uk/2/hi/in_depth/sci_tech/2000/dot_life/1586229.stm (consultado a 05/07/2005).

DARWIN MAGAZINE

Prime Movers

LEADING LIGHTS OF TECHNOLOGY

January 2002, Daintry Duffy

Ray Tomlinson, Inventor of e-mail

Certain pivotal moments have been immortalized in communications history, such as Alexander Graham Bell's rather perfunctory first telephone call to his assistant ("Mr. Watson, come here. I want you.") and Samuel Morse's dramatic exclamation in his first telegraph message ("What hath God wrought!"). Given the revolutionary effect that e-mail has had on the way people communicate the world over, one might expect the first e-mail message to have been similarly memorable. But Ray Tomlinson, the computer engineer who first discovered the means to send a message from one computer to another across a network, clearly had other things on his mind.

"I think I may have just dragged my fingers across the keyboard," muses Tomlinson, recalling the first message that he sent back. A symbol plan

Tomlinson came up with the @ symbol after 30 to 40 seconds of thought.

in late 1971. At the time, he was working for Cambridge, Mass.-based BBN Technologies, the company that developed ARPANET, the forerunner of the Internet. Tomlinson was working on a program called SNDMSG (send message) that allowed users of the same computer to leave messages for one another—sort of a single-computer version of an e-mail system. At the same time he was testing a file transfer program (CYPNET) that would allow users to send files to remote computers linked to ARPANET. It occurred to Tomlinson that if he melded SNDMSG and CYPNET together it would be possible to send messages to other mailboxes on the network as easily as sending files. "It was straightforward," he recalls, "just a matter of two ideas that came close enough together."

One of the decisions that Tomlinson had to make as he experimented with e-mail was how to distinguish between messages that were headed out onto the network and those that were addressed to users in the same office. He studied the keyboard for a symbol that didn't occur naturally in people's names and that wasn't a digit. The designation for mailboxes on remote computers that he came up with was the now ubiquitous @ symbol. "It designates a place, and it's the only preposition on the keyboard," he points out. Though it turned out to be a decision with far-reaching impact, at the time Tomlinson gave it only "30 to 40 seconds of thought."

These days Tomlinson is still working at BBN (which has since been acquired by GTE and then Verizon) on a software application that can perform logistics planning. Though he has had very little to do with e-mail (other than being a user) since the mid-1970s, Tomlinson remains proud of his creation. "The cases where it has opened up new avenues of communication between people has been gratifying," he acknowledges. "I have received a number of e-mails from individuals who have found it to be a godsend in getting in touch with people and building a sense of community."

http://www.darwinmag.com/read/010102/buzz_mover.html (consultado a 05/07/2005).

DATAMATION[®]

A Conversation With The Inventor Of Email

July 16, 2002

By Sharon Gaudin

Ray Tomlinson gave society one of the greatest communication tools in history. He invented email back in 1971 -- essentially fostering global business communication and turning the Internet into a digital kitchen table for far-flung family members.

The MIT grad is one of the forefathers of the Internet, working on ARPANET, the forerunner to the Internet, along with workstations, super computers and a slew of protocols.

But email may be his greatest legacy -- if not the toughest project he's ever worked on. Alexander Graham Bell became a household name -- someone children learn about in school -- because he invented the telephone. But consider that in this high-tech era there are more emails sent every day than telephone calls. That definitely gives Tomlinson his own place in history, if not a life of fame and fortune.

In this Q&A, the man who was honored earlier this year for a lifetime of innovation by Discover magazine, says he's irked by spam and hopes for a technical solution. He also talks about his vision for the future of email, dismisses claims that he's changed society and updates us on the distributed computing project he's working on today at BBN Technologies in Cambridge, Mass., where he's worked for the past 35 years and is their much-lauded principal engineer.

Q: What was your vision for email, and has the reality of it lived up to your expectations?

I'm not sure there was a vision there. It was a hack -- a neat thing to try out. ...It probably took four, five, six hours to do. Less than a day spread over a week or two -- when I had a spare moment. The idea was this facility had proved its usefulness sending messages to the same computer. What about when someone was on another computer, maybe across the country? It would be like the telephone but they wouldn't have to be there to answer the phone.

