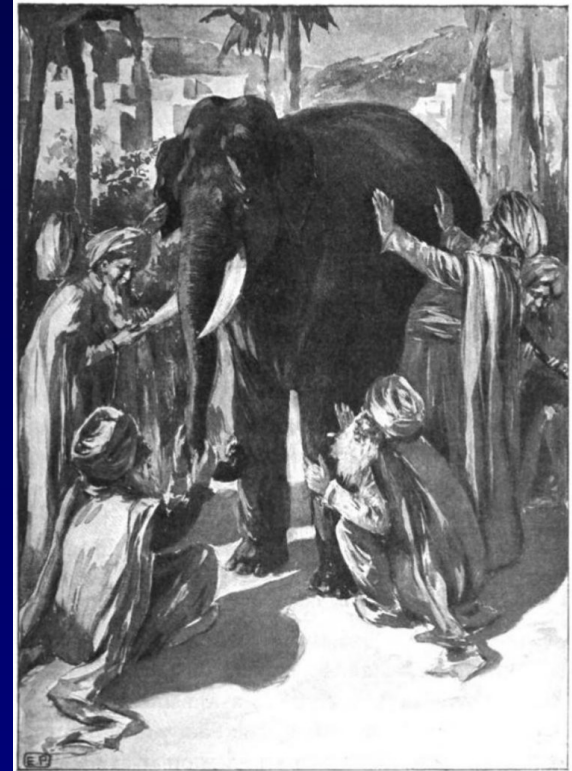


# From PLATO to OpenAI: Developments in Cyberspace

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# For starters: touching the elephant, - or, everyone's got an opinion

- “A quite recently invented nice place to read news, write to friends and chat”
- “A toy for computer nerds”
- “A lot of info - and, of course, ChatGPT”
- “Warez is cool!”
- “Cyber, the 5th dimension of warfare”
- “Unlimited advertising!”
- “Playground of perverts and other weirdos”
- “The mystical cyberspace”



Illustrations come from Wikimedia Commons, if not noted otherwise

# You'll get what you're looking for

- Plenty of useful information  $\Leftrightarrow$  loads of bullshit
- Many nice people  $\Leftrightarrow$  a host of dorks and idiots
- An interaction aid  $\Leftrightarrow$  a source of 'Oops..!'
- A place to get help  $\Leftrightarrow$  a source of despair
- A media channel  $\Leftrightarrow$  yellow news, deepfakes and hate speech
- Literature and art  $\Leftrightarrow$  a toilet wall ('F... you, too!')
- Faeryland  $\Leftrightarrow$  cyberjungle



# Two small parables

- Internet is a knife – a surgeon can save lives, a bandit can kill someone
- Internet is an amplifier – for human relations, mass media, wisdom, stupidity...

# Main services

- The Web (WWW)
- E-mail
- File transfer (FTP, various P2P solutions)
- Virtual terminal / remote access (Telnet, SSH)
- Real-time interaction (IRC, talkers, MUD, IM, VoIP, Zoom etc)
- Derivatives and combinations of the above

# When did it all start?

- Again, opinions differ. Some possible starting points include
  - The Atlantic Cable 1858/1866 (the first connection)
  - Nevil Maskelyne vs Guglielmo Marconi: the 1903 radio hack
  - Hackers: the U.S. radio amateurs of early 20th c.; Radio Act 1927
  - The *War of the Worlds* media panic 1938
  - *As We May Think* by Vannevar Bush 1945 (Memex and microfilms)
  - *Cybernetics* by Norbert Wiener 1948 (tech + management)
  - The AI Conference at Dartmouth 1956 (McCarthy and Minsky; the first suggestion of exponential growth of tech, aka Moore's Law)
  - Sputnik 1...

