TEU00311

What is the Internet doing to me? (witidtm)

Stephen Farrell
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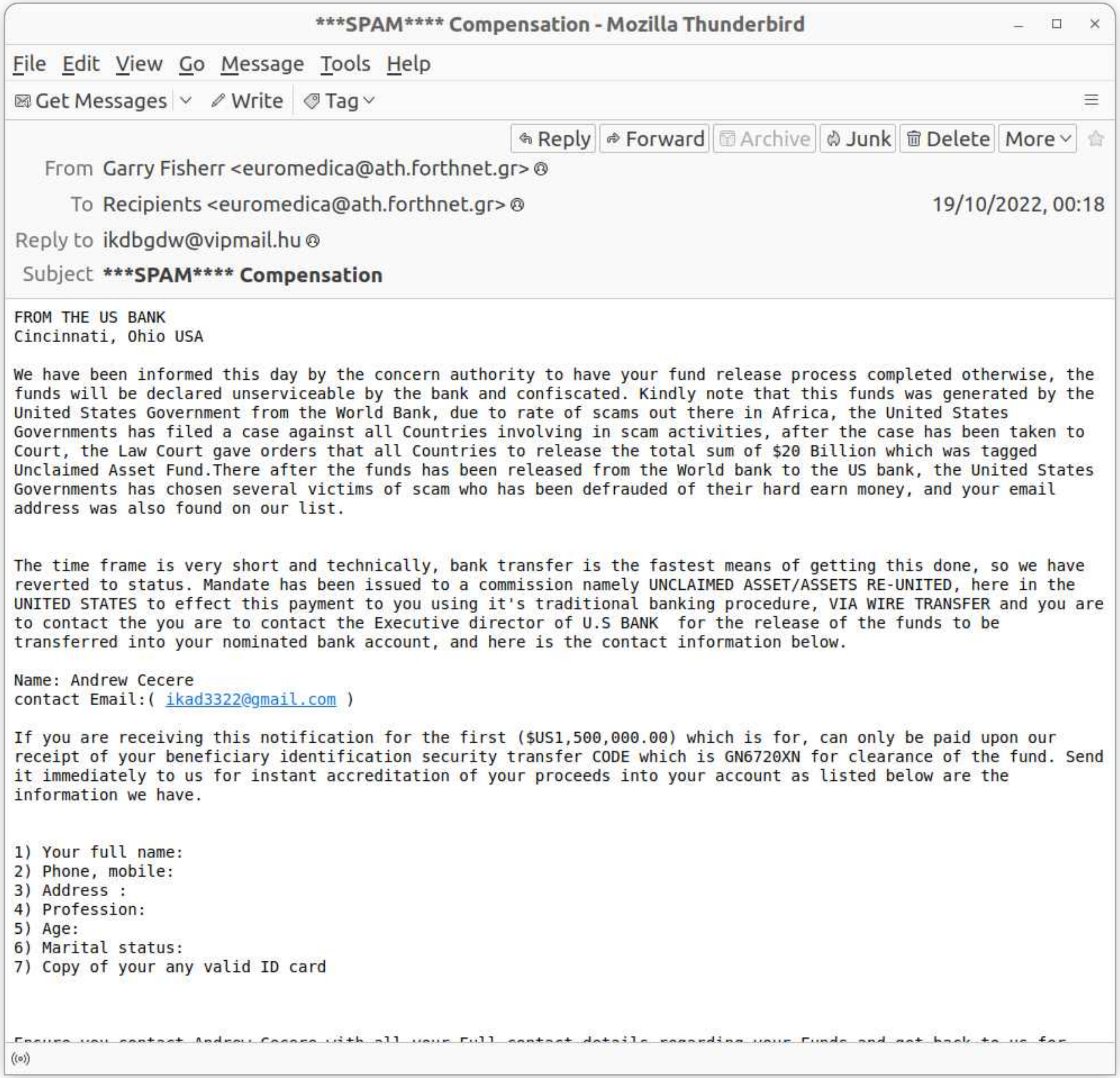
https://github.com/sftcd/witidtm
https://down.dsg.cs.tcd.ie/witidtm

What do we think about this?


