

Deborah J. Nightingale, Sen Song, Leslie P. Michelson,
Robert Field

Origin of Email & Misuses of the Term “Email”

Abstract: The origin of email, the *system* as we all know and use today, begins in 1978 when a 14-year-old Research Fellow, V.A. Shiva Ayyadurai, working at the University of Medicine and Dentistry of New Jersey (UMDNJ), located in Newark, New Jersey, invented the first electronic system to replicate the interoffice, inter-organizational paper-based mail system consisting of Inbox, Outbox, Folders, Memo, Attachment, Address Book, etc. Ayyadurai named this system “email,” a term he was the first to create, because he was inventing the “electronic” or “e” version of the interoffice, inter-organizational paper-based “mail” system. Moreover, the specific naming of email arose for idiosyncratic reasons since FORTRAN IV, the programming language used to create his invention, required all variable and program names to be in upper case and a maximum of six characters, while the Hewlett Packard RTE-IVB operating system, on which the software executed, had a five-character limit for program names. These constraints motivated the selection of “E,” “M,” “A,” “I,” and “L.” Prior to 1978, neither the term “email,” in any variation, upper case, lower case, mixed case, with or without the dash, nor did the software application “email” exist. After Ayyadurai’s invention, the term “email” was misused, primarily by members of the ARPANET community and Raytheon/BBN, to refer to their developments in rudimentary methods for exchanging text messages, done *prior* to 1978, as “email.” Such developments, while important in their own right, were not email, the system of interlocking parts intended to emulate the interoffice, inter-organizational paper-based mail system -- the email we all experience today.

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Chapter 1

Introduction

“Email, upper case, lower case, any case, is the electronic version of the interoffice, inter-organizational mail system, the email we all experience today — and email was invented in 1978 by a 14-year-old working in Newark, NJ. The facts are indisputable.”
(Garling, 2012)

Professor Noam Chomsky, MIT
Institute Professor & Professor of Linguistics

What is email? Email is actually a system --- a system of interlocking parts intended to emulate the interoffice, inter-organizational paper-based mail system consisting of the Inbox, Outbox, Drafts, Folders, Memo, Attachment, Address Book, etc., the now-familiar components of every email system (Pearl, 1993; Ramey, 1993; Markus, 1994; Tsuei, 2003), made accessible and easy-to-use for ordinary people with little to no computer experience to manage the complex and myriad functions necessary for office communications mediated through the model of the interoffice memorandum (Yates & Orlikowski, 1992; Foster, 1994; Holmes, 1995; Morrisett, 1996).

Deborah J. Nightingale (✉)
Massachusetts Institute of Technology
77 Massachusetts Avenue, Cambridge, MA 02138, USA
email: dnight@mit.edu

Sen Song
Tsinghua University, School of Medicine
Beijing, Haidian, China

Leslie P. Michelson, Robert Field
Rutgers University, High Performance Computing, Information Services & Technology
Newark, NJ 07103, USA

P. Michelson, initially as a research scholar and later as a Research Fellow, at the University of Medicine and Dentistry of New Jersey (UMDNJ), located in Newark, New Jersey (Michelson, 2012). Michelson challenged Ayyadurai to create a software application, which would be full-scale electronic version (or emulation) to support all functions of the interoffice, inter-organizational paper-based mail system (Aamoth, 2012; Nanos, 2013; Gopalakrishnan, 2014), Table 1.

Prior to 1978, experts in the ARPANET community had concluded it “impossible” to invent such a full-scale electronic emulation of the interoffice, inter-organizational paper-based mail system, as documented in the RAND Report published on December 1977 by Mr. David Crocker, a leading member of the ARPANET community (Crocker, 1977; Nightingale, 2014). Mr. Crocker unequivocally conveyed both the ARPANET researchers’ lack of interest as well as their conclusion to the *impossibility* of creating such a system in the introductory sections of the Report, which defined the limits and scope of the ARPANET’s then-current work in electronic messaging:

“At this time, no attempt is being made to emulate a full-scale, inter-organizational mail system [p.4].... 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 [p.7].” (Crocker, 1977)

Mr. David Crocker
ARPANET Researcher, December 1977

In the 1970s, access to and use of computers were nearly exclusive to highly trained technical personnel such as systems analysts, programmers, scientists and engineers. More importantly, at the time, human interaction with computers required significant technical training that demanded the end user to have knowledge of computer programming languages and cryptic computer codes, making the use of the computer inaccessible to an ordinary person. In this context, one can understand why the idea of an ordinary office worker, a “secretary,” primarily a woman, who was relegated to a typewriter at an office desk, and who likely had never even seen a computer, interacting with one, was thought inconceivable. In addition to overcoming such sociological barriers, “to build a system” that not only incorporated the myriad technological functions of the interoffice, inter-organizational paper-based mail system, as listed in Table 1, but also was designed easy-to-use for “users of differing expertise” from the secretary to the highly trained technical personnel was considered monumental, as reflected in Mr. Crocker’s statement.

Chapter 2

The Invention of Email in Newark, NJ (1978)

The 14-year-old Ayyadurai, however, did not think it impossible to create such a system. He took on Michelson's challenge ("Livingston Student", 1980; Michelson, Bodow, Brezenhoff & Field, 2013), and did "attempt" to create such a system, and did do the "impossible," when he became the first to conceive, design and invent the first software application that replicated myriad functions, as itemized in Table 1, of the interoffice, inter-organizational paper-based mail system (McLeod & Bender, 1982) so it could be of "use in various organizational contexts" and by "users of differing expertise" ranging from secretaries, office workers, students, doctors, who had never experienced a computer keyboard or terminal, to highly trained technical personnel such as systems analysts, programmers, scientists and engineers, i.e. end users (Cheney & Lyons, 1980; Michelson, et al., 2015).

Ayyadurai named his invention "email" (Smithsonian National Museum of American History [NMAH], 2012; Ayyadurai, 1982a; Ayyadurai, 1982b), a term he was the first to create in 1978, as verified by its first use in naming the main subroutine of his program (Smithsonian National Museum of American History [NMAH], 2012; Ayyadurai, 1982a; Ayyadurai, 1982b), as shown in Figure 3. The non-existence of the term "email," prior to Ayyadurai's creation of this term in 1978, is further substantiated by two eminent dictionaries the Oxford English Dictionary ("E-Mail Origin", 1980) and the Merriam Webster Dictionary ("E-mail; First Known Use", 1982) by their reference to the dates of origin of the term "email" and its variations, as being after 1978, in 1980 and 1982, respectively.

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11 C
12 PROGRAM EMAIL(3,98)
13 COMMON IBASE(71),IDCB(144),ICOM(40),ICLOS,MAIN,LU,JVAL(4),NOI
14 IILEN,MCBORT,MCRSEC,MFLCRT,MFLSEC,ISTATE(2),KFILE(3),IDCBQ(14
15 ZIPRMT1,IWHER1,IPRMT2,IWHER2,IWHDH,IPARAM,IFINIS,INDE
16 COMMON/LABL/ IPL,ISL,LUH,IRWAIT,IPWAIT,ISCAN,ICREAT,IPRINT
17 COMMON/REQS/ KERR,IFNAM(3),IVAR1,IVAR2,MFILE(3),NFILE(3),IR
18 IICODE,NABL,NABL,IFORMT,ISNAME(13),IGRP
19 COMMON/RECV/ ISSBUF(12),LBUF(25),ICDNT,MACCPT,IGRIAL
20 DIMENSION ISTAT(10),ITABL(11),ISEGS(3,9)
21 DATA ITABL/2HT?,2HCH,2HTH,2HCH,2HEM,2HDN,2HDC,2HLM,2HDM,2HR
22 I,IMODE1/1/
23 DATA ISEGS/2HRE,2HCE,2HV,2HTR,2HAN,2HS,2HCH,2HPO,2HS,2HC
24 12HS,2HNA,2HME,2HS,2HCR,2HOU,2HP,2HME,2HMO,2HS,2HDE,2HLE
25 2ZHRE,2HDS,2HT /
26 C
27 C
28 C*****
29 C*
30 C* ELECTRONIC MAIL SYSTEM
31 C*
32 C* THIS IS THE MAIL SYSTEM INTERFACE. ALL COMMANDS ARE PROCESS
33 C* HERE AND APPROPRIATE SEGMENTS ARE LOADED. THE DATA BASE IS NO
34 C* DATA BASE IS CLOSED HERE

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Fig. 3. The naming of "email" (c. 1978). (Smithsonian National Museum of American History [NMAH], 2012; Ayyadurai, 1982a; Ayyadurai, 1982b)

Ayyadurai named the system “email” because he was inventing the “electronic” or “e” version of the interoffice “mail” system. Moreover, the specific naming of “email” arose from idiosyncratic reasons since the FORTRAN IV programming language, used to build the software, required all variable and program names to be in upper case and a maximum of six characters, while the Hewlett Packard RTE-IVB operating system, on which the software executed, had a five-character limit for program names. These constraints motivated the selection of “E,” “M,” “A,” “I,” and “L.

Chapter 3

V.A. Shiva Ayyadurai: The Inventor of Email

On August 30, 1982, the United States government awarded Ayyadurai the first U.S. Copyright for "Email," "Computer Program for Electronic Mail System" (Ayyadurai, 1982a), officially recognizing Ayyadurai as the inventor of email --- the system of interlocking parts designed to electronically emulate and expand the functionality of the interoffice, inter-organizational paper-based mail system.

CERTIFICATE OF COPYRIGHT REGISTRATION
FORM TX
 UNITED STATES COPYRIGHT OFFICE
 REGISTER OF COPYRIGHTS
 UNITED STATES OF AMERICA

TXu 111-775

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE A SEPARATE CONTINUATION SHEET.

1 TITLE OF THIS WORK
EMAIL

2 AUTHOR
 V.A. SHIVA AYYADURAI

3 DATE OF REGISTRATION
 AUG 30 1982

4 PUBLICATION OR DISTRIBUTION
 COMPUTER PROGRAM FOR ELECTRONIC MAIL SYSTEM

5 PREVIOUS REGISTRATION
 NONE

6 REPRODUCTIVE RIGHTS
 NONE

7 MANUFACTURER AND LOCATION
 NONE

8 REPRODUCTION FOR USE OF BLIND OR PHYSICALLY HANDICAPPED INDIVIDUALS
 NONE

9 DEPOSIT ACCOUNT
 NONE

10 CORRESPONDENCE
 SHIVA AYYADURAI, 97 BAY STATE RD, BOSTON, MA, 02215

11 MAIL CERTIFICATE TO
 SHIVA AYYADURAI
 97 BAY STATE RD
 BOSTON, MA 02215

Fig. 4. The U.S. Government Copyright Issuance for "Email" in 1982, Officially Recognizing Ayyadurai as the Inventor of Email. (Ayyadurai, 1982a).

At time of the invention of email in 1978, there existed no legal methods to protect software inventions. In fact, software patents were non-existent, and questionable at best, since the patentability of software itself was unclear and not recognized by the United States Supreme Court (Flewelling, 1980; Moran and James, 1980). However, in 1980, the United States Copyright Act of 1976 was amended to include software inventions. This resulted in the United States Computer Software Act of 1980 (Crews, 1987; Lemley, et. al., 2006).

In 1981, Ayyadurai, per the compliance requirements of the new Computer Software Act of 1980, applied for legal protection of his invention. In 1982, he

received such protection from the United States government, which formalized in government records his being the inventor of email. In addition to being awarded the Copyright for the software “Email,” Ayyadurai was also awarded another Copyright for the software users manual, “*Email User’s Manual*,” “*Operating Manual for Electronic Mail System Program*” (Ayyadurai, 1982b). The user’s manual provided the office workers at UMDNJ a detailed guide on how to use email.

