Myths About Email

*ARPANET and Ray Tomlinson Did Not Invent Email; Email is Not the Simple
Exchange of Text Messages; and, More…*

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ABSTRACT

Prior to 1978, the term "email" did not exist in the modern English language, as verified by the Oxford English Dictionary and Merriam Webster's, two of the world's most eminent dictionaries.

Email as a system was created and *defined* by V.A. Shiva Ayyadurai, in 1978, when Shiva used the term "email" to name his computer program, which was the first full-scale electronic replication of the *interoffice mail system* consisting of the now-familiar components of email: Inbox, Outbox, Folders, Memo, Address Book, etc., elements we all experience today in other email systems as Gmail, HotMail, Yahoo Mail, etc.

As an MIT Professor, who led MIT's Sociotechnical Systems Research Center in MIT's Engineering Systems Division for nearly half a decade, my research has focused on new methodologies to architect large-scale enterprise systems. I have spent nearly 40 years helping some of the largest companies in the world as well as military organizations understand the complexity of such large-scale systems in order to enhance their performance.

So, I know a bit about systems. Email is a *system*. The classic definition of a system, by the eminent systems scientist Eberhardt Rechtin, is "A set of different elements so connected or related as to perform a unique function not performable by the elements alone."

Email, by its definition, was as a direct electronic emulation of the interoffice mail system, as Robert Field. The interoffice mail system consisted of a set of different elements, which are the now-familiar components of email: Inbox, the Memo ("To:", "From:", "Date:", "Subject:", "Body:", "Cc:", "Bcc:"), Forwarding, Composing, Drafts, Edit, Reply, Delete, Priorities, Outbox, Folders, Archive, Attachments, Return Receipt, Carbon Copies (including Blind Carbon Copies), Sorting, Address Book, Groups, Bulk Distribution.

These elements functioned together to provide the foundations of complex inter-office, inter-departmental, inter-organizational communications.

If you took away any one element or part of this system, such as the ability to attach other materials (Attachments) or the use of Folders or the ability to Forward or Prioritize, your ability to function and communicate with co-workers was greatly impaired in the office environment. This is why it was a "system", because you needed all elements to function cohesively together for office communications to take place.

When we understand that email is a system, it provides a foundation to understand the myths about email's history – myths, which are promulgated on popular sites such as Wikipedia.

As a systems scientist, who believes systems thinking is the key to our future, I'm pleased to help clarify, on the Anniversary of Email, the myths about email's history to support the Huffington Post's History of Email Series.

These myths are fundamentally based on the misuse of the term "email". Earlier an extensive analysis documenting twelve such myths about email, with primary sources, was completed and is available here: False Claims About Email. Given the limitations of space, in this article, I've focused on five prevalent myths, in an abridged format.

MYTH #1: "EMAIL" WAS CREATED ON THE ARPANET

This statement is a misuse of the term "email", since the invention referenced in this statement is command-line protocols for the simple transfer of electronic text messages, not email – the electronic replication of of the interoffice, inter-organizational paper mail system.

ARPANET researchers, as history shows, were never interested in creating email. The famous RAND Report written by David Crocker, a leading ARPANET researcher, in December of 1977, is unequivocal as to the lack of intention of ARPANET researchers to create email, the inter-organizational mail system.

In December of 1977, Mr. Crocker wrote:

> "At this time, **no attempt is being made to emulate a full-scale, inter-organizational mail system.** The fact that the system is intended for use in various organizational contexts and by users of differing expertise **makes it almost impossible to build a system which responds to all users' needs.**"
> ⸻Crocker, David. Framework and Function of the "MS" Personal Message System. Santa Monica, CA: RAND Corporation, December 1977.

The ARPANET researchers were focused on creating methods for the simple exchange of text messages, in the lineage of the telegraph, and not on creating an electronic version of the interoffice, inter-organizational mail system.

During the Civil War, the military, for example, relied on the telegraph as a core and strategic medium of communication for sending short text messages. The telegraph inspired continuing work by military research organizations. The Defense Advanced Research Projects Agency (DARPA), for example, funded the ARPANET to develop methods for transport of simple text messages reliably across computers during the 1960s and 1970s.

The purpose of the telegraph, unlike the interoffice mail system, was to transport text messages electronically across wires, using cryptic codes.

Telegraph operators sending and receiving text messages.

The interoffice system, unlike the telegraph, was a system used for transporting interoffice paper mail across offices, departments, organizations and buildings, using people, cars, trucks and pneumatic tubes that were prevalent across many offices.

Pneumatic tubes, a critical component of the interoffice mail system.

Just as the telegraph was not the interoffice mail system, the ARAPNET work was not email, but at best a precursor to what we know today as Texting or Text Messaging. Therefore, statements that claim email was invented by the ARPANET are simply false and conflate the ARPANET work.