SPAM* Compensation - Mozilla Thunderbird
File Edit View Go Message Tools Help
Get Messages
Write
Tag
Reply
Forward
Archive
Junk
Delete
More

From Garry Fisherr <euromedica@ath.forthnet.gr>
To Recipients <euromedica@ath.forthnet.gr>
19/10/2022, 00:18
Reply to ikdbgdw@vipmail.hu
Subject ***SPAM**** Compensation

FROM THE US BANK
Cincinnati, Ohio USA

We have been informed this day by the concern authority to have your fund release process completed otherwise, the funds will be declared unserviceable by the bank and confiscated. Kindly note that this funds was generated by the United States Government from the World Bank, due to rate of scams out there in Africa, the United States Governments has filed a case against all Countries involving in scam activities, after the case has been taken to Court, the Law Court gave orders that all Countries to release the total sum of $20 Billion which was tagged Unclaimed Asset Fund.There after the funds has been released from the World bank to the US bank, the United States Governments has chosen several victims of scam who has been defrauded of their hard earn money, and your email address was also found on our list.

The time frame is very short and technically, bank transfer is the fastest means of getting this done, so we have reverted to status. Mandate has been issued to a commission namely UNCLAIMED ASSET/ASSETS RE-UNITED, here in the UNITED STATES to effect this payment to you using it's traditional banking procedure, VIA WIRE TRANSFER and you are to contact the you are to contact the Executive director of U.S BANK for the release of the funds to be transferred into your nominated bank account, and here is the contact information below.

Name: Andrew Cecere
contact Email:(ikad3322@gmail.com)

If you are receiving this notification for the first ($US1,500,000.00) which is for, can only be paid upon our receipt of your beneficiary identification security transfer CODE which is GN6720XN for clearance of the fund. Send it immediately to us for instant accreditation of your proceeds into your account as listed below are the information we have.

1) Your full name:
2) Phone, mobile:
3) Address :
4) Profession:
5) Age:
6) Marital status:
7) Copy of your any valid ID card

Ensure you contact Andrew Cecere with all your Full contact details regarding your Funds and get back to us for

Overview

- Email Architecture
- Spam
- End-to-end email security
- A few lessons to learn along the way

Mail pre-history

- There used to be non-Internet email systems
  - uucp, X.400, other proprietary
- Internet email “won” - largely because it could connect all the others
- Fundamental basis of email is that anyone can (try) send mail to anyone, without needing permission first
  - Contrast with Twitter, FB etc. walled gardens
- Prime requirement: deliver the message, at all costs!
  - There really is no marginal cost:-)
  - That allows mail to be the basis for most other Internet/web services (e.g. so you can sign-up or do a password reset)
  - That also allows spam and other nasties
- Though there is no real per-message cost, running an effective mail server does have increasing costs
  - Often imposed by anti-spam measures and their ecosystem effects

Mail Addresses

- Mail address: user@example.com
  - “user” is left-hand-side (LHS) of the “@”
  - Right Hand Side of the “@” is the email domain and is almost always a DNS domain
- RHS (plus DNS) is basically how mail gets routed to recipients – at example.com in the above
- LHS is (or should be) only interpreted at the recipient’s server(s)
- Internationalisation (I18N) for canonical mail addresses can be done but support isn’t so good, so we often see “decorated” forms of the email address:
  - “provost@tcd.ie” <notthat@example.com>
  - What you see in your mail user agent will vary
  - But it’s the bit in “<>” that counts – the decoration can be forged

A helpful trick: LHS “+”