# Competing narratives

- Was the Internet born
  - ...of the need to protect the U.S. against the imminent Soviet nuclear attack? (still the prevailing opinion)
  - ...as a manifestation of the hippie-influenced techno-culture (classic hackerdom in MIT and Stanford? (*Hackers* by Steven Levy, and several others)
  - ...as a surveillance tool from day one (another question is how much of this was actually necessary; e.g. see the *Surveillance Valley: The Secret Military History of the Internet* by Yasha Levine, 2018)

# “OMG! The Russians are in space!”

- Someone said: “The Russians put up Sputnik yesterday, and it goes around the world saying *beep-beep-beep*. Then, when it gets to the U.S., it says *ha-ha-ha*.”
- NY Times on Oct 4, 1957: “A shocker like Pearl Harbor, waking America up and making it buckle down.”
- The National Defence Education Act 1958 – 5 bln \$ => 13 bln
- The Advanced Research Projects Agency (ARPA) and their 'nuclear shield' programme – one of the goals was to create a control network capable to keep working 'half dead' (the assumption was that the Russians will shoot first)



# Early research

- 1960 – *Man-Computer Symbiosis* by J.C.R. Licklider
- 1961 – a theoretical foundation for a new type of network laid by Leonard Kleinrock at MIT
- 1962 – *Augmenting Human Intellect: A Conceptual Framework* by Douglas Engelbart
- 1964 – the first practical specification by Paul Baran. The central idea was to divide the whole traffic into packages that find their way over the network independently
- 1965 – Welsh computer scientist Donald Davies proposed the same solution independently of Baran (at the UK National Physical Laboratory)

# The fathers of the Internet (in a way)



Paul Baran (US)  
1926-2011



Donald Davies (UK)  
1924-2000

# Summer of '69 (thanks, Bryan)

- The most popular suggestion for the birth of Internet
- 4 nodes: Santa Barbara, UCLA, Stanford, Utah
- The first login (Oct 29, 1969; Charles S. Kline from UCLA to Stanford) crashed at 'g'... Incidentally, the first word transmitted online was 'lo' (as in 'lo and behold')
- The spiritual roots of Internet - academy + counterculture (so that's why there are so few normal people online...)

# The tech Babel

- For a while, no common 'language' existed
- 1970 – the first attempt in NCP (Network Control Program), the first layered approach and development of the Open Systems Interconnection (OSI) model
- 1974 – Transmission Control Program
- 1978 – Transmission Control Protocol / Internet Protocol (TCP/IP), developed by Robert Kahn and Vinton (Vint) Cerf

# First e-mails, plus an online shrink

- 1971 – ARPAnet spanned the whole 23 computers
- A MIT engineer named Ray Tomlinson sent the first text message between computers. His application to ARPAnet for a new protocol was approved and e-mail was born. He also borrowed the @-sign from teletype
- 1972 – first real-time long-distance text chat – a 'patient' in Stanford and a 'psychiatrist' in Massachusetts. To top it off, both were actually what we call bots today (PARRY vs ELIZA). While ELIZA was a lighthearted creation of engineers, PARRY the paranoid schizophrenic was actually the brainchild of psychiatrist Kenneth Colby


# Expansion

- 1970 – AlohaNet on Hawaii, a wireless connection
- 1973 – expansion to the UK and Norway, the term 'Internet' adopted. First specification of FTP. Bob Metcalfe invented Ethernet
- UIUC PLATO Notes – a pioneer of many things (first online community, e-learning, plasma monitors... but also viruses; see the *Friendly Orange Glow* by Brian Dear 2017)
- 1975 – first mailing lists. Queen Elizabeth became the first head of state to send e-mail. First version of the Jargon File

# A screenshot of the UIUC PLATO

```

-- PLATO  NOTES --
Press -NEXT- on
BACK1 for news

LET ME OUT!  10/13  09:20


CHOOSE AN OPTION  >

a. Read about NEW SYSTEM FEATURES
b. Read & write PUBLIC NOTES
c. Read & write other GROUP notes
+ d. Read PERSONAL notes to you
  D. Write PERSONAL notes to others
e. Report a broken terminal

Press HELP for information.
```