Ayyadurai’s distinction as the inventor of email, therefore, emerges from: 1) He being the first to conceive, design and invent the electronic version of the interoffice, inter-organizational paper-based mail system, containing all the features we experience today in every email program, which experts of the ARPANET community had deemed “impossible”; 2) His creating the term “email” in 1978 to name this invention; and, 3) His receiving formal legal protection and recognition by the United States government as the inventor of email.

The 14-year-old Indian immigrant’s invention, moreover, was likely the world’s first end user software application that made the computer accessible and meaningful to the lives of ordinary people. Ayyadurai’s invention was revolutionary not only for the technological and design challenges that it overcame but also for the sociological and elitist barriers that it broke by enabling ordinary office workers, primarily woman, to move from the typewriter and paper to the terminal and keyboard, where email became their gateway to the brave new world of computing and digital communications.

What is even more compelling is the prescience of the young teenage inventor as to the relevance of his own invention, and its potential to humankind. In 1981, he submitted an essay on his invention for an awards entry to the Thomas Alva Edison/Max McGraw Foundation to be considered for a scholarship to support his attending university (Ayyadurai, 1981). The concluding paragraph in Ayyadurai’s essay reveals that prescience:

“[Email]’s practical applications are unlimited. Not only is mail sent electronically, as many telexes and teletypes are capable of doing, but it offers a computational service that automates a secretary’s or file clerk’s work of writing a memorandum, document or letter, editing, filing, and retrieving. If electronic mail systems become a reality, they will surely create different patterns of communication, attitudes, and styles. Volumes of written work, for example, shall become obsolete.” (Ayyadurai, 1981)

V.A. Shiva Ayyadurai in 1981, Livingston High School
Thomas Alva Edison/Max McGraw Awards Application

His invention did not go unnoticed and began to receive public recognition starting as early as 1980. On October 30, 1980, for example, a feature article, with the headline “Livingston Student Designs Electronic Mail System,” appeared in the West Essex Tribune, which described his development efforts while a high

school student involved in a special independent study program setup by a pioneering Livingston High School educator, Ms. Stella Oleksiak (“Livingston Student”, 1980).

On January 21, 1981, the prestigious Westinghouse Science Talent Search Awards, today known as the Intel Science Talent Search Awards, honored his invention by awarding him the prestigious Westinghouse Science Talent Search Honors Group Award (Westinghouse, 1981).

On September 2, 1981, the Massachusetts Institute of Technology (MIT), the most eminent science and technology institute in the world, also found it important to mention and recognize the invention. On that day, Ayyadurai was attending MIT’s incoming freshman student orientation for the Class of 1985. The front page of the MIT Tech Talk, the official newspaper of the MIT faculty and administration, highlighted achievements of only 3 of the 1,041 students entering the MIT Class of 1985. Ayyadurai was one of them. The article shared his invention of email (Miller, 1981).

Chapter 4

Email Is Not the Simple Exchange of Text Messages

After Ayyadurai's invention, the term "email" began to be used to refer to methods for the simple exchange of text messages, done prior to 1978. However, email is not simply a method for the rudimentary exchange of text messages (Ngwenyama & Lee, 1997), as some have erroneously documented (Marold & Larsen, 1997), and one which continues to appear even on popular websites such as Wikipedia, which define "email" as "a method of exchanging digital messages" ("Email", n.d., para 1)

In the 1970s and early 1980s, developing such methods for the simple exchange of text messages was the focus of early workers at the Defense Advanced Research Projects Agency (DARPA) and its ARPANET research community, Raytheon/Bolt Beranek and Newman (BBN), and MIT, in order to support military battlefield communications (Kuo, 1979; Lyons, 1980; Postel, Sunshine & Cohen, 1981). The aim of their efforts was to develop methods for the reliable communication of simple text messages from one location to another (Cerf, 1979; Malgieri, 1981).

The invention of email by Ayyadurai at UMDNJ in Newark, New Jersey, in contrast, was not motivated to create such simple point-to-point exchange of text messages for supporting battlefield communications, but rather to create a *system* to manage the complex functions of day-to-day civilian office communications where the interoffice memo was the primary medium of formal business communications in the office environment (Yates, 1989; Gains, 1999; Orlikowski & Yates, 1994).

The military had little interest in creating a system for managing the interoffice memorandum on the battlefield. This was far beyond their scope of work as the ARPANET was neither designed nor intent on creating email (Patel, 2003). The ARPANET researchers were not being funded by the military to make the lives of ordinary office workers easy. Even as late as 1985, seven years after the invention of email by Ayyadurai in Newark, NJ, the ARPANET's official brochure, *ARPANET Information Brochure* (Dennett, Feinler & Perillo, 1985), Figure 5a, **makes no mention whatsoever either about "email" or "electronic mail"** as evidenced by the lack of existence of any entries in its Index, Figure 5b, starting with "e," for "email" to be found anywhere in the Index of this brochure.

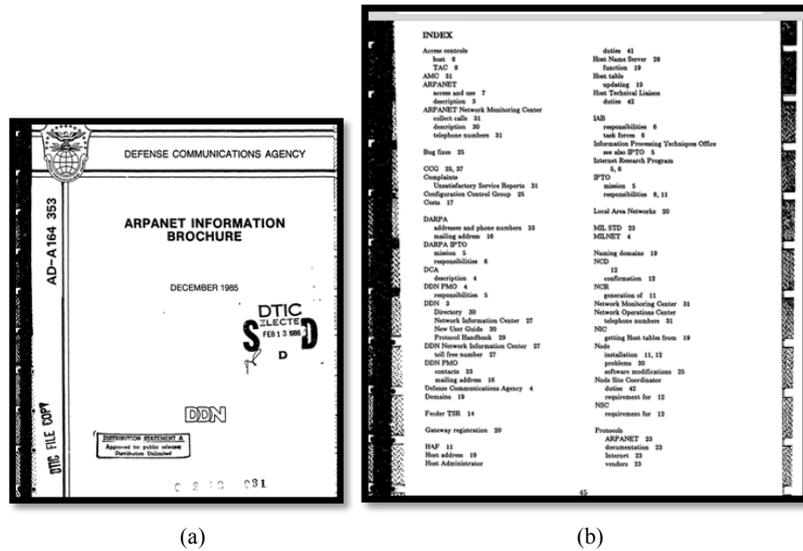


Fig. 5. The ARPANET's *ARPANET Information Brochure* cover page (a), and the Index on page 45 (b), which makes no mention or use of "email."

Chapter 5

Historical Revisionism of Email's Origin

The historical revisionism to *re-define* the term “email” as the simple exchange of text messages took place after Ayyadurai’s invention so as to misappropriate credit specifically to DARPA, the ARPANET researchers, MIT and Raytheon/BBN. Following Ayyadurai’s invention of email, Raytheon/BBN, a multi-billion dollar defense contractor, created its entire brand image as the “inventor of email,” to provide itself a competitive advantage in the lucrative cyber-security market (Raytheon/BBN. (n.d.). The ARPANET community, including personnel such as Mr. Crocker, now misuse the term “email” to perpetuate the claim that the ARPANET created “email” to perpetuate a false narrative that all great innovations, such as email, only emerge in a “collaboration”(Crocker, 2012) from the realms of the military-industrial-academic complex (Leydesdorff & Etzkowitz, 1996; Etzkowitz & Leydesdorff, 2000; Carayannis & Campbell, 2011).

The misuses of the term “email” not only attempts to misappropriate credit when the ARPANET community had not intention to create email as they had thought it “impossible,” but also attempts to confuse journalists by equating “email” to be the simple exchanges of text messages so as to obfuscate email’s true origin, away from the monumental achievement of a 14-year-old boy, working in Newark, New Jersey, in 1978. This manuscript itemizes and exposes these misuses, many of which are deliberately perpetuated by a cabal of “historians,” who promote this false narrative as their allegiance, in spite of the overwhelming and overt facts, is to the larger narrative that great innovations, such as email, can only emerge from the military-industrial-academic complex (‘SIGCIS Blog’, 2012).

The facts are that in 1978, at UMDNJ in Newark, New Jersey, there was no ARPANET, and the invention of email did not depend on any infrastructure or technology created by the ARPANET. The challenge to invent email required Ayyadurai to go far beyond just creating a simple means to exchange text messages. He used a computer network that was already present at UMDNJ and independent of the ARPANET. The challenge demanded him to invent an entire communications platform consisting of a sophisticated database and workflow systems architecture, while implementing the myriad features for enabling interoffice, inter-organizational paper-based mail communications (Smith, 2011; Gopalakrishnan, 2014) necessary for office workers to move from the world of the typewriter to the realm of the keyboard and computer terminal, delivered through an easy-to-use interface. Ayyadurai’s work was focused on digitizing the entire “system” of inter-

office communications rather than just the mere transport of messages reliably from point-to-point (Westinghouse, 1981; Field, 2014).

The components used by Ayyadurai to build email, furthermore, were not based on any tools or technologies built by DARPA or the ARPANET community. The tools used by Ayyadurai to build email were: 1) computer hardware, 2) an operating system, 3) terminals and keyboard, 4) a network, 5) a programming language, and 6) a database system (Michelson, 2012; Field, 2014). These components already existed at UMDNJ in 1978, and none of them were developed by the ARPANET. Erroneous claims promulgated by some “historians,” and copy and pasted in tabloid journals and blogs have asserted that the components used by Ayyadurai to invent email at UMDNJ had been created previously by the ARPANET (Biddle, 2012; Aguilar, 2012). This is simply not true, but is duplicitous, and serves to perpetuate the false and revisionist history, going back to the 1970s, when Raytheon/BBN attempted to credit for having “invented everything,” as noted by the Mr. M.A. Padlipsky, a computer scientist and contemporary of Mr. Crocker, who was also a prolific ARPANET contributor and author of more than 20 RFC specifications.

Mr. Padlipsky, in a famous essay, shared how Raytheon/BBN was habitual in performing such historical revisionism to take credit “...for having invented everything...” (Padlipsky, 2000):

*“[T]he[Raytheon/]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.”*

Mr. M.A. Padlipsky
ARPANET Researcher

Ayyadurai, as a 14-year-old boy working in Newark, New Jersey, in contrast, sought neither fame nor fortune for his invention of email. His efforts were done independent of the ARPANET or Internet, and ran on its own private network known as the Laboratory Computer Network (LCN), which had been earlier implemented to connect the four campuses of UMDNJ (Michelson, 2014). Email did not need to “transport messages,” but provided a novel database-driven mechanism to share the interoffice memorandum across relevant users and organizational hierarchies, long before Simple Mail Transfer Protocol (SMTP) was made available in 1982 (Postel, 1982a) and which was four years after email’s invention at UMDNJ in 1978.

Therefore, the triangle of DARPA (including the ARPANET community), Raytheon/BBN and MIT, simply put, cannot take credit for email’s invention. They were solving a different, important, but much easier problem, from Ayyadurai’s mission to create email, the first full-scale electronic emulation of the entire inter-office, inter-organizational paper-based mail system. An objective review of these

facts that email's history begins from the civilian interoffice, inter-organizational paper-based mail communication system at UMDNJ in 1978 and not from the military or its developments prior to 1978 provides a much larger historical lesson that innovation can occur anytime, anyplace by anybody, outside of big universities, military and large corporations (Aamoath, 2013; Garling, 2012; Rocca, 2015).