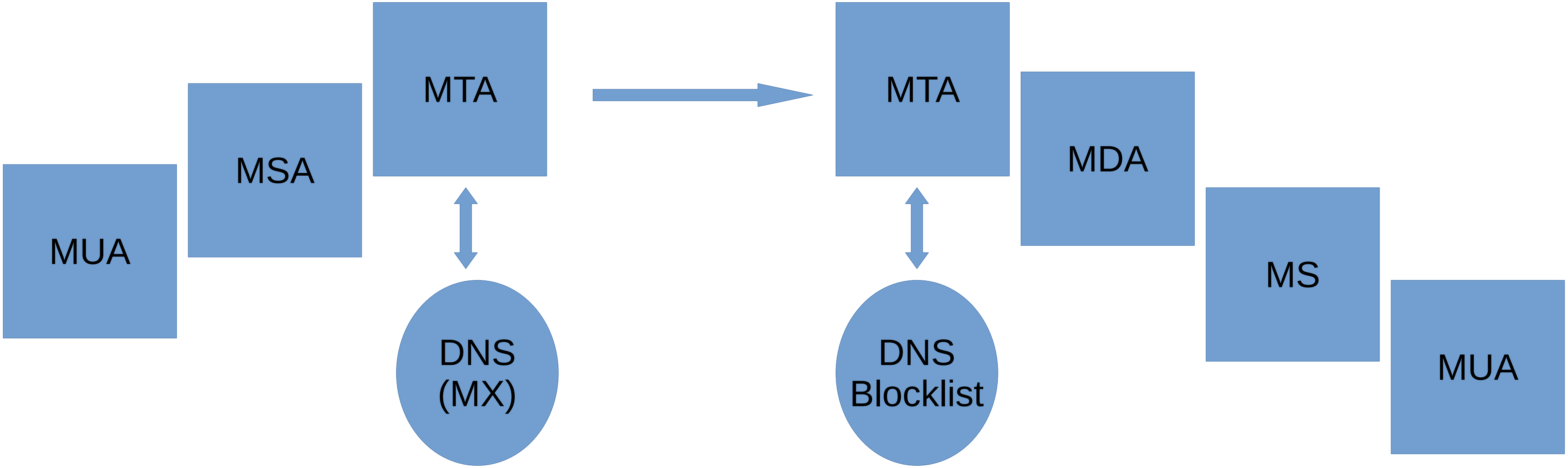
- For some mail services you can customise the LHS, e.g. if you have to give your email to some web site
- Instead of user@example.com you give them user+place@example.com
  - Other characters (not just “+”) can work sometimes
- Mail to user+place@example.com will still arrive in the mailbox for user@example.com
- That allows you to spam-folder them later and see who else got your address from them
- Can also avoid username collisions in services where email address is username and you want some form of separation, e.g. between work and personal accounts when forced to setup a web account somewhere
- Suggestion: try it out – that works (or used to?) for cs.tcd.ie but IIRC doesn’t work for tcd.ie though that could change, I’m told it does work for many mail providers though

Use plaintext!

- If you want good email hygiene send plaintext email and render received emails as plaintext
- Why?
  - To locally avoid tracking pixels that are in almost all commercial email
  - Better interoperability
  - Much smaller attack surface for you (and to an extent, your correspondents)
- How?
  - Instructions at: https://useplaintext.email

Email Architecture

- RFC5598 - https://www.rfc-editor.org/rfc/rfc5598



Component Terminology

- As a prompt for me, so I cover the basics, we’ll chat about various parts of the email ecosystem
- Mail User Agent (MUA) – that’s the “client” you use, which could be outlook, thunderbird, a phone-app, or a Web User Agent, where you access your mail via a normal web browser
- Mail Submission Agent (MSA) – the thing to which email is submitted by an MUA, often via the SMTP or SMTP/SUBMIT protocol
- Mail Transmission Agent (MTA) – a server that receives mail routes it to the next MTA on it’s way to the recipient, and that can do other things, e.g. scan for spam/malware using the SMTP protocol, hopefully, and often, over TLS so the mail is encrypted **in-transit**
- Mail Delivery Agent (MDA) – mail delivery agents delivery of email into a message store or generating a bounce message e.g. if no such mailbox exists
- Message Store (MS) – is where your email messages live before (and after) you read ‘em and is how you can see the same messages from different MUAs (e.g. laptop/phone)