# “Stop the damn world, I wanna get off!”

- The Vietnam War (1965-75) and Nixon's Watergate (1972-74) – many people in the U.S. got a rude awakening
- Among other things, emergence of crackers, phreakers and other similar creatures - “the government does not deserve respect anymore, it deserves a finger!”
- Primitive viruses, first ‘electronic’ bank heist (~1.5 mln USD by Roswell Steffen; later contested by some authors), Steve Wozniak trolled the Pope (calling as Henry Kissinger)



# 70s

- 1973-75: Community Memory at UC Berkeley
- 1975 – Minitel (France) and CompuServe (US)
- 1978 – first BBS opened in Chicago
- 1979 – first MUD at the University of Essex, UK
- A controversial idea (the author is disputed, could be Scott Fahlman or Kevin McKenzie) to add characters denoting emotions to texts – after a while, smileys/emoticons started to spread (What is that? >8-[     ] )



## 80s: Internet gets ready (for a short while)

- 1982 – TCP/IP adopted as the universal base of Internet
- 1983 – FidoNet (note: still alive as retrocomputing – somewhat even grown since 2015)
- 1983 – first nameserver standard (NIC)
- 1984 – first DNS
- 1985-1990 - a period of stability: main services were E-mail, Telnet, FTP and Usenet, IRC was added in 1988

# Birth of the Web

- 1989 – CERN (European Organization for Nuclear Research) connected to Internet
- 1990-91 – a British independent contractor named Timothy Berners-Lee proposed a novel method for non-linear (hypertext) documents (the ‘Web page No 1’ is still online at <https://info.cern.ch/hypertext/WWW/TheProject.html>) The system was published via CERN FTP site and spread rapidly
- Note: Berners-Lee refused to use any restrictive measures for his invention

# Prerequisites for the Web explosion

- The Protocol: HTTP by Sir Timothy
- The new operating system called Linux, also released in 1991 (and a bit later, also the Apache web server software)
- MS Windows, the first ubiquitous GUI for PC-s
- NCSA Mosaic and later Netscape, the first web browsers

# Right time, right place

- Like at other important points in history, some people made a lot of money:
- Marc Andreessen – left NCSA, founded Netscape and ruled the web for some years
- Brian Pinkerton – built Webcrawler, the first web robot, as a part of his thesis at the University of Washington
- Two Stanford students named David Filo and Jerry Yang piled up their web links and built a large 'Web catalogue', later known as Yahoo
- A bit later, two more Stanford (doctoral) students – Larry Page and Sergey Brin – made it really big

# 90s

- 1993-94 – governing organizations created (InterNIC and W3C)
- 1995 – birth of LAMP and Java
- 1995-2000 – the censorship wars in the U.S. (CDA, COPA, CIPA)
- 1996 – A Declaration of the Independence of Cyberspace by John Perry Barlow
- 1998 – ICANN takes over from InterNIC, the current domain system is introduced

# The (first) browser war

- 1994-95 – Microsoft ignored Internet and aimed to build their own Microsoft Network
- 1996 – MS woke up and attempted to 'divide the market' with Netscape. Refusal provoked an all-out offensive
- Spyglass => IE
- 1997 – MS won the first war. Netscape open-sourced their newest prototype
- The war goes on till today – Mozilla/Firefox and others; recently another giant (Google) has largely taken the market over

# Why did IE prevail?

- A number of different reasons, including
  - In a quite unprecedented move for early Microsoft, IE was offered for free (in monetary sense) – Netscape was only gratis for private persons and NGOs, companies had to pay
  - Integration with Windows (“It came with the computer!”)
  - A lot of shady moves typical for the company (e.g. the Compaq blackmail with Windows licenses)
- IE won the (first) war – and stagnated on version 6 for the next three years (almost no development)



# Messengers

- Forefathers: Unix Talk and MUDs/talkers
- 1996 – ICQ (I Seek You – meant for finding game partners)
- 1997 – AOL Messenger, later developing into Gaim/Pidgin
- 1999 – Microsoft Messenger (aka MSN Messenger and Windows Live Messenger)
- 2000 – Jabber and multi-protocol clients (e.g. Trillian)
- Later, convergence with VoIP apps (Skype), microblogging (Twitter/X), social networks (FB Messenger), mobile platforms (Signal, Telegram), video chat systems (Zoom, Teams, Jitsi)...