Chapter 6

Misuses of the Term “Email”

So email as a system is not simply exchanging messages among computers, even if a person at one end types a message to a human recipient. Sending text messages alone is what today we call Texting, SMS, Chat or Twitter. Standard histories of the Internet are full of claims that certain individuals (and teams) in the ARPANET environment in the 1970s and 1980s ‘invented email’. For example, the ‘@’ sign, early programs for sending and receiving messages, and technical specifications known as RFCs, have been claimed to be ‘email’. But as some claimants have admitted, none of these innovations were intended as a system of interlocking parts - Inbox, Memo, Outbox, Folders, Address Book, etc. - the email system used today by billions of people worldwide.

These standard histories have misused the term “email” - which today is understood to be a system of interdependent features - to apply to other forms of electronic communications. Those developments aimed to solve various problems, but were not intended to substitute for the interoffice paper mail system. On February 16, 2012, nearly 35 years after Ayyadurai’s invention of email, the Smithsonian Institution’s National Museum of American History (NMAH) acquired his papers, artifacts and computer code, documenting his invention in 1978 at UMDNJ. The Smithsonian acquisition led to a vocal minority unleashing disinformation to deny email’s origin in spite of the technical and legal documentation of facts.

These attacks were unwarranted and unfortunate and, as subsequent research revealed, the attacks were motivated by industry insiders intent on protecting the vested interests of Raytheon/BBN, a multi-billion dollar company, which, during the period after Ayyadurai’s invention of email in 1978, had built its entire brand on the falsehood that it had “invented email.” Some detractors went so far as to confuse the public by stating that upper case “EMAIL,” was different than lower case “email,” to misappropriate credit away from Ayyadurai.

The eminent linguist Professor Noam Chomsky, during the heated controversy in 2012, responded by stating (Garling, 2012):

“What continue[s] to be deplorable are the childish tantrums of industry insiders who now believe that by creating confusion on the case of ‘email,’ they can distract attention from the facts....Given the term email was not used prior to 1978, and there was no intention to emulate ‘...a full-scale, inter-organizational mail system,’ as late as December 1977, there is no controversy here, except the one created by industry insiders, who have a vested interest.”

Professor Noam Chomsky, MIT
Institute Professor & Professor of Linguistics

These vested interests included a coterie of “historians,” who instigated the harsh vitriol against Ayyadurai in order to deliberately discredit and character assassinate Ayyadurai to distract media and press from the indisputable facts of email’s origin, by spreading disinformation and false claims about email’s origin. Twelve of these false claims, originally itemized, investigated and exposed as disinformation by Drs. Nightingale and Song (Nightingale and Song, 2012) have now been compiled and updated in the *Supplementary Materials* of this manuscript, to demonstrate how misuses of the term “email” were used to disseminate fiction versus fact on the origin of email. These claims include:

1. “Email” was created on the ARPANET.
2. Ray Tomlinson invented “email” and sent the first “email” message.
3. The use of the “@” symbol equals the invention of “email.”
4. RFCs demonstrate “email” existed prior to 1978.
5. Programs for exchanging messages were “email”.
6. Mail On CTSS developed in 1960's was “email”.
7. In 2012, the term “email” now needs to be defined.
8. “Email” is not an invention, but VisiCalc is an invention.
9. Dec and Wang created “email”.
10. Laurel was “email”.
11. The term “email” belongs to Compuserve.
12. “Email” has no single inventor.

The addendum elaborates on each instance and explains why they are misuses of the term “email” by providing references to primary sources that definitively expose that what is referred to as “email,” in such uses, was not email but rudimentary methods for text messaging. The research across hundreds of primary sources concerning these false claims shows that each of these innovations, while very important in the evolution of the Internet, were single functions and never email --- the system of interlocked components intended to emulate the interoffice, inter-organizational paper-based mail system.

6.1 Misuse #1: “Email” was created on the ARPANET

The statement:

*“Under ARPANET several major innovations occurred: **email** (or electronic mail), the ability to send simple messages to another person across the network,” (Bellis, 2012)*

misuses the term “email,” since the invention referenced as “email,” and attributed to the ARPANET, in the above statement is command-line protocols for transfer-

ring text messages, not email --- a system of interlocking parts designed to be full-scale emulation of the interoffice, inter-organizational paper-based mail system.

Early workers of the ARPANET community, such as Mr. David Crocker, in the field of electronic messaging, admitted, with great and direct clarity, that the ARPANET community, had no intention to create a full-scale electronic version of the interoffice or inter-organizational paper-based mail system. This is expressed in the following two statements of Mr. Crocker, published in December of 1977, months before Ayyadurai began his work in inventing email.

*“At this time, **no attempt is being made to emulate a full-scale, inter-organizational mail system.** p.4” (Crocker, 1977)*

*“The level of the MS project effort has also had a major effect upon the system’s design. To construct a fully-detailed and monolithic message processing environment requires a much larger effort than has been possible with MS. In addition, 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.** p.7” (Crocker, 1977)*

Moreover, other electronic messaging workers of that same time, such as Tom Van Vleck, affiliated with the ARPANET community, also admitted that their superiors, at the time of their work in electronic messaging, in the early 1970s, made it clear that they were not allowed to work on creating an electronic system to replicate “letters” e.g. the interoffice paper mail system, since it was considered a waste of time, as expressed in this statement:

“The idea of sending ‘letters’ using [the Compatible Time-Sharing System] was resisted by management, as a waste of resources.” (Van Vleck, 2001)

Mr. Van Vleck, one of the vocal detractors to the news of Ayyadurai’s invention of email in March 2012, after the Washington Post’s news of the February 16, 2012 Smithsonian’s acquisition of Ayyadurai’s documents, went to the extent of revising his own Multicians.Org history of email website, in March of 2012, which had remained unchanged for many years, by **inserting** the word “initially” to the sentence referenced above to read:

*“The idea of **initially** sending ‘letters’ using [the Compatible Time-Sharing System] was resisted by management, as a waste of resources.” (Nightingale and Song, 2014b)*

This revisionism was done deliberately to give the false impression that somehow, he was allowed, back in his time, by his “management” to implement the “letter”, or interoffice memo, afterwards following an “initial” resistance. Mr. Van Vleck made this revision to his website after the authors of this manuscript’s re-

search team discovered and published Mr. Van Vleck's original comment that he was not allowed to work on "letters."

By revising his own website, after our exposure of his lack of intent to invent anything close to email, Mr. Van Vleck was performing historical revisionism on his own material. The research team was fortunate, at the time, to capture in screenshots as shown in Figure 6, which documents this revisionism. Mr. Van Vleck's historical revisionism was done retroactively to substantiate that he was allowed to work on an electronic system for "letters" so as to take credit for the invention of "email."

BEFORE	AFTER
<p><i>Note: Van Vleck clearly states that CTSS management resisted allowing him to create a system for sending "letters" e.g. To, From, Cc, Bcc, etc., but would allow him to create a system for sending/receiving, requests, e.g. text messages.</i></p> <p>Here is the Original Text</p> <p>"The idea of sending 'letters' using CTSS was resisted by management, as a waste of resources. However, CTSS Operations did need a facility to inform users when a request to retrieve a file from tape had been completed, and we proposed MAIL as a solution for this need."</p>	<p><i>Note: Now, "initially" added --- subtle but a BIG difference.</i></p> <p>Here is the Revised Text</p> <p>"The idea of sending 'letters' using CTSS was initially resisted by management, as a waste of resources. However, CTSS Operations did need a facility to inform users when a request to retrieve a file from tape had been completed, and we proposed MAIL as a solution for this need."</p>
(a)	(b)

Fig. 6. Blatant example of historical revisionism conducted by Mr. Tom Van Vleck after hearing of Smithsonian's acquisition of documents validating Ayyadurai's invention of email at UMDNJ. Before the Smithsonian news of February 16, 2012, Mr. Van Vleck's website had the content as shown in (a). After the Smithsonian news (c. March 2012), Mr. Van Vleck changed the content to as shown in (b). (Nightingale and Song, 2014b).

This was not the only instance of this kind of revisionism that Mr. Van Vleck deliberately performed. On another part of his website, again after the Smithsonian's acquisition on February 16, 2012, Mr. Van Vleck revised his own published timeline of the history of email where in that timeline Mr. Van Vleck inserts that he invented email in 1965, as shown in Figure 7A and Figure 7B below (Nightingale and Song, 2014b)

BEFORE	AFTER
<ul style="list-style-type: none"> • 1971: Ray Tomlinson develops an email application for over the ARPANet. Tomlinson chose the "@" sign for email addresses. • 1970 - Monty Python Spam Skit airs • 1965 Noel Morris and Tom Van Vleck invent email • 1960s Email developed for time share computers (individuals could message each other) • 1890s: USPS declared it illegal to deliver paper messages through pneumatic tubes 	<ul style="list-style-type: none"> • 1971: Ray Tomlinson develops an email application for over the ARPANet. Tomlinson chose the "@" sign for email addresses. • 1970 - Monty Python Spam Skit airs • 1965 Noel Morris and Tom Van Vleck invent email • 1960s Email developed for time share computers (individuals could message each other) • 1890s: USPS declared it illegal to deliver paper messages through pneumatic tubes
(a)	(b)

Fig. 7. Another blatant example of historical revisionism conducted by Mr. Tom Van Vleck after hearing of Smithsonian’s acquisition of documents validating Ayyadurai’s invention of email at UMDNJ. Before the Smithsonian news of February 16, 2012, Mr. Van Vleck’s website had the history of email timeline as shown in (a). After the Smithsonian news (c. March 2012), Mr. Van Vleck changed the content to as shown in (b). (Nightingale and Song, 2014b)

6.2 Misuse #2: Ray Tomlinson Invented “Email” and Sent the First “Email” Message

The statements such as these:

“Ray Tomlinson invented email in 1971.” (“Ask.com - What's Your Question?”, 2012)

“Ray Tomlinson sent the first email.” (“A Brief History of Email in the Federal Government.”, 2012)

“Ray Tomlinson is credited with inventing email in 1972. Like many of the Internet inventors, Tomlinson worked for Bolt Beranek and Newman as an ARPANET contractor.” (“History of Internet/Email.”, 2012)

misuse the term “email,” since Mr. Ray Tomlinson did not invent email --- the system of interlocking parts which is the full-scale emulation of the interoffice, inter-organizational paper-based mail system.

The invention referenced in these statement(s) and attributed to Tomlinson is the simple exchange of text messages between computers. Tomlinson simply modified a pre-existing program called SNDMSG, which he did not write, but made some minor modifications to, in order to enable the exchange of simple text messages across computers.

SNDMSG required a set of cryptic and highly technical computer codes to instruct the computer to transfer a message from one computer to another. Only trained technical personnel, such as computer scientists and technicians, not end users, such as a secretary or office worker with minimal to no computer knowledge, could use such a method. Tomlinson updated this previously existing SNDMSG command program to transmit text strings over a network connection.

SNDMSG was not a system of interlocking parts designed for laypersons to manage routine office communications; thus, it was not designed to replicate the inter-office, inter-organizational paper-based mail system.

As primary references show, SNDMSG was not only not email but also was just a very rudimentary form of text messaging (Vittal, 1981):

“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, 1981)

Moreover, Tomlinson, to his own admission, said his work was a “no-brainer” and was merely a minor contribution (Tomlinson, 2012):

“I was making improvements to the local inter-user mail program called SNDMSG. The idea occurred to me that CPYNET could append material to a mailbox file just as readily as SNDMSG could. SNDMSG could easily incorporate the code from CPYNET and direct messages through a network connection to remote mailboxes in addition to appending messages to local mailbox files. 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, 2012).