Protocol Terminogy

- Protocols for fetching messages from MS to MUA:
  - Internet Message Access Protocol (IMAP)
  - Earlier similar thing: Post office Protocol (POP/POP3)
- Protocol for sending messages from MUA to MTA, or between MTAs: Simple Mail Transfer Protocol (SMTP)
- Today: all of those should really be run over TLS, which is true for about 99% of messages
  - If not, you're using the wrong service!
- Not all email interactions are standardised (actually a significant %):
  - Web MUA<->MS protocol generally proprietary stuff done via Javascript
  - Outlook/MS-Exchange also does proprietary stuff

Mailing Lists

- Mailing lists are (mostly) handled via special MUAs – you send to the list address and then a list server creates new email messages (with the same content) and sends those to a set of list subscribers
- Might seem v. basic, but that is how most Internet standardisation still happens!

Message Terminology

- Message = envelope + body
- Envelope = sequence of header fields:
  - E.g. From:, Date:, Subject:, Resent-From: ...
- Body = set of MIME body-parts
  - MIME = Multimedia Internet Media Extensions is how cat images are added to emails, which were originally just ASCII bodies

Message Attachments

- Messages can have attachments, e.g. images, ms-word files, pdfs
- Those can trigger applications, e.g. if you click to open the attachment
- Some of those can be dangerous, e.g.
  - ms-word files can contain macros (small programs) that might be run when you open the file – that should be turned off (I’m not sure what the default is nowadays with “cloudy” office licensing etc.)
  - An attachment might be a specially crafted file that triggers a bug in a common application used to open that file format – that’s a typical way to attempt to distribute malware
  - An attachment might contain an “executable” file – a program that you can run – you’ll be warned but it’s easy to go wrong on when having a bad day
- When sending: try send the least dangerous format attachment, often that’d be a PDF or raw image file (JPEG, PNG)
- When receiving: try setup your MUA to be more conservative and don’t just open random attachments even if they’re from people you know

Spam

- A “first principles” description

https://www.theguardian.com/environment/2017/feb/13/extraordinary-levels-of-toxic-pollution-found-in-10km-deep-mariana-trench#img-1