# “Web for common people”

- Back then, proper webmasters had to know HTML – it was considered too esoteric for ‘Uncle Bob’
- First sites for ‘normal people’: GeoCities, Angelfire, Tripod
  - On the one hand, the web pages were clumsy, ugly hacks
  - On the other hand, it was the first real ‘window to the Web’ for commoners – and as such a forerunner of social media
- The tendency goes on – for a while, Wix.com filled the niche, today even WordPress inclines towards it

# Remember the history

- On early Internet, if stuff disappeared, it was gone for good
- In May 1996, Brewster Kahle founded the Internet Archive ([archive.org](https://archive.org))
- Especially important is the Wayback Machine for the Web
- Data checked on Sept 15, 2023:
  - 735 billion web pages
  - 41 million books and texts
  - 14.7 million audio recordings (including 240,000 live concerts)
  - 8.4 million videos (including 2.4 million Television News programs)
  - 4.4 million images
  - 890,000 software programs

# An example: the earliest snapshot of the IT College website (in English) from 2000

INTERNET ARCHIVE [http://www.itcollege.ee/index\\_en.html](http://www.itcollege.ee/index_en.html) Go SEP OCT DEC  
**WaybackMachine** 24 captures 17 1999 2000 2002 About this capture

## Estonian IT College - brief overview

**Jump to:**

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- [Curricula](#)
- [Contacts](#)

This document gives a brief overview of the Estonian IT college project: the problems, the plan and the steps taken, associated costs and finances.

### The issues and needs

It is often claimed that Estonian IT-infrastructure is of a high level - as evidence people cite the Tiger Leap program, the amount of internet connections, mobile phones and PC-s per person. However, the reality is somewhat bleaker: while there is a good amount of low- and mid-range IT competence, the amount of high-level IT professionals in Estonia is relatively low. This seriously hinders both the development of strong IT-companies, technological advances of telecommunications

# Millennium

- Commercialization and dotcom boom
- Multimedia
- FLOSS emerged as a serious alternative (also on desktop)
- New domain names (.name, .biz, .info)
- Internet as a venue for games and relationships
- Legal nitpicking and cyberdung

# Social software and social media

- Networked services and applications that actively involve the user community
- Wikipedia 2001, Flickr 2004, YouTube 2005...
- Blog boom => web services (Blogger.com, WordPress.com) and standalone software (Movable Type, TextPattern, WordPress)
- Increasing use in education and business
- Microblogging (Twitter, Jaiku, identi.ca)
- Social networks
- Darker side: 4chan (2003)

# Web-based social networks

- Main players
  - 2002 Friendster (and Rate.ee in Estonia)
  - 2003 MySpace and LinkedIn
  - 2004 Facebook and Orkut
  - 2005 YouTube and Reddit
  - 2006 Twitter and VK
  - 2009 WhatsApp, Pinterest and Sina Weibo
  - 2010 Instagram and Diaspora
  - 2011 Snapchat, Google Plus and Twitch.tv
  - 2012 Tinder
  - 2015 Discord
  - 2016 TikTok
- Notable rise-and-falls:
  - Orkut
  - Google Plus