Tomlinson’s work was in no manner comparable to the enterprise-class system that Ayyadurai developed at UMDNJ, that was a complete end user application consisting of 50,000 lines of code, built from the ground up, to create email --- the full-scale emulation of the entire interoffice, inter-organizational paper-based mail system in 1978.

What is also alarming, in this context, is that Michael Padlipsky's famous essay, originally linked on Van Vleck’s site, in which Padlipsky exposed Tomlinson’s conflated claim as being the “inventor of email,” (Padlipsky, 2000):

“I don't believe Ray Tomlinson invented 'e-mail.' And not because of the quibble that we called it netmail originally, though that does offer an excuse to observe that I personally find the term 'e-mail' awfully cutesy, and references to 'sending an e-mail' syntactic slime. Nor because of the semi-quibble that 'mail' had been around intra-Host on several of the Host operating systems since well before anybody realized they were Hosts, though that one has a great deal of abstract 'historical' appeal. No, it's because I have a completely clear memory that Ray wasn't even at the FTP meeting where we decided to add mail to the protocol.” (Padlipsky, 2000)

was deleted and removed by Van Vleck (Nightingale& Song2014b), after the Smithsonian event. Van Vleck’s website used to link to Padlipsky’s article prior to the Smithsonian event.

Prior to the Smithsonian event, Van Vleck also questioned the claim that Tomlinson was the “inventor of email.”; however, after the Smithsonian event, Van Vleck, who by all indications had close and collegial relationships with members of the ARPANET community who were threatened by Ayyadurai’s facts exposing their false claims, change his sardonic position of Mr. Tomlinson being the “inventor of email,” fell in line with the revised propaganda of Raytheon/BBN, after the Smithsonian event, to deem Tomlinson as the inventor of “network email,” a new term crafted to bequeath credit to the ARPANET community in the face of the mounting facts, following Ayyadurai’s documentation of inventing email in 1978.

6.3 Misuse #3: The Use of the “@” Symbol Equals the Invention of “Email”

The statement:

“When [Tomlinson] is remembered at all, it is as the man who picked ‘@’ as the locator symbol in electronic addresses. In truth though, he is the inventor of e-mail, the application that launched the digital information revolution. And yet the breakthrough he made was such a simple evolutionary step that hardly anyone noticed it till later.” (“The Invention of Email,” 1998)

misuses the term “email” since it implies that Ray Tomlinson’s use of the “@” symbol is equivalent to inventing email --- the system of interlocking parts which is the full-scale emulation of the interoffice, inter-organizational paper-based mail system.

The “@” symbol is used 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 of email --- the system of interlocking parts. In some cases “-at” was used (Van Vleck, 2012), or the “.” symbol as in the first email system developed by Ayyadurai.

“Because the ‘@’ was a line kill character in Multics, sending mail from Multics to other hosts used the control argument -at instead.” (Van Vleck, 2012)

Some have mistakenly characterized the “@” symbol as something very unique, “underused” and novel. As a point of fact, the “@” symbol was the line-kill character on Multics, (Pogran, 2012), another early timesharing system, and

created a character conflict for those Multics users trying to use Tomlinson's SNDMSG.

As Kenneth Pogran recalled:

“Do folks remember that ‘@’ was the Multics line-kill character? We were opposed to Ray Tomlinson's famous (or is it infamous?) selection of @ as the character that separated the user name from the host name.... Early versions ... allowed the use of space-a-t-space (i.e., ‘at’) in place of the ‘@’ to accommodate Multics (and the mail composition software I wrote used the syntax -at on the command line)” (Pogran, 2012).

“Early versions of ARPANET email specs allowed the use of space-a-t-space (i.e., " at ") in place of the ‘@’ to accommodate Multics and the mail composition software I wrote used the syntax -at on the command line to begin composing an email....” (Pogran, 2012)

The “@” symbol was “underused” only to the extent that it interfered with some users' host environments. Equating of the “@” symbol with the invention of email was a result of the branding and marketing effort of Raytheon/BBN as obvious on their web site in 2012. After the Smithsonian's acquisition of Ayyadurai's documents, which began to expose the false claims of Raytheon/BBN (Padlipsky, 2000), Raytheon/BBN escalated their PR and marketing efforts as documented on the history of email section on www.inventorofemail.com. Raytheon/BBN, in fact, cleverly juxtaposed the “@” symbol with Tomlinson as their brand mascot, with the false claim that he “invented email”.

6.4 Misuse #4: RFCs Demonstrate “Email” Existed Prior To 1978

The statement:

“...email underpinnings were further cemented in 1977's RFC 733, a foundational document of what became the Internet itself.” (Biddle 2012)

misuses the term “email” since Requests for Comments (RFCs) were simply written documentation, not a computer program, nor software, nor email ---- the system of interlocking parts which is the full-scale emulation of the interoffice, inter-organizational paper-based mail system.

RFCs were literally meeting notes following meetings by electronic messaging researchers. RFCs, such as RFC 733, were written documentation not a computer program or code or system. Moreover, statements such as, and others like it:

"In 1977 these features and others went from best practices to a binding standard in RFC 733." (Biddle, 2012)

are hyperboles and conflation of RFCs.

Mr. Sam Biddle, neither a computer scientist nor a software developer, who wrote the statement referenced above, in an article in Gizmodo referencing Ayyadurai as an "asshole" and "dick," is known for his puerile, sensationalist, and yellow journalism. For example, a few weeks after writing this outrageous article on Ayyadurai, Biddle wrote an article about a virtual Internet dog name "Boo," which had died. It was later found out that "Boo" had not died. Anderson Cooper, a CNN journalist, later exposed Mr. Biddle's quality of journalism on his TV news show "The Ridiculist."

What is unfortunate is that even scholarly "historians," like Mr. Thomas Haigh, a leader of the SIGCIS group, and others either purposely wanting to deny the facts of email's origin from 1978 at UMDNJ, or unconsciously cutting and copying the Gizmodo article, believing Biddle's sensationalistic article to be the truth, continue to use Biddle's article as a primary and scholarly source reference to deny email's invention by Ayyadurai in Newark, New Jersey. Such tabloid articles are referenced as the primary source on Wikipedia and some major media to attempt to perpetuate false assertions that RFCs are email, and predate Ayyadurai's invention.

Specifically, RFC 733, for example, is a document that was drafted in November 1977, and was simply, at best, a specification attempting to provide a standardization of messaging protocols and interfaces. RFC 733 should not be conflated as "email underpinnings" (Biddle, 2012) and equated as email --- the electronic system of interlocking parts emulating the interoffice, inter-organizational paper-based mail system created by Ayyadurai at UMDNJ in 1978. The RFC 733 is explicitly described as:

*"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.**"*

RFC 733 did not even dictate which features of the interoffice, inter-organizational paper-based mail process would be included, such as the basic components of the user interfaces for message creation and reading. Moreover,

RFC 733 attempted to define a standard **that was never even fully accepted nor implemented.** (Crocker et al., 1977).

“Some of RFC #733’s features failed to gain adequate acceptance.” (Crocker et al., 1977)

The very term “RFC” means “Request for Comments” and were typically lists, notes and at best specifications (Shicker, 1981) on what could be in the future, but were neither computer code nor software application, such as email, the system and software application developed by Ayyadurai.

“Prospective users, system designers, and service offering companies often compile lists of potential services [of electronic mail systems]...Nobody claims that these lists are complete, and most often it is admitted freely that these lists represent a first cut synthesis of services offered by other communication facilities. Unfortunately, these lists mostly convey just a number of buzz-words which everybody interprets in his own fashion.”
(Shicker, 1981)

In summary, RFCs only proposed an interface for message format and transmission, but said little about feature sets of individual electronic messaging or mail systems. The RFCs’ authors, by their own admission, clearly state this was not their intention. RFCs were the definition of command-line terminology, at best, but certainly not email --- the system of interlocking parts intended to emulate the interoffice, inter-organizational paper-based mail system.

6.5 Misuse #5: Programs For Exchanging Messages Were “Email”

The statement:

“By the mid-1970s, other user-oriented e-mail programs arrived on the scene. Two of the more popular examples were ‘Hermes’ at Bolt, Beranek, and Newman, now BBN—a wholly owned subsidiary of Raytheon — and ‘Laurel,’ which was in use at Xerox PARC.”
(Crocker, 2012)

misuses the term “email” since programs like Hermes and Laurel were not email -- the system of interlocking parts which is the full-scale emulation of the interoffice, inter-organizational paper-based mail system. Laurel was really, in fact, a single component, front-end for the independent, lower-level Grapevine messaging platform (Schroeder, 1984).

“A client program of Grapevine generally obtains services through code.... The primary clients of Grapevine are various mail interface programs, of which Laurel is most widely used.” (Schroeder, 1984)

Though Laurel was beginning to incorporate some elements of the interlocked parts such as folders and the inbox, it was still like nearly all messaging systems of the period: heavily dependent on external system resources, and not designed as a system of interlocking parts to be a full-scale emulation of the interoffice, inter-organizational paper-based mail system.

Furthermore, internal Xerox documentation (Schroeder, 1984), such as:

“...the Grapevine system was first made available to a limited number of clients during 1980.” (Birrel, 1980)

shows that independent Grapevine component was still being prototyped with five dedicated servers in 1981, well after Ayyadurai’s invention of email (from 1978) which had been in use in routine communications at UMDNJ for several years by 1980. No word of Laurel or Grapevine, moreover, is publicly available until 1982 (Tesler, 2012). Larry Tesler, who worked at Xerox during 1973 to 1980 on the internal development of Laurel, acknowledges that he himself did not

“...know what if any email systems based on unofficial internet standards were implemented before 1979.” (Tesler 2012)

Tesler, however, was aware that Laurel was still under development in 1979 (Tesler, 2012), when the Xerox work would be published in the Communications of the ACM (Schroeder, 1984, Birrell, 1980).

Hermes was similar. It was not a system of interlocked parts and not something user-friendly that an ordinary office worker could use. Users had to learn about twenty commands to use it (Vallee, 1984):

“In systems like SEND MESSAGE and its successors, such as HERMES, ON-TYME, and COMET, there is no provision for immediate response. A message is sent into a mailbox for later access by the recipient. No automatic filing is provided: any searching of message files requires users to write their own search programs, and to flag those messages they want to retain or erase. The burden is placed on users to manage their own files, and a fairly detailed understanding of programming and file structures is required. Both senders and receivers must learn about 20 commands, and if they misuse them they can jeopardize the entire data structure. Some messages may even be lost in the process.” (Vallee, 1984)

Another program, PLATO, which was an invention for computer-assisted instruction, which some reference as “email,” also is best understood from Vallee’s comments, which also help to place in context PLATO relative to Ayyadurai’s invention (Vallee, 1984). In 1979, all known messaging systems were itemized in RFC 808 by the leading researchers who worked at the big universities, large companies and for the military (Postel, 1982b):

“Dave Farber gave a bit of history of mail systems listing names of all the systems that anybody had ever heard of (see Appendix A).... It was noted that most of the mail systems were not formal projects (in the sense of explicitly sponsored research), but things that ‘just happened’.” (Postel, 1982b)

Note, Laurel and PLATO do not appear on this list in Postel’s “Appendix A” as late as 1982.