Q: When did you realize how big email was going to be?

It never seemed big at the beginning because there weren't many computers. It was only as big as the network. It depended upon having people with access. As an idea, it caught on right away, but there were so few people on the network... We didn't call it email. If we called it anything we called it mail or messages. The contrast with snail mail wasn't necessary then... I never documented the creation of the program. In 1993, someone started to ask where email started. I knew I had done the program... but later various people came along and there were a lot of additional ideas that went into it.

Q: How many email addresses do you have?

I have three that I use and three that I don't. They're three come-along-for-the-ride email addresses that you get from an ISP.

Q: How do you feel about spam and what should be done about it?

I get irked when I get spam. It's a tough problem and I'd like to see a solution come along. So far the solutions aren't working. Either they filter too much or they're not effective when they should be. They don't do what humans would do. Why did that email come through? And why didn't that legitimate one get through? No, I don't think legislation will work. I hate legislative solutions. It just doesn't sit well. I'd like to think people have the common sense not to spam, but obviously they don't. It's still possible we may have a technological solution for it. I would like to see that. I'm not spending any time on it myself. The other stuff I'm working on now is more interesting to me. I didn't have any association with email after the late '70s. I watched it from afar but I didn't participate.

Q: How do you see email evolving? What will it look like 10 years from now?

If it doesn't get killed off from spam, it probably won't be a lot different. You may see it more closely integrated with other forms of communication, though, like instant messaging. Once email is answered, you could continue the conversation more immediately, like with instant messaging. Simultaneous correspondence is a lot better than a few emails in a few hours. Or maybe you'll get an email and press a button and make a phone call... not with Verizon, but over the Internet. People would like more seamless interaction between the tools. They don't like being in a particular mode and having to switch to another. I want to specify what

I want to do. I don't care how it happens... Bandwidth will go up. DSL is becoming more common. Cable modems are more common. Technology there will improve those services.

Q: What do you think of instant messaging?

I don't use it myself. I got turned off when I installed some browser that insisted with cluttering my screen up with instant messaging. The closest I've come to IM is some chat services. They were not fast enough. They weren't instant to me. I think people who use it are very happy with it. It fills an important niche.

Q: What can be done to make email more secure and cut down on the distribution of viruses and worms?

The insecure part of email is not something you can fix with technology. It's just so convenient. You can have an attachment in an email that does something for you. The attraction with that tempts people to click on an application... and get a virus. Anything you can think of to tag that as a virus is not going to be used. You'd have to have the cooperation of the hacker for that to work. And if your ISP threw away every attachment, that wouldn't work because email would lose its utility as a communication tool.

Q: A lot of people say email has changed society. Do you buy into that?

I think there will never be an answer to that. It's had an effect. I don't think people are fundamentally different now than they would have been. They simply communicate more. Maybe they've made friends and maintain relationships that they wouldn't have. But bad guys are still bad guys. Good guys are still good guys. Friendly people are still friendly. Just because they can be friendly over email and not a telephone [isn't that much of a difference]. You just have a larger community to draw from. If you have problems or are looking for answers, you have additional opportunities to find those answers. It's like having a library in your hometown or not. If it's not there and you have to make a trip to another town, you might not do it. You can tap into resources more readily. People have found answers to questions and email has been part of that solution.

Q: Is high-tech research as exciting to you now as it was back in the late '60s and early '70s when you were working on ARPANET and email?

Yeah, the subjects are different. This may be more exciting because there's so much happening all at once. We have this wonderful tool - the Internet. It's been around in one form or another since about '74. That's when the first networks were hooked together. It's just a wonderful resource. Think of ways to hook things together. Think of ways to get information.

Q: What are you working on now?