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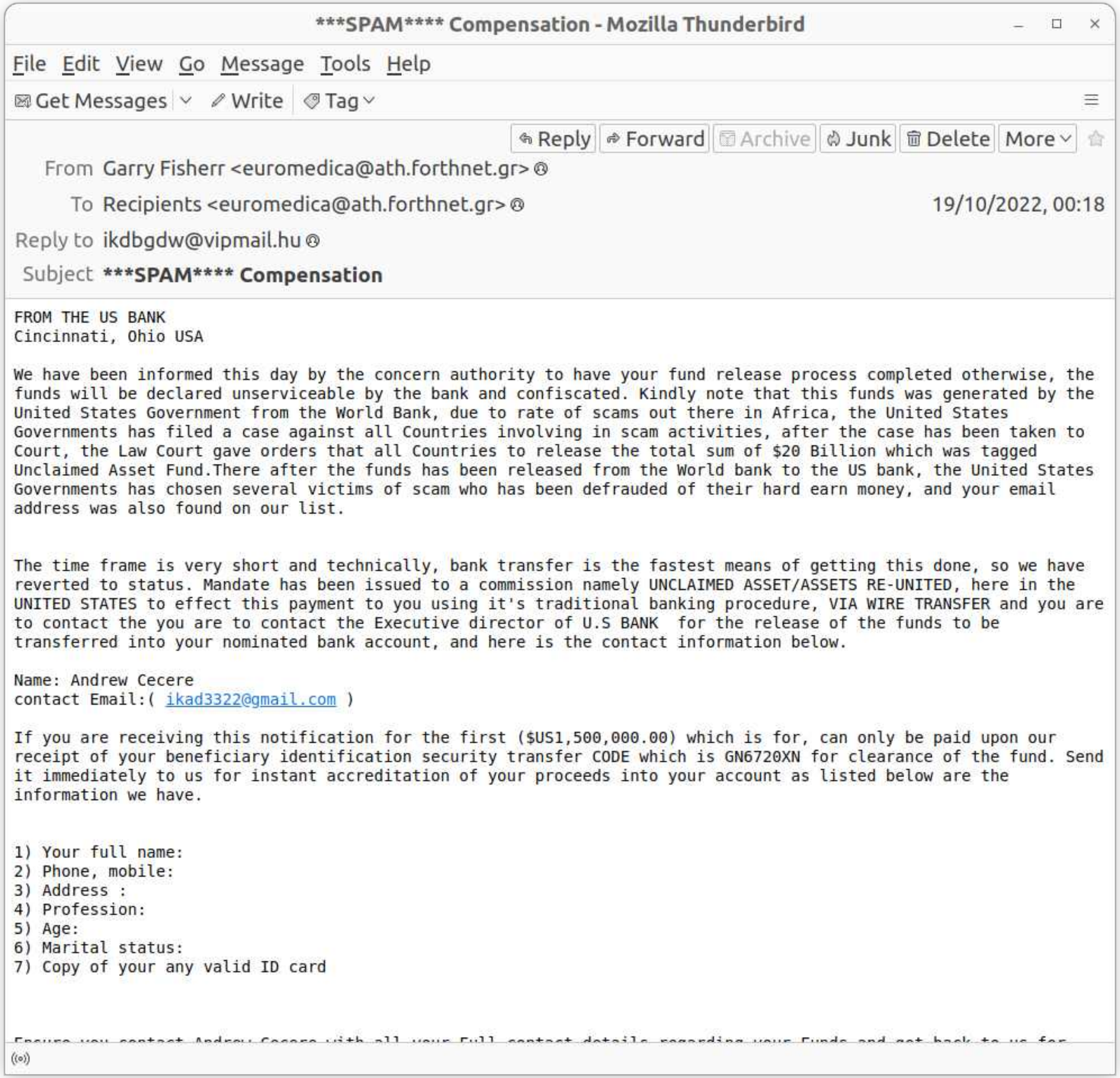
SPAM* Compensation - Mozilla Thunderbird
File Edit View Go Message Tools Help
Get Messages
Write
Tag
Reply
Forward
Archive
Junk
Delete
More

From Garry Fisherr <euromedica@ath.forthnet.gr>
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Advance fee fraud

- “We have been informed this day by the concern authority to have your fund release process completed otherwise...”
- Method:

  ```
  100: I’ll send you €1M once you send me €1
  200: Receive €1
  300: GOTO 100
  ```
- Why is the language in such emails often poor?
- Don’t be disparaging of those who fall for fraud! We’ll all have a bad day some day.

What is spam?

- Various acronyms:
  - Unsolicited bulk email (UBE)
  - Unsolicited commercial email (UCE)
- Spam is bad:
  - Would overwhelm utility of mail if not countered
  - Resource consumption
    - Filters, scanners etc. cost time & money
  - Malware
  - Phishing attempts

Original spam tricks

- Just send email!
  - Ahh…the naivety of it all!
- Email to list:
  - List servers got better, e.g. subscriber only with controlled subscription
- Forge headers and submit to your own server
  - Mostly outbound messages are sanity checked now
- Send via open relay
  - Used to be a lot of these, very few now

Originating Spam

- Rent a botnet for 48 hours, send some millions of spam
  - Ideally using the mail credentials of the botted device’s true owner
- Can be done via single compromised hosts but those’ll quickly be closed down
- Spend a few quid, setup a supposedly “legitimate” domain, wait a month or two, then send millions of spams before you’re shut down
  - Cost: maybe O(10k€) @ high-end, but might still make a profit
- State of the art in originating spam will always be ahead of defenders so long as there’s money to be made

Sometimes hard to know…

- Is this spam?