For a review of individual systems of the period, it is best to look at the 1979 RFC (‘IETF Tools’, 2012), which contains a listing of the names of all the computer mail systems anybody had ever heard of, at the time. The vast majority of the systems, itemized in this list, such as MSG, MS, SNDMSG, RD, and HERMES, all share a common ancestry, and inherit features (and deficiencies) from this heritage. John Vittal tried to distinguish the features and qualities of his MSG message system relative to its antecedents (Vittal, 1981):

MSG started from a set of primitive message processing operations. Several of the commands listed above were not implemented in the initial version of MSG:

- o Creation: Answer and Forward
- o Motion: Move
- o File operations: Write
- o Marking: Mark and Unmark
- o User-interface and Profile: Koncise, Verbose, and Zap profile
- o Miscellaneous: Print date and Comment

It became clear, even before MSG was first publicly released, that the operations of Put and Delete were so commonly used together that a combining operation (Move) should be included in the functionality of the system. This was the first major modification.

COMPARISON WITH OTHER SYSTEMS

Many of the other CBMSs of the time have already been alluded to. 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.

On the other hand, two systems came very close to MSG. BANANARD gained acceptance, but seemed to not have the right functionality. The user-interface seemed to be a little too verbose for experienced

users. However, it is important to note that some users still prefer to use BANANARD. These tend to be users who view mail rather than respond to it.

In Vittal's conclusion, he was careful to stress the limitations of MSG as a general communications tool:

However good MSG is, it is not perfect. Its major drawback is that it does not have a directly integrated message creation facility with the same style of user-interface as the rest of MSG. The result is that users are forced to use two separate interfaces for a single conceptual process -- dealing with mail. In addition, the decision to use SNDMSG limits users because it has no way to edit various fields of the message after a specific field has been completely specified, especially address lists.

Vittal states,

"Its major drawback is that it does not have a directly integrated message creation facility...." (Vittal, 1981)

MSG was at best a rudimentary text messaging client. It was lightweight messaging system, designed to aid users of the TENEX operating system. It served its purpose well, but was crippled by a limited feature set, and was not email --- the system of interlocked parts intended to emulate the interoffice, interlocked paper-based mail system.

6.6 Misuse #6: Mail On CTSS Developed In 1960's Was "Email"

The statement:

"Electronic mail, or email, was introduced at MIT in 1965 and was widely discussed in the press during the 1970s. Tens of thousands of users were swapping messages by 1980." (Crisman et al., 2012)

misuses the term "email" since the reference to CTSS MAIL, the method referenced and attributed to MIT, was an early text messaging system, not a version of email --- the system of interlocking parts which is the full-scale emulation of the interoffice, inter-organizational paper-based mail system. This invention refers to the MAIL command on MIT's CTSS timesharing system. The basic usage of MAIL, as documented in CTSS Programming Staff Note # 39 (Crisman et al., 2012), is below:

The MAIL Command

A new command should be written to allow a user to send a private message to another user which may be delivered at the receiver's convenience. This will be useful for the system to notify a user that some or all of his files have been backed-up. It will also be useful for users to send authors any criticisms.

```
MAIL LETTER FILE USER1 USER2 USER3 ....
MAIL 'ME'
```

LETTER FILE is the name of a BCD file which contains the message to be sent.

USERn is the designation of the user who is to receive the message. USERn may be a programmer's name or programmer number or the problem-programmer number. It may also be just the problem number if the message is to go to all users of the same problem number.

MAIL ME is the command given by the receiver when he wants the mail to be printed. The files will be left in permanent mode and should be deleted by the receiver at his convenience.

The MAIL command will create or append to the front of a file called MAIL BOX. System messages to the user will be placed in a file called URGENT MAIL. The LOGIN command will notify the user if he has either kind of mail. MAIL ME will always print URGENT MAIL before MAIL BOX.

This invention, MAIL, was not a system of interlocked parts emulating the interoffice, inter-organizational paper mail system. MAIL allowed a CTSS user to transmit a file, written in a third-party editor, and encoded in binary-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. Corruption to the MAIL BOX file could result in the loss of a user's messages. From the CTSS Programmer's Guide, Section AH.9.05, (Crisman, 1965):

```
BOX'. Because of the appending feature of the MAILing
process, the command 'DELETE MAIL BOX' should be issued
after a message has been PRINTed, to avoid having to run
through previous messages to get to the latest one.)
```

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. This was not email --- the system of interlocking parts, created to emulate the interoffice, inter-

organizational paper-based mail system. MAIL was well-suited to the low-volume transmission of informal (i.e. unformatted) messages, at best, like text messaging of today.

The creator of MAIL admitted this fact:

“The proposed uses [of MAIL],” wrote Tom Van Vleck, “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.” (Crisman, 1965)

The limited feature set of MAIL would be carried over to its progeny (SNDMSG, MSG, HERMES), creating headaches for even the most sophisticated technical staffers (Vallee, 1984):

In systems like SEND MESSAGE and its successors, such as HERMES, ON-TYME, and COMET, there is no provision for immediate response. A message is sent into a mailbox for later access by the recipient. No automatic filing is provided: Any searching of message files requires users to write their own search programs, and to flag those messages they want to retain or erase. The burden is placed on users to manage their own files, and a fairly detailed understanding of programming and file structures is required. Both senders and receivers must learn about 20 commands, and if they misuse them they can jeopardize the entire data structure. Some messages may even be lost in the process. These drawbacks are compensated for by the fact that the cost per message is very low.

Those who promoted MAIL as "email," when the term "email" did not even exist in 1965, are misusing the term "email" to refer to 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, and perhaps the predecessor to early forms of online discussion boards.

6.7 Misuse #7: In 2012, the Term “Email” Now Needs To Be Defined

This statement (made following news of Ayyadurai's invention of email in 2012, after the Smithsonian's acquisition of Ayyadurai's work):

"...we need a more specific definition that captures the essence of computer based electronic mail as it actually emerged. Here is one that was developed in discussion with email pioneers Ray Tomlinson, Tom Van Vleck and Dave Crocker:

'Electronic mail is a service provided by computer programs to send unstructured textual messages of about the same length as paper letters from the account of one user to recipients' personal electronic mailboxes, where they are stored for later retrieval.' " ('SIGCIS Blog', 2012)

serves to misuse and confuse the term email --- the system of interlocking parts which is the full-scale emulation of the interoffice, inter-organizational paper-based mail system, since they conflate the term "electronic mail" with "email" by referencing Ray Tomlinson, Tom Van Vleck and David Crocker as "email pioneers." Neither Tomlinson nor Van Vleck nor Crocker invented email --- the system of interlocking parts intended to emulate the interoffice, inter-organizational paper-based mail system, which specifically Crocker had as of December 1977 concluded "impossible" to build.

Moreover, this attempt to provide a "specific definition" by Mr. Haigh in 2012, 34 years after email was precisely defined in 1978 by Ayyadurai, as the electronic version of the interoffice, inter-organizational paper-based mail system, is historical revisionism. Mr. Haigh leads SIGCIS, which is a group of computer "historians" that denies the invention of email in 1978 at UMDNJ, in spite of the clear facts. Their disinformation and historical revisionism is based on equating "electronic messaging" with "email." These "historians" had already written "email history," prior to Smithsonian's acquisition of Ayyadurai's artifacts on February 16, 2012.

The fact is "email" was already clearly defined in 1978 as the electronic interoffice, inter-organizational paper-based mail system, and formally recognized in 1982 by the issuance of the U.S. government's issuance of the first Copyright for "Email" to Ayyadurai. Such an attempt to provide a revisionist definition of "email" by industry insiders, in 2012, served one purpose, to allow them: Tomlinson, Van Vleck and Crocker, who worked with the early messaging systems SNDMSG, MAIL and MS, respectively, to retroactively define their work as "email" so as to ensure their primacy to "email," which they did not create, and had no intention of creating, while misappropriating credit from Ayyadurai.

The documentation of that period reveals that the term "email" did not exist prior to 1978. More importantly, the definition of the juxtaposed terms "electronic" and "mail," and a specification of its functions, was anything but clear-cut. In fact, prior to 1978, the term "electronic mail" and "electronic message" were used interchangeably to refer to the "electronification" of any type of text message, dating back to the telegraph of the 1800s.

Email, created by Ayyadurai in 1978, however, has a precise definition as the system of interlocking parts emulating the entire interoffice, inter-organizational paper-based mail system. Prior to Ayyadurai's invention, the confusion about the term "electronic mail" existed:

As Gordon B. Thompson of Bell Northern Research wrote in 1981 (Thompson, 1981):

Electronic Mail Systems give me some major concern. The use of the word "mail" brings with it a lot of baggage, and most certainly people are going to get some surprises because of this. A conventional letter always presents itself to the reader in the same format as it had when it left the writer. In the electronic situation, unless rigid controls are exercised over the terminals allowed on the system, there is no guarantee that the recipient will see the same lay out at all. Designers tell us that the way text is presented can significantly alter the attitude the reader has towards printed text. In electronic mail this variable is left wide open!

Peter Schicker wrote of similar concerns of messaging service and feature lists (Schicker, 1981):

Users of such computer based mail systems are less intrigued by the various internal mechanisms and resource allocation strategies but require exact definitions of the facilities and services that these systems offer. Prospective users, system designers, and service offering companies often compile lists of potential services, e.g., like the list shown in appendix A. Nobody claims that these lists are complete and most often it is admitted freely that these lists represent a first cut synthesis of services offered by other communication facilities (e.g., postal service, telephone, telegraph, telex, etc.).

Unfortunately, these lists mostly convey just a number of buzz-words which everybody interprets in his own fashion. For example, a multitudinous of shades of different services...

Even normally well-defined terms like "memo" and "conferencing" took on confusing, often conflicting meanings (Vallee, 1984):

sary obstacle. Much confusion still exists about the requirements for effective communications. One person calls "conferencing" what another calls "mail."

Or, as James Robinson wrote in the opening lines of his master's thesis on a review of electronic mail, messaging systems (Robinson, 1983):

'Electronic Mail' is a term that means different things to different people. To one person, electronic mail may represent a technology as old as the telegraph, while to another, it may mean high-powered computers that relay digitized information. Part of the confusion about what electronic mail really is can be traced to how the term is defined. Usually, electronic mail is defined as any process

The term "email," however, has had a clear definition based on Ayyadurai's invention of email, the electronic emulation of the interoffice, inter-organizational paper-based mail system, which he explicitly named "email."

Therefore, any attempt, in 2012 to redefine it, is clearly an attempt to inappropriately assign "the inventor of email" moniker to those who are not the inventors of email.

6.8 Misuse #8: "Email" Is Not An Invention, But VisiCalc Is An Invention

The statements (in reference to VisiCalc being an invention but email not being and invention since):

"To 'invent' something you have to devise some kind of new technology or capability that had not existed before. A computer program is not invented; it is 'written' or 'developed.' So, for example, it would make sense to say that Dan Bricklin and Bob Frankston invented the spreadsheet when they wrote Visicalc. It wouldn't make sense to say that Google invented the web browser when it developed Google Chrome, as many previous browsers existed, or even that it 'invented the world's first Google Chrome' as that is a specific system rather than a technology." ('SIGCIS Blog', 2012).

and,

"The system [created by Ayyadurai] will still be of interest to historians as a representative example of a low-budget, small scale electronic mail system constructed from off-the-shelf components, including the HP/1000's communications, word processing, and database programs." ('SIGCIS Blog', 2012)

demonstrate ignorance on the fact that "email" is a system just as VisiCalc is a system and is a deliberate attempt to denigrate the significant contribution of Ayyadurai, who invented "email," the system, which is the electronic version of the

interoffice, inter-organizational paper-based mail system, consisting of the interlocked parts: Inbox, Outbox, Folders, Attachments, etc.

Like VisiCalc, which was an electronic metaphor of the accounting paper-based ledger system, EMAIL, the first email system, also created an electronic metaphor for the interoffice, inter-organizational paper-based mail system.