# “Because we can”

- In times of old, nobody could just write an encyclopedia, add new stories to the *Lord of the Rings* or be a hotshot reporter at an international crisis site
- Today, we have (respectively) Wikipedia, Fanfiction.net/AO3 and Twitter/Flickr/Facebook/Snapchat/...
- Read more on the topic: *The Wealth of Networks* by Yochai Benkler (see [benkler.org](http://benkler.org))



# Internet of Things

- The idea of interacting devices was already proposed in the 80s (Carnegie-Mellon had an online Coke machine back in 1982).
- Real spread since about 2008-2009
- Main categories:
  - Consumers (home automation, assistive solutions...)
  - Organizations (medical systems, public transport...)
  - Production (industry, agriculture...)
  - Infrastructure (smart houses/cities, environment control...)
- Internet of Bad Things...?

# Three layers

- ... of the Web (often confused):
  - **Surface web** – ‘ordinary’ Web, available for indexing (basically, “what Google sees”)
  - **Deep web** – the parts of the Web with restricted access (“what Google does not see” – online banks, many e-learning environments, essentially everything with authentication)
  - **Dark web** – overlay networks (darknets) that use protocols like Tor or I2E, not accessible with ordinary means (Brave browser probably has the closest to the wider public, followed by the Tor browser suite)

# Dark web

- 2004 – a new type of communication channel tested by a US Navy research laboratory (together with EFF), the aim being to create something that dissidents in the ‘bad countries’ could use
- 2006 – Tor Project
- 2009 – the term ‘Dark Web’ appears
- 2011-2013 – Ross Ulbricht ran the Silk Road (2.0 operated for a shorter time in 2013-2014)
- A bit off the radar for now – dangerous for possible AI-related developments going on ‘somewhere in the dark’

# COVID-19 and life from distance

- 2019/20 – the pandemic effectively locked down many societies, those who already had the ‘distance life’ experience took it lighter
- Forced e-learning and telework: Zoom, MS Teams, Jitsi Meet etc
- In Estonia, a number of centrally-offered tools: [jitsi.eesti.ee](https://jitsi.eesti.ee) (Jitsi Meet), [vestlus.eesti.ee](https://vestlus.eesti.ee) (RocketChat) and [sahver.eesti.ee](https://sahver.eesti.ee) (NextCloud)
- Somewhat boosted the development of cross-platform solution (an example: MS Teams moving from locally installed clients to a web-based, cross-platform solution)

# “Let the machine think for us!”

- 2015 – OpenAI founded as NGO, turning into a company in 2018/19
- 2020 – GPT-3, 2021 – DALL-E, 2022 – ChatGPT
- Quite a confusion and panic in several fields, still going on (including education and research)
- The knife and amplifier metaphor (quoted earlier) applies here as well
- Dangers do exist – and are worse due to improbability of global agreement (some countries do not care)

# Ignorance can kill

- A serious problem of the recent years
- Cheap PC + ubiquitous Internet + insecure software + stupid user = LOADS OF CRAP
- Malware, credit card fraud, phishing, social engineering, DDOS...
- No clear-cut solution. Mandatory 'driving license'? Allow remote administration by software vendors (newer Windowses seem to go that way)? Outlaw Windows?
- A major problem: lack of motivation (in several ways)

# “What about the future? You can shove it...” (Meat Loaf)

- Even more multimedia
- Semantic Web and Big Data
- More fun (but no work?)
- Digital Enclosure
- Network of humans... or machines (IoT, AI, bots...)?
- More controlled and commercial? Or back to the roots? Or split the thing in half?
- Death by dung?
- We'll see...

## Additional reading

- Moschovitis C. et al. History of the Internet
- Living Internet, <http://www.livinginternet.com/i/ii.htm>
- Hobbes' Internet Timeline,  
<http://www.zakon.org/robert/internet/timeline/>
- History of the Internet,  
<http://www.nic.funet.fi/index/FUNET/history/internet/en/etusivu-en.html>
- ISOC. History of the Internet,  
<http://www.internetsociety.org//internet/internet-51/history-internet>



**That's it for today :)**