  “HILARY TERM GREETINGS FROM THE COLLEGE CHAPLAINS The College Chaplains send best wishes to all, and would like to bring the following upcoming events to your attention. They are open to any students or staff members who wish to join us. ...”

- There are “legitimate” bulk email senders – for announcements, marketing, support, newsletters,...

- Those can easily start to look like spam (esp. marketing)

More spam tricks…

- Confusion:
  - accounts@paypa1.com
  - support@eboy.com
  - postmaster@boi-support.com
  - About to get worse thanks to I18N
  - security@bigbank.com

    ^ Unicode 0430 is cryllic small ‘a’
- Throwaway domains/addresses
- Zombie hosts
- Trojans
- Fake ISPs

HTML messing

- Originally mail was text based, then we added MIME, one kind of MIME body is “text/html” which turns your MUA into a dangerous web browser
- Vulnerabilities created by HTML rendering in your MUA:
  - Colour-related trickery
  - Font size 0: break words with zero width spaces
  - Presentation of nice-looking link-text not clearly-dodgy URL
- Web-bugs: use of image URL that includes a value related to you allows sender to track when you open a mail if you render images

Solution to HTML messing

- Solution: turn off images and all HTML rendering in your MUA!
- While there: turn off clever fonts too if you can
- Both can be tricky on phones – in that case turn if off on your laptop and wait to read possibly dodgy mails there
- You do NOT have to buy into other people’s idea of what is urgent!

How much spam is there?

- Lots
  - Hard to get good figures, these are ones I’ve overheard
- ISP backbones:
  - 70% + of email traffic
- Delivered mail:
  - 40% + delivered
- Increasing or not?
  - Harder to tell if MTAs silently filter

Some Anti-spam techniques

- Content filtering (Bayesian, etc.)
- DNS Block Lists (SORBS, DNSBL)
- Register of known spam operators (ROKSO)
- Greylisting
- Sender Policy Framework (SPF)
- Domain Keys Identified Mail (DKIM)
- Domain Message Authentication Reporting and Conformance (DMARC)

End-to-end (e2e) email security

- That’s where you use cryptography to protect messages between the sender and recipient
  - Rather than just between each “hop” on the path the mail follows
- There are two different standards for how to do that: S/MIME and PGP
  - S/MIME is mostly used inside enterprises/govt
  - PGP is mostly used by nerds or smallish groups

Deployment

- Most MUAs suport s/mime or PGP either built-in or as an option
  - There are also “plug-in” products
- And mostly then *can* work together
  - I’ve used both, PGP more usable (via Thunderbird/Enigmail)
- But secure mail is not ubiquitous
  - Why?

e2e email security barriers

- Designs pre-date web user agent which changes trust model (where's the private key kept? Needs new infrastructure)
- Needs all major email service providers (yahoo, hotmail, gmail) to deploy the same thing which also needs to be implemented by all major user agent developers (microsoft, mozilla, apple, google)
- Public key retrieval needs to be fixed (doable if the above done, but a killer if not done), likely with some new PKI (doable but who's gonna pay?)
- Mail headers need to be protected as users don't get that S/MIME and PGP only protect body and not e.g. Subject, From (new enveloping protocol needed, can be done but kludgy)
- We need to unify S/MIME and PGP or pick one or we'll lose interop (it's ok if the other soldiers on for some niches)
- Users don't care much, so it has to be entirely transparent for them (needs significant UI work, co-ordinated across MUAs and significant web-UAs)

What can you do?

- Target diversity – don’t all use the same service(s)
- Use LHS “+” trick if it works for your service
- Don’t react immediately
- Take **much** longer to write mails than to read mails
  - Always re-read before you send
- Don’t render mails as HTML if your MUA allows that
  - It’s ok to wait until you’re using a laptop to process mail
- Don’t assume any names/links displayed to you are real
- Treat all mails and and especially attachments with caution