The accessibility of Ayyadurai's invention of email was its essential attribute. It wasn't a simple text messaging system inspired to support battlefield communications for soldiers, and usable only by highly trained technical personnel, with cryptic codes and commands. It embodied the definition of "email" as we define the word today. Along these lines, we should remember that Bill Gates, in the early years of Microsoft, stated that the company's mission was to place a personal computer in every American home. Steven Jobs was determined to make a computer that could be bought in a box just like any other product. Consumers didn't have to shop for components in various electronics stores. They didn't have to do anything except plug the machine in and start using it. Microsoft and Apple were defined by the accessibility of their products.

Unquestionably, that was the real innovation on the part of Gates and Jobs. In just the same way, Ayyadurai's 1978 application, EMAIL, invented email. It created something – a practical, user-friendly electronic communication system on the model of the interoffice, inter-organizational paper-based mail system – that simply had never existed before, and one which experts of the time had thought "impossible."

The absurdity of Haigh's statements, therefore, is simply evidence of the bias of the SIGCIS "historians," who in collusion with industry insiders, seek to misappropriate credit of Ayyadurai's invention of email. The assertion that email is not an invention, but that VisiCalc is an invention, assumes that the reader will acknowledge such illogic.

There is a clear analogy between the invention of EMAIL and the invention of VisiCalc. Bricklin's title as the Father of the Modern Spreadsheet belies significant contributions to the field of data processing completed prior to the release of VisiCalc. It was the subject of Iveron and Brooks's seminal Automatic Data Processing and a major research topic for industry and academia.

What Bricklin did was to create an integrated system for data processing, complete with a consistent user interface (UI) and a strong metaphor, which was targeted towards end users. Bricklin's accomplishment wasn't that he invented data processing, but that he integrated it and increased accessibility, just as Ayyadurai's accomplishment wasn't that he invented electronic messaging, but that he integrated and created a new electronic system for making the paper-based system

of interoffice, inter-organizational communications accessible to ordinary office workers.

In the same way that Bricklin's VisiCalc digitized the system of paper spreadsheets, Ayyadurai's email digitized the interoffice, inter-organizational paper-based mail system. Both took well-defined social processes, and gave them the power of computation, freeing users from the drudgery of manual recalculation in the former case, or the delivery of physical interoffice memos in the latter case.

This puts both projects in stark contrast to the messaging systems of early timesharing architecture, which evolved to address the administrative and technical needs of mainframe users. As stated in RFC 808, most of these message systems "were not formal projects (in the sense of explicitly sponsored research), but things that 'just happened,'" and Jacques Vallee wrote of these early systems (Vallee, 1984):

The human factors of communications are still largely ignored. As new companies get into the field, they hire the best programmers they can find to implement message systems. These programmers are often compiler writers or experts in operating systems and have had no experience in dealing with end users. They have operated in a completely different environment, where communications had a much narrower meaning. Some early successes have also had the unfortunate result of freezing the technical reality of the field for too long. Network mail on the ARPANET is a case in point. Introduced in the early 1970s, electronic mail systems have been very successful on the ARPANET, where they served a highly trained community of technical experts. When it came time to design new systems for wider communities, these same technical experts found it very difficult to be creative in ways that differed from what they had first learned.

The statement by the SIGCIS "historian," part of the industry insider clique, has asserted, with reference to Ayyadurai's work that:

"The system will still be of interest to historians as a representative example of a low-budget, small scale electronic mail system constructed from off-the-shelf components, including the HP/1000's communications, word processing, and database programs." ('SIGCIS Blog', 2012).

is simply a false, unscholarly, and denigrating statement.

This statement reveals deliberate and reckless ignorance of the facts, which are accessible now at the Smithsonian. EMAIL, the first email system, was designed as an integrated system—it included all its own facilities for message handling, distribution, composition, archival, and user management. It was "small scale" only in the sense that it did not need the ARPANET, in contrast to systems like MAIL and MSG, which leveraged a host of facilities in the host environment. EMAIL the program and system, consisted of nearly 50,000 lines of FORTRAN

IV code, unlike Van Vleck's MAIL command, which comprised less than 300 lines of MAD, a high-level language on the CTSS (Crisman et al., 2012).

EMAIL was far from a "small-scale electronic mail system." EMAIL was a full-scale emulation of the entire interoffice, inter-organizational paper-based mail system, with all the features we now experience in modern email programs and many features, which some email programs even in the late 1990's, did not have.

What also needs to be investigated, by likely an independent professional ethics body, is the biased, unscholarly, and defamatory attacks on Ayyadurai ('SIGCIS Blog', 2012), and the clear conflict of interest, as exemplified in the list of individuals in Mr. Haigh's "Acknowledgements" section thanking those who helped him in denigrating Ayyadurai:

"Acknowledgements: Thanks to the dozens of people who sent me hundreds of messages after learning that I was working on a response for the Post. Many helped to read and shape earlier drafts. In no particular order: Evan Koblentz, Catherine Lathwell, Peter Meyer, Dave Walden, Debbie Deutsch, Marie Hicks, James Sumner, Ken Pogran, Tom Van Vleck, Dag Spicer, Mark Weber, JoAnne Yates, Murray Turoff, Al Kossow, Ramesh Subramanian, David Alan Grier, Paul McJones, Nathan Ensmenger, David Hemmendinger, Jeffrey Yost, David Moran, Peggy Kidwell, Debbie Douglas, Alex Bochanek, Bill McMillan, Len Shustek, Petri Paju, Elizabeth Finler, Dave Crocker, Ray Tomlinson, Pierre Mounier Kuhn, James P.G. Sterbenz, Ben Barker, Jim Cortada, and Craig Partridge." ('SIGCIS Blog', 2012)

A significant cluster or coalition of the individuals listed in the Acknowledgements have a direct and indirect, and/or close affiliation to Raytheon/BBN, who claims they "invented email," as evident on their website (Raytheon/BBN, n.d.), which brandishes the '@' logo with its numerous press and marketing releases claiming that it is the home of the "inventor of email," Mr. Ray Tomlinson.

6.9 Misuse #9: Dec And Wang Created "Email"

The statement:

"By 1980, electronic mail systems aimed at the office environments were readily available from companies such as DEC, Wang, and IBM." ('SIGCIS Blog', 2012)

conflates all forms of electronic communication, from telegraph services, to Telex or CBMS systems with the email --- the system of interlocked parts intended to emulate the interoffice, inter-organizational paper-based mail system. This con-

flation is confusing, and an attempt to equate the broad term “electronic mail,” dating back to the 1800s, with email, the system.

The offerings of “electronic mail” systems by private suppliers varied greatly, and were largely incompatible. Wang Laboratories, for example, had already been well established for its line of word processing equipment (Wang Systems Newsletter, 1979). When network facilities became readily available, it bolted on file transfer facilities to its machines, creating a line of “communicating word processors” (Trudell et al., 1984). This networking of word processors is not email --- the system of interlocked parts intended to emulate the interoffice, inter-organizational paper-based mail system.

In 1980, there was tremendous pressure to innovate in the “office automation sector.” However, as addressed in James Robinson’s 1983 thesis, “An Overview of Electronic Mail Systems” (Robinson, 1983), these offerings were part of a larger defensive strategy:

“[Computer-based message systems] are sold to users who have an interest in implementing electronic mail on their current equipment. Not surprising therefore, many of the vendors in this grouping tend to be minicomputer manufacturers such as Data General and Prime. The reason for this is not so much that minicomputer manufacturers have a real interest in electronic mail, but rather have devised messaging systems in an attempt to prevent other firms from selling a system that would run on their hardware. Thus, this type of electronic mail system has evolved as part of a defensive strategy by original equipment manufacturers (OEMs). An excellent example of a product by an OEM is Wang Laboratories Inc.’s Mailway” (Wang Systems Newsletter, 1979)

The “electronic mail” offerings by private industry in 1980 were not the system of interlocked parts emulating the entire interoffice, inter-organizational paper-based mail system. They were, at best, wildly unstable and inconsistent.

6.10 Misuse #10: Laurel Was “Email”

The statement:

“...the PARC email software, Laurel, ran on the user’s local computer, was operated with a mouse, and pulled messages from the PARC server to a personal hard drive for storage and filing.” (‘SIGCIS Blog’, 2012)

is a misuse of the term email --- the system of interlocking parts which was the full-scale emulation of the interoffice, inter-organizational paper-based mail system.

The invention, Laurel, was a mail user interface program for the Xerox Alto. It was a graphical front-end to a series of messaging programs akin to SNDMSG and MS (Schroeder et al., 1984). The use of mouse was an innovation of its host environment Alto, not of Laurel itself (Alto User Handbook, 1979). Laurel was capable of basic message composition, scanning and flat-file storage (through the use of its *.mail files). Like other file-flat approaches, mail management remained in the hands of users (ALTO World Newsletter, 1979).

The Laurel Manual, as it existed at Stanford in September 1980 (Stanford, 1980) provided a thorough explanation of what Laurel was, and what its capabilities were. Laurel was just a user interface, and not the system of interlocked parts to emulate the entire interoffice paper mail system.

Laurel was disconnected and relied on "Piping" other small programs which were loosely connected to each other.

Mention of MSG in the official Laurel documentation refers to the same command program discussed earlier, created and critiqued by John Vittal, and listed in RFC 808 as running on a TENEX operating system. Maxc referred to a Xerox-produced machine that emulated the facilities of PDP-10 TENEX-based systems. Its operation is well documented (Fiala et al., 1974). It follows that Laurel, as it existed in 1979 and 1980, fundamentally depended on MSG and Maxc, for message transmission. It was an Alto-based front-end for a more pedestrian MSG program. Ironically, the revealing kinship of Laurel and MSG is well described in the 1979 Whole ALTO World Newsletter (ALTO World Newsletter, 1979). The sentence, "Eventually, the services of Laurel will surpass those of MSG, but at present, the two are roughly equivalent in function," should not be overlooked.

The "distributed message system" mentioned in the Laurel Manual would eventually be realized in Grapevine, tested on a limited number of clients in 1980, and not publicly documented ('ACM Transactions on Computer systems', 1984) until 1982, well after Ayyadurai's invention of email was well established in a production environment. Larry Tesler, who was at Xerox throughout Laurel's development, corroborates these points (Tesler, 2012).

A review of period documentation helps to put Laurel in perspective. It was, as of 1979 and 1980, an Alto-based graphical front-end for MSG. It stood on the foundations of the beautifully sophisticated Alto environment, and contributed Alto-specific operations like menu picking and Bravo-type editing, which were not available in other MSG environments.

However, Laurel 2.0 provided only a small subset of the features available in Ayyadurai's EMAIL, lacking an attachment editor, relational database, administrator/postmaster functionality, prioritization and search tools, among others. The Alto was a brilliant machine, the precursor to the Apple machines, and Laurel

would evolve to become a worthy Alto application. However, as of 1980, Laurel was not the state-of-the-art technology. Readers are encouraged to read the Laurel Manual for details.

6.11 Misuse #11: The Term “Email” Belongs To CompuServe

The statement:

“For years CompuServe users could type ‘GO EMAIL’ to read their messages....”
(CompuServe Information Service User’s Guide, 1983)

is a misdirection to attempt to convince readers that the term “email” existed prior to the invention of email --- the system of interlocked parts intended to emulate the interoffice, inter-organizational paper-based mail system.

The term “email” was created and coined by V.A. Shiva Ayyadurai in 1978 at UMDNJ. Those five characters E-M-A-I-L were juxtaposed together to name the main subroutine of the first email system. Ayyadurai coined the term email for the idiosyncratic reason that in 1978 FORTRAN IV only allowed for a six-character maximum variable and subroutine naming convention, and the RTE-IV operating system had a five-character limit for program names.