Distributed systems that use tools in various places around the country and work out solutions to problems. Trying to get it to happen is a challenge, but getting it to happen is tremendous. The system is based on agents, which are software applications that have certain expertise to work out solutions, like scheduling. Other agents know how to take a problem and break it down into smaller problems. They talk with each other and give each other answers. One agent will have access to specific information so it will be able to answer specific questions. We're actually working on solving the Department of Defense's logistical problems. We have a particular focus, but the overall techniques are general and could be adapted to other scenarios... We're working on both Linux and Windows and it's written in Java so it's relatively platform independent.

Q: Does it bother you that Ray Tomlinson is not a household name despite the contributions you've made?

No, it doesn't bother me. It's a geek thing. Computer nerds know that I've done this. I've gotten emails from individuals who've run across this fact. They say, 'It's great what you did. Why don't you do something about spam?' I'm not a household name. I wouldn't say it has brought me no fame and fortune, but it's not what most people think of when you say those words. It's kind of neat to have people talking about what you did and have people interested in it. It's not the center of my life.

Q: What is the center of your life?

I'm not sure I have a center. I just do what I do. I play around with computers and do some music and a little golfing.

Q: Was email the biggest thing that you've worked on?

I think there were bigger things -- things that took more effort. The workstation that I designed and built back around 1980 -- that was the biggest single thing I've done. It was a two-year effort. And it worked and it was useful. We never tried making a product out of it but it did serve our researchers... It was fun playing around with the super computer design. It didn't pan

out, but it expanded my own knowledge. Everything has been interesting. I can't single out any one thing.

Q: What else interests you right now?

I read about anything I can get my hands on, from biology to archeology. I see none of these as something I'll directly work on... but biological computing is intriguing. And I'm interested in quantum computing too.

<http://itmanagement.earthweb.com/entdev/article.php/1408411> (consultado a 05/07/2005).

W I C H I T A BUSINESS JOURNAL

From the June 14, 2002 print edition
Briefcase

Whether you love e-mail or hate it, Ray Tomlinson made it all possible

Does the name Ray Tomlinson sound familiar to you? Without good old Ray, e-mail just wouldn't be the same.

It may not have even been possible.

Tomlinson, an engineer at BBN Technologies in Cambridge, Mass., is the brains behind e-mail. He was the guy who wrote the first programs that put the "@" in e-mail addresses, enabling us to zip messages to each other's computers in seconds.

In doing so, he sent the first network e-mail message more than 20 years ago. Of course, for the first two decades of its life, e-mail led a very cloistered existence among universities, the military and computer nerds.

Today, it's a different story as more than half of all Americans use e-mail.

Tomlinson recently got his just reward as he won one of the five of the 2002 Innovation Awards presented by Discovery magazine.

Also winning were Paul MacCready, who designed the Gossamer Condor, the first human-powered aircraft; and Bradford W. Parkinson, who led the team that built the Global Positioning System.

Neither sex excels at asking or listening

Dorothy Leeds, who calls herself a communications expert, polled more than 350 men and women in her new survey "Does Your Sex Determine How You Ask and Answer Questions?"

First the bad news: Neither sex excels at asking or listening, Leeds says.

The study shows men assume too much. "They don't ask for help, and often just don't care enough to ask and women have been discouraged from asking." Some 72 percent of women say men avoid answering questions.

On the other hand, 83 percent of men and women feel that women volunteer too much information when asked a question.

When answering questions, 81 percent of people think women put more thought into their answers and decisions and 65 percent agree men assume more.

Today's grads face a new reality

Just a couple of years ago, life was great for a new college grad, especially if they some sort of computer discipline on their sheepskin.

But those days are over.

Today's tech grads have to get real, get with it and stay loose about the jobs they take because there are one third less hires available. So says Barbara Marchilonis, a director of DBM, an outplacement firm with 200 worldwide offices.

People must face new realities in the job hunt, Marchilonis says, who create a Web site on the topic (<http://www.dbmrealworld101.com>).

"The trick is to thrive on these changes and be willing to take the job that's available," she says. "Whatever the degree, there has to be a willingness to look at small and mid-sized companies. That's where the big opportunities are."

<http://tampabay.bizjournals.com/wichita/stories/2002/06/17/tidbits.html?page=2> (consultado a 05/07/2005).