In fact, prior to 1978, the ARPANET referred to their work as "Text Messaging" or "Messaging" never as "email". After the invention of email by Shiva in 1978, ARPANET alumni began to refer to their work as "email".

This important distinction between the telegraph and the interoffice mail system helps us to understand the myth of the statement that "Email was created on the ARPANET".

The military had little interest in sending interoffice memoranda on the battlefield in the 1970s - this is not what ARPANET was built for.

MYTH #2: RAY TOMLINSON INVENTED "EMAIL" AND SENT THE FIRST "EMAIL" MESSAGE

This statement is a misuse of the term "email" since Ray Tomlinson did not invent email - the electronic replication of the interoffice, inter-organizational paper mail system. The invention referenced in such statements and attributed to Mr. Tomlinson is the simple exchange of text messages between computers.

In fact, what Mr. Tomlinson did was to simply modify a pre-existing program called SNDMSG, which he himself did not write. The minor modifications he made enabled the exchange of simple text messages across computers. The resulting SNDMSG, however, was unusable by ordinary people, and required a set of highly technical computer codes that the sender had to type to transfer a message from one computer to another. Such cryptic codes were far too technical, and could not be used by a secretary or office worker.

As historical references demonstrate, SNDMSG, far from being email, was at best, a very rudimentary form of text messaging. As John Vittal, an early leading pioneer in electronic messaging researcher, observed:

> *"The very simple systems (SNDMSG, RD, and READMAIL) did not integrate the reading and creation functions, had different user interfaces, and did not provide sufficient functionality for simple message processing."*—Vittal, John. MSG: A Simple Message System. Cambridge, MA: North-Holland Publishing Company, 1981.

Moreover, Mr. Tomlinson, to his own admission said that what he created was a "no-brainer" and a minor contribution.

> *"I was making improvements to the local inter-user mail program called SNDMSG. The missing piece was that the experimental CPYNET protocol had no provision for appending to a file; it could just send and receive files. Adding the missing piece was a **no-brainer—just a minor addition to the protocol.**"*—Tomlinson, Ray, retrieved April 7, 2012. http://openmap.bbn.com/~tomlinso/ray/firstemailframe.html.

SNDMSG was less than a rudimentary form of text messging, and a far cry from email, the system created by Shiva which consisted of 50,000 lines of code that was the full-scale emulation of the entire interoffice mail system, by definition.

MYTH #3: THE "@" SYMBOL EQUALS THE INVENTION OF "EMAIL"

This is a misuse of the term "email" since it implies that the "@" symbol is equivalent to inventing email - the electronic replication of the interoffice, inter-organizational paper mail system.

The "@" symbol is used in an email address to separate the user name from the domain name. The invention referenced in the above statement is the use of the "@" symbol to distinguish two computers when sending a text message. The "@" symbol is *not a necessary component* to distinguish two computers, in some cases "-at" was used, as verified by Tom Van Vleck:

> *"Because the '@' was a line kill character in Multics, sending mail from Multics to other hosts used the control argument -at instead."*—Van Vleck, Tom. History of Electronic Mail, www.multicians.org/thvv/mail-history.html, April 7, 2012.

In the first email system developed by Shiva, the symbol "." was used to distinguish different computers. Equating the "@" symbol with the invention of email was a major branding and public relations effort of Raytheon/BBN. The "@" symbol is not email.

As M.A. Padlipsky, the eminent electronic messaging pioneer, an MIT graduate, a member of the ARPANET team, and a close contemporary of Mr. Tomlinson, observed of Raytheon/BNN's long history of self-promtional activities:

> *"[T]he BBN guys - who always seemed to get to write the histories and hence always seemed to have claimed to have invented everything, anyway, perhaps because BBN was the only "for-profit" to furnish key members of the original Network Working Group."*—Padlipsky, M.A., ARPANET contributor and author of more than 20 RFC specifications), "And they argued all night….", http://archive.is/dx2TK

To conclude, the creation of the "@" symbol to distinguish computers, does not equate to the invention of email.

MYTH #4: RFCS DEMONSTRATE "EMAIL" EXISTED PRIOR TO 1978

Requests for Comments (RFCs) were simply written documentations, not an email computer program, nor an email system. RFCs were literally meeting notes that recorded the meetings of electronic messaging researchers in the 1970s. As such, this is a flagrant misuse of the term "email".

For example, sensationalist statements, such as the one issued by Gizmodo in 2012 stating:

> *"[E]mail underpinnings were further cemented in 1977's RFC 733, a foundational document of what became the internet itself."*

are, at best misinformed, and completely lack understanding that email was the electronic interoffice mail system. Furthermore, email does not need the Internet to operate. Email systems initially ran on Wide Area Networks (WANs) and Local Area Networks (LANs), independent of the Internet and ARPANET. In fact, even today, one doesn't need the Internet to run email.