By 1980, Ayyadurai’s email system was in production use at UMDNJ. Needless to say, EMAIL, the program, and its user manual were already in distribution around the UMDNJ campus. Email was a CompuServe trademark in 1983, but that remains a moot point for discussions of primacy. CompuServe applied for an EMAIL trademark on June 27, 1983, an effort that it abandoned in August 1984, likely because of the prior arte of email dating back to Ayyadurai’s Copyright in 1982. However, for the sake of clarity and transparency, two instances of CompuServe’s 1983 EMAIL advertising are included below:

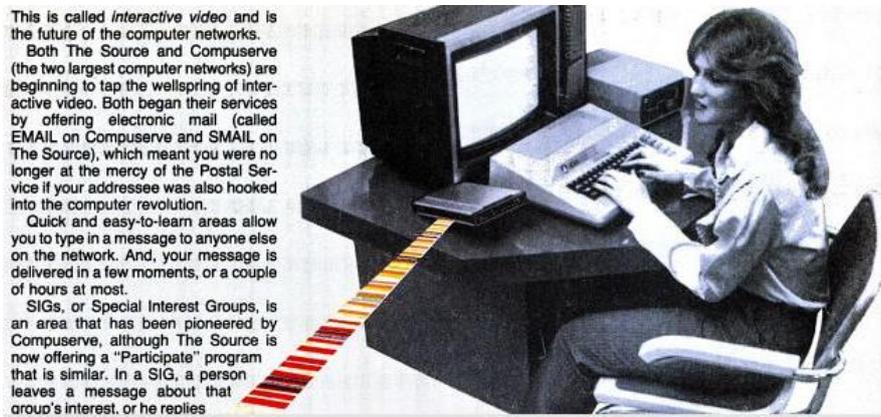


Fig. 8. Taken from the August, 1983 Edition of Popular Mechanics Magazine, pg. 107.



**LAST NIGHT WE EXCHANGED LETTERS WITH
MOM, THEN HAD A PARTY FOR
ELEVEN PEOPLE IN NINE DIFFERENT STATES
AND ONLY HAD TO WASH ONE GLASS...**

**That's CompuServe, The
Personal Communications
Network For Every Computer
Owner**

And it doesn't matter what kind of computer you own. You'll use CompuServe's Electronic Mail system (we call it Email™) to compose, edit and send letters to friends or business associates. The system delivers any number of messages to other users anywhere in North America.

CompuServe's multi-channel CB simulator brings distant friends together and gets new friendships started. You can even use a scrambler if you have a secret you don't want to share. Special interest groups meet regularly to trade information on hardware, software and hobbies from photography to cooking and you can sell, swap and post personal notices on the bulletin board.

There's all this and much more on the CompuServe Information Service. All you need is a computer, a modem,

and CompuServe. CompuServe connects with almost any type or brand of personal computer or terminal and many communicating word processors. To receive an illustrated guide to CompuServe and learn how you can subscribe, contact or call:

CompuServe
Information Service Division, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220
800-848-8990
In Ohio call 614-457-8650

An H&R Block Company

Circle 98 on inquiry card.

BYTE January 1983 145

Fig. 9. Taken from the January, 1983 Edition of Byte Magazine.

It's important to note that CompuServe "popularized" the term 'Email' only to the extent that it triggered animosity and ridicule from system users; it was notoriously buggy and feature-light (CompuServe Information Service User's Guide, 1983).

6.12 Misuse #12: “Email” Has No Single Inventor

The statement:

"Email has no single inventor. There are dozens, maybe hundreds, of people who contributed to significant incremental 'firsts' in the development of email as we know it today. There was a collective accomplishment, and there is a quiet pride (or at least was until recent press coverage provoked them). Email pioneer Ray Tomlinson has said of email's invention that, 'Any single development is stepping on the heels of the previous one and is so closely followed by the next that most advances are obscured. I think that few individuals will be remembered.'" (Crocker, 2012)

is a misuse of the term “email” --- the system of interlocking parts intended to be a full-scale emulation of the interoffice, inter-organizational paper-based mail system. The individuals being referenced here as having been “email pioneers” and contributing to the development of “email,” including Mr. Tomlinson, did not contribute to the development of email, but rudimentary systems for text messaging.

More importantly, this statement is an attempt to feign humility with a “collaborative spirit,” with the deliberate aim of isolating and dismissing Ayyadurai's singular and rightful position as the inventor of email. Ayyadurai did singularly create email, the system of interlocking parts emulating the entire interoffice, inter-organizational paper-based mail system.

The assertion that “email has no single inventor” and “email cannot be invented” are statements, which industry insiders began promoting after an article in the Washington Post appeared that “V.A. Shiva Ayyadurai honored as the inventor of email” (Kolawole, 2012).

For many decades, Raytheon's subsidiary, BBN, has been falsely promoting that it employs the “inventor of email,” referring to Ray Tomlinson. Yet, prior to the ceremony to honor Ayyadurai's accomplishment and acquisition of the 50,000 lines of code, tapes, papers and artifacts documenting his invention, these insiders and the SIGCIS group did not expose or ever question the false statements attributing Mr. Tomlinson as “the inventor of email.”

Raytheon/BBN put a great deal of effort into their own branding as innovators, by claiming publicly that they are the “inventors of email.” This branding involves juxtaposing the “@” symbol with the face of Ray Tomlinson as the “inventor of email.” In fact, on Raytheon/BBN's home page, the word “innovation” is visually juxtaposed next to the @ logo, with Tomlinson's picture overlaid (Raytheon/BBN, n.d.).

After the Smithsonian ceremony of Ayyadurai's invention, Raytheon/BBN sent press releases re-asserting that Tomlinson was the "inventor of email." Concomitant with these efforts, as the timeline shows of attack on Ayyadurai (Abraham, 2014) industry insiders, supported by SIGCIS "historians," Ray Tomlinson, BBN supporters, and ex-BBN employees continued to perpetuate a false history of email by discrediting Ayyadurai's invention as well as character assassinating him as an inventor and scientist. They used historical revisionism and confusion to re-define and misuse the term email. Through these efforts, they re-declared Tomlinson, and thereby the Raytheon/BBN brand, as the singular "inventor of email," the "Godfather of email," and the "King of email" (Hesse, 2012; Hicks, 2012).

One ex-BBNer, Dave Walden, though part of the Tomlinson coterie, acknowledged the following:

"Naturally this was discussed on the ex-BBN list. In my view, this "new guy" [Shiva Ayyadurai] has described something not quite like what the rest of us understand when we say 'email.'" (SIGCIS Blog, 2012)

Walden recognized the misuse of the term "email" as the transmission of text messages between terminals, as was the case with the early messaging systems such as MAIL. This text-message transmission can signify nearly all forms of digital communication—facsimiles, communicating word processors, online bulletin board systems, instant messaging clients, and formal communication.

However, email has a very clear meaning, as established by Ayyadurai in 1978: it is the electronic interoffice, inter-organizational paper-based mail system. It includes all the features one expects from paper mail systems: memo composition, editing, drafts, sorting, archival, forwarding, reply, registered mail, return receipt, prioritization, security, delivery retries, undeliverable notifications, group lists, bulk distribution, and managerial/administrative functions. It had to be fault-tolerant, familiar, and universal. By this definition, Ayyadurai's invention is the only instance in which this level of integration was first achieved, the same level we all experience nearly every other email products such as Gmail, Hotmail and others.

References

- "A Brief History of Email in the Federal Government." FedTech. Web. 13 July 2012.
- Aamoth, D.** (2013). 'The Man Who Invented Email' Time Magazine: Techland, <http://techland.time.com/2011/11/15/the-man-who-invented-email>.
- Abraham, S.** (2014). 'Vitriol, Attacks, Character Assassination and Defamation of V.A. Shiva Ayyadurai after Smithsonian Acquisition in Major Media', Retrieved November 12, 2014 from <http://www.historyofemail.com/defamation-of-inventor-of-email-on-major-media-after-smithsonian-acquisition.asp>.
- "Ask.com - What's Your Question?" Ask.com. Web. 13 July 2012.
http://answers.ask.com/computers/internet/who_invented_email.
- ACM Transactions on Computer Systems 2.1 (1984) pp. 3-23.
- ALTO User's Handbook (1979 September) Palo Alto, CA: XEROX Palo Alto Research Center.
- Ayyadurai, V.A.S.** (1981). 'Software Design, Development and Implementation of a High-Reliability Network-Wide Electronic Mail System', Thomas Edison/Max McGraw Foundation Awards Application, Livingston, NJ, pp. 1-12.
- Ayyadurai, V.A.S.** (1982a). U.S. Copyright Registration Number: TXu000111775. Email: Computer Program Electronic Mail System. Washington, DC: United States Copyright Office.
- Ayyadurai, V.A.S.** (1982b). U.S. Copyright Registration Number: TXu000108715. Email User's Manual: Operating Manual for Electronic Mail System Program. Washington, DC: United States Copyright Office.
- Aguilar, M.** (2012 February 22). 'The Inventor of Email Did Not Invent Email?', Gizmodo.
- Bellis, M.** "Ray Tomlinson and the History of Email." About.com Inventors. About.com. Web. 13 July 2012. <http://inventors.about.com/od/estartinventions/a/email.htm>.
- Biddle, S.** (2012 March 5). Corruption, Lies, and Death Threats: The Crazy Story of the Man Who Pretended to Invent Email. Gizmodo.
- Birrell, A.** (1980). Grapevine: An Exercise in Distributed Computing, <http://birrell.org/andrew/papers/Grapevine.pdf> :272
- 'Bitsavers Website' (2012). Retrieved from http://www.bitsavers.org/pdf/mit/ctss/CTSS_ProgrammersGuide_Dec69.pdf on April 7, 2012.
- Carayannis, E. G., & Campbell, D. F.** (2011). 'Open innovation diplomacy and a 21st century fractal research, education and innovation (FREIE) ecosystem: building on the quadruple and quintuple helix innovation concepts and the "mode 3" knowledge production system', Journal of the Knowledge Economy, Vol. 2 No. 3, pp. 327-372.
- Cerf, V. G.** (1979). 'DARPA activities in packet network interconnection', In Interlinking of Computer Networks, Springer Netherlands, pp. 287-305.

- Cheney, P. H., and Lyons, N. R.** (1980). 'Information systems skill requirements: A survey', MIS Quarterly, pp. 35-43.
- Compuserve Information Service User's Guide. Radio Shack (1983). Tandy Corporation.
- Crews, K. D.** (1987). University Copyright Policies in ARL Libraries (Vol. 138). Association of Research Libraries.
- Crisman et al.** Programming Staff Note 39. <http://www.multicians.org/thvv/psn-39.pdf>, retrieved April 7, 2012.
- Crisman, J.G.** (1965). The Compatible Time-Sharing System. Cambridge, MA: The M.I.T. Press.
- Crocker, D. H.** (1977). 'Framework and Functions of the MS Personal Message System', (No. RAND/R-2134-ARPA), Rand Corporation, Santa Monica, CA.
- Crocker, D.H., Vittal, J.J., Pogran, K.T., Henderson, D.A.** (1977), Standard For The Format Of Arpa Network Text Messages, <http://www.rfc-editor.org/rfc/rfc733.txt>, retrieved April 2012.
- Crocker, D.H.** (2012 March 20). 'A history of e-mail: Collaboration, innovation and the birth of a system', The Washington Post.
- Dennett, S., Feinler, E. J., and Perillo, F.** (1985). 'ARPANET Information Brochure (No. NIC-50003)', Sri International, Menlo Park, CA DDN Network Information Center Retrieved from <http://www.dtic.mil/dtic/tr/fulltext/u2/a164353.pdf> on November 21, 2014.
- Email. (n.d.). In Wikipedia. Retrieved September 12, 2014, from <http://en.wikipedia.org/wiki/Email>.
- Email Origin. (1980). In Oxford English Dictionary. Retrieved September 12, 2014, from http://www.oxforddictionaries.com/us/definition/american_english/e-mail.
- Email First Known Use. (1982). In Merriam Webster Dictionary. Retrieved September 12, 2014, from <http://www.merriam-webster.com/dictionary/e-mail>.
- Etzkowitz, H., & Leydesdorff, L.** (2000). 'The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university-industry-government relations', Research Policy, Vol. 29 No. 2, pp.109-123.
- Field, R.** (2014, August). 'The First Email System', Retrieved November 2014, from www.historyofemail.com/the-first-email-system.asp
- Fiala, E. R. et al.** (1974 May 29) MAXC Operations. Maxc 18.1. Palo Alto, CA: XEROX Palo Alto Research Center.
- Flewellen, L. N.** (1980). 'Anomaly in the Patent System: The Uncertain Status of Computer Software', An. Rutgers Computer & Tech. LJ, Vol. 8, p. 273.
- Foster, D. G.** (1994 March). 'In Praise of Lan-Based E-Mail', TechTrends. Vol. 39 No. 2, pp. 25-27.

- Gains, J. (1999).** ‘Electronic mail—a new style of communication or just a new medium?: An investigation into the text features of e-mail’, *English for Specific Purposes*, Vol. 18 No. 1, pp. 81-101.
- Garling, C.** (2012 June 16). Who Invented Email? Just Ask... Noam Chomsky. *Wired*.
- Gopalakrishnan, R.** (June 12, 2014). ‘The “I” Factor in Innovation’, *Business Standard*.
- Hesse, M. (2012):** “He put the @ in email”, *The Sunday Morning Herald*, <http://www.smh.com.au/technology/technology-news/he-put-the--in-email-20120425-1xkx4.html>.
- "History of Internet/Email." Web. 13 July 2012. <http://www.nethistory.info/History of the Internet/email.html>.
- Hicks, J.** (2012): “Ray Tomlinson, the inventor of email: 'I see email being used, by and large, exactly the way I envisioned'”, *The Verge*, <http://www.theverge.com/2012/5/2/2991486/ray-tomlinson-email-inventor-interview-i-see-email-being-used>.
- Holmes, M.E.** (1995). ‘Don't Blink or You'll Miss It: Issues in Electronic Mail Research’, *Communication Yearbook*, Vol. 18, pp. 454-463.
- “IETF Tools” (n.d.). Retrieved September 12, 2012, from <http://tools.ietf.org>. "The Invention of Email." http://socrates.berkeley.edu/~scotch/innovation/inventing_email.pdf. 1998. Web. 13 July 2012.
- Kuo, F. F.** (1979). *Message Services in Computer Networks*, Springer Netherlands.
- Kolawole, E.** (2012). “Smithsonian acquires documents from inventor of ‘EMAIL’ program”. *The Washington Post*. http://www.washingtonpost.com/national/on-innovations/va-shivaayadurai-inventor-of-email-honored-by-smithsonian/2012/02/17/gIQA8gQhKR_story.html
- Lemley, M. A., Menell, P. S., Merges, R. P., & Samuelson, P.** (2006). *Software and Internet Law*. Aspen Publishers, Inc.
- Leydesdorff, L., & Etzkowitz, H.** (1996). ‘Emergence of a Triple Helix of university—industry—government relations’, *Science and Public Policy*, Vol. 23 No. 5, pp. 279-286.
- ‘Livingston Student Designs Electronic Mail System’, (1980, October 30). *West Essex Tribune*, p. B8.
- Lyons, R.** (1980). ‘A Total AUTODIN System Architecture,’ *IEEE Transactions on Communications*, Vol. 28 No. 9, pp. 1467-1471.
- Malgieri, W.** (1982). *Implementation of Command and Control Training Systems*, COMPUTING ANALYSIS CORP, ARLINGTON VA.
- Markus, M. L.** (1994). ‘Electronic mail as the medium of managerial choice’, *Organization Science*, Vol. 5 No. 4, pp. 502-527.
- Marold, K. A., and Larsen, G.** (1997, April). ‘The CMC range war: an investigation into user preferences for email and vmail’, In *Proceedings of the 1997 ACM SIGCPR conference on Computer personnel research*, pp. 234-239. ACM.

- McLeod Jr., R., and Bender, D. H.** (1982). 'The integration of word processing into a management information system', *MIS Quarterly*, Vol. 6 No. 4, pp. 11-29.
- Michelson, L.M.** (April 2012). 'Recollections of a Mentor and Colleague of a 14-Year-Old, Who Invented Email in Newark, NJ', Retrieved October 2014, from http://www.inventorofemail.com/va_shiva_recollection_inventing_email_leslie_michelson.asp.
- Michelson, L.M., Bodow, M., Brezenhoff, T. and Field, R.** (2013, September 17). 'Launching of Innovation Corps' [Video file], University of Medicine and Dentistry of New Jersey, Newark, NJ. Retrieved from <http://www.innovationcorps.org/launching-of-innovation-corps>.
- Michelson, L.M.** (August 2014). 'The Invention of Email', Retrieved October 2014, from <http://www.historyofemail.com/the-invention-of-email>.
- Miller, J.** (1981, September 2). 'Incoming Class of 1985 Arrives to Meet Institute', *MIT Tech Talk*, Vol. 26 No. 5 p.1.
- Morrisett, L.N.** (1996). 'Habits of Mind and A New Technology of Freedom', *First Monday*, Vol. 1 No. 3, pp. 1-7.
- Mullish, H.** (1978). 'New York University Summer High School Program in Computer Science', Certificate of Successful Completion with Distinction, New York University, Courant Institute of Mathematical Sciences, New York, NY.
- Nanos, J.** (2013). 'Return to Sender', *Boston Magazine*, Boston, MA.
- Nightingale, D.J. and S. Song** (2012). "False Claims About Email." <http://www.inventorofemail.com/>. 2012. Web. 13 July 2015.
- Nightingale, D.J.** (2014a). 'The Five Myths of Email' Retrieved November 13, 2014, from <http://www.historyofemail.com/the-five-myths-of-email.asp>
- Nightingale, D.J., and S. Song** (2014b). "Revisionism of History by Tom Van Vleck After the News of Ayyadurai's Invention of Email." *The Inventor of Email*. 2012. Web. 13 July 2015. <http://www.inventorofemail.com/Historical-Revisionism-By-Tom-Van-Vleck.asp>.
- Ngwenyama, O. and Lee, A.** (1997). 'Communication Richness in Electronic Mail: Critical Social Theory and the Contextuality of Meaning', *MIS Quarterly*, Vol. 21 No. 2, pp. 145-167.
- Padlipsky, M.A.** (2000). 'And they argued all night...' *The ARPANET Source Book*, <http://tinyurl.com/8373917>, retrieved April 7, 2012. pp. 504-509.
- Patel, N. V.** (2003). 'e-Commerce technology', *E-business Fundamentals*, Routledge, New York, pp. 43-63.
- Pearl, J. A.** (1993). 'The E-Mail Quandary', *Management Review*, Vol. 82 No. 7, pp. 48-51.
- Pogran, K.** (2012). ARPANET contributor, <http://www.multicians.org/mx-net.html>, retrieved April 2012.
- Postel, J. B., Sunshine, C. A., and Cohen, D.** (1981). 'The ARPA internet protocol', *Computer Networks*, Vol. 5 No. 4, pp. 261-271.

- Postel, J. B.** (1982a). 'SMTP-Simple Mail Transfer Protocol', RFC 821.
- Postel, J. B.** (1982b). 'Summary Of Computer Mail Services Meeting Held at BBN on 10 January 1979', RFC 808. <http://tools.ietf.org/html/rfc808>.
- Ramey, C.** (1993). 'Emm: An Electronic Mail Management System for UNIX', Masters Thesis Project Report, Case Western Reserve University, Cleveland, OH pp. 1-49. Retrieved October, 2012, from <http://tiswww.case.edu/php/chet/info/emm.report.ps>.
- Robinson, J.G.** (1983). Introduction. An Overview of Electronic Mail Systems. Cambridge, MA: The M.I.T. Press.
- Rocca, M.** (2015). "Inventor of Email", CBS Dream Team - Innovation Nation with Mo Rocca, <http://cbsdreamteam.com/the-henry-fords-innovation-nation/episodes/inventor-of-email/>.
- Raytheon/BBN. (n.d.). Retrieved May 12, 2012, from www.bbn.com
- 'SIGCIS Blog' (2012). Retrieved from www.sigcis.org on April 17, 2012.
- Schroeder, Michael D., Andrew Birrell, and Roger Needham** (1984). "Experience with Grapevine: The Growth of a Distributed System." ACM Transactions on Computer Systems 2.1, 3-23.
- Shicker, P.** "Service Definitions in a Computer Based Mail Environment" Computer Message Systems. Ottawa, Canada: North-Holland Publishing Company, 1981. 159-171.
- Smith, C.** (2011, August 30). ' "Email" Anniversary: V.A. Shiva's EMAIL Copyright Issued August 30, 1982', Huffington Post.
- Smithsonian Institution National Museum of American History (2012, February 16). Artifacts of Invention of Email from V.A. Shiva Ayyadurai's 1978 Invention. Submitted to Smithsonian Institution National Museum of Natural History. 10th Street & Constitution Ave. NW, in Washington, D.C. 20560.
- Stanford Department of Computer Science & Xerox Corporation (1980 September). Welcome to ALTO Land. Stanford ALTO User's Manual. Department of Computer Science, Stanford University.
- Tesler, Larry** (2012). Retrieved from <http://tinyurl.com/83nlq32> on April 7, 2012.
- Thompson, G.A.** (1981) What's the Message. Computer Message Systems. pp. 1-6. Ottawa, Canada: North-Holland Publishing Company. Tomlinson (2012). <http://openmap.bbn.com/~tomlinso/ray/firstemailframe.html>, retrieved April 7, 2012
- Trudell, L. et al.** (1984) Options for electronic mail. Distributed Electronic Mail Networks. p. 67. White Plains, NY: Knowledge Industry Publications.
- Tsuei, H. T.** (2003). U.S. Patent No. 6,654,779. Washington, DC: U.S. Patent and Trademark Office.
- Van Vleck, T.** (2001) "The History of Electronic Mail," <http://web.archive.org/web/20110720215402/http://www.multicians.org/thvv/mail-history.html>, (retrieved April 2012.)

Vallee, Jacques (1984). *Computer Message Systems*. New York: McGraw-Hill

Vittal, John (1981). *MSG: A Simple Message System*. Cambridge, MA: North-Holland Publishing Company, 1981.

Wang Systems Newsletter 14 (1979 July). Whole ALTO World Newsletter (1977 December 31).

Westinghouse Science Talent Search (1981, January 21), 'Software Design, Development and Implementation of High Reliability, Network-Wide, Electronic Mail System', The 40th Annual Science Talent Search for the Westinghouse Science Scholarships and Awards: 1981 Honors Group, Science Service, Washington, DC.

Yates, J. (1989) 'The Emergence of the Memo as a Managerial Genre', *Management Communication Quarterly*, Vol. 2, pp. 485-510.

Yates, J. and Orlikowski, W. (1992) 'Genres of Organizational Communication: A Structural Approach to Studying Communication and Media', *Academy of Management Review*, Vol. 17 No. 2, pp. 299-326.