Moreover, RFC 733 was a document to define an attempted standard that **was never even fully accepted**. The very term "RFC" means "Request for Comments". It was a document created from meeting notes, and proposed ideas for message format and transmission, but said little about feature sets of individual electronic messaging or mail systems.

As the opening of RFC 733, it states:

> *"This specification is intended strictly as a definition of what is to be passed between hosts on the ARPANET. It is not intended to **dictate** either **features** which systems on the Network are expected to support, or **user interfaces** to message creating or reading programs."*
> —http://tools.ietf.org/rfc/rfc733.txt

Therefore, RFCs do not demonstrate that email existed prior to 1978. What RFCs demonstrate are that meetings and discussions were taking place on defining methods to exchange text messages, not the creation of email.

MYTH #5: "MAIL" ON CTSS DEVELOPED IN 1960'S WAS "EMAIL"

This is a misuse of the term "email" since the reference to CTSS MAIL (Computer Time Sharing System), the method referenced and attributed to MIT, was an early text messaging system, not a version of email - the system of interlocked parts intended to emulate the interoffice mail system.

This invention, MAIL, allowed a CTSS user to transmit a file, written in a third-party editor, and encoded in binary-coded decimal format (BCD), to other CTSS users. The delivered message would be appended to the front of a file in the recipient's directory that represented the aggregate of all received messages. This flat-file message storage placed strict constraints on the capacity of MAIL, and required users to traverse and review all messages one-by-one; search and sort mechanisms were not available.

The design choices in MAIL—lack of search and sort facilities, need for an external editor, dependence on CTSS-specific user IDs, and flat-file message storage—put strict constraints on the use and capacity of the command. It was well-suited to the low-volume transmission of informal (i.e. unformatted) messages, like text messaging of today.

The creator of MAIL, Tom Van Vleck, admitted this fact. Van Vleck stated:

> *"The proposed uses [of MAIL] were communication from 'the system' to users, informing them that files had been backed up, communication to the authors of commands with criticisms, and communication from command authors to the CTSS manual editor."* -http://www.multicians.org/thvv/mail-history.html, retrieved April 18th, 2012

Those who promoted MAIL as "email," when the term "email" did not even exist in 1965, were attempting to redefine "email" as a command-driven program that transferred BCD-encoded text files, written in an external editor, among timesharing system users, to be reviewed serially in a flat-file.

One would be hard-pressed to draw a historical straight line from MAIL to today's email systems. MAIL was not "email", but a text messaging command line system, at best. Historically perhaps, one can give credit to MAIL as a predecessor of today's electronic bulletin board systems or modern blog postings.

Conclusion

Email is a system of interconnected parts that was designed with a clear aim to emulate another system: the interoffice paper-based mail system, a system of interlocking parts - Inbox, Memo, Outbox, Folders, Address Book, etc., the elements of the email system used today by billions of people worldwide.

From our review of the five myths about email, one can understand developments such as the ARPANET efforts, early programs for sending and receiving messages, the "@" sign, technical specifications known as RFCs, and MAIL, which were claimed to be "email", were not email - the system of interlocked parts for emulating the interoffice mail system.

Those developments, while significant to the advancement of the Internet, aimed to solve various problems, but were not intended to substitute for the interoffice paper mail system --- email.

About Deborah J. Nightingale

Deborah J. Nightingale, Ph.D. is a world-renowned expert in enterprise systems transformation and architecting. For nearly 17 years, Dr. Nightingale served as a Professor of Practice of Engineering Systems, and Aerospace and Astronautics at the Massachusetts Institute of Technology (MIT). For the past nearly half a decade, she led the MIT Sociotechnical Systems Research Center. Today, she works with some of world's leading organizations, bringing her strategic systems thinking approaches to transform their enterprises to achieve desired capabilities such as sustainability, flexibility or enhanced innovation and entrepreneurship.

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Dr. Nightingale has a Ph.D. from The Ohio State University in Industrial and Systems Engineering. In addition, she holds MS and BS degrees in Computer and Information Science from The Ohio State University and University of Dayton, respectively. She is a member of the National Academy of Engineering, Past-President and Fellow of the Institute of Industrial Engineers, and co-Editor-in-Chief of the *Journal of Enterprise Transformation.* She is the author of numerous articles and books, including *Beyond the Lean Revolution: Achieving Successful and Sustainable Enterprise Transformation* and *Architecting the Future Enterprise* (Spring 2015, MIT Press). Dr. Nightingale is a frequent keynote speaker and serves on a number of boards and national committees, where she interacts extensively with industry, government and academic leaders.