

COM3504/6504 The Intelligent Web

Lecture 1: The Digital World: How did we get here and where is our society going?



**University of
Sheffield**

Department of
Computer
Science

Let's start

- What is the Web and where did it come from?
- How can we use the Web in an intelligent way?
- And what is more important:
 - What will the future of the Web be like?



University of
Sheffield

Department of
Computer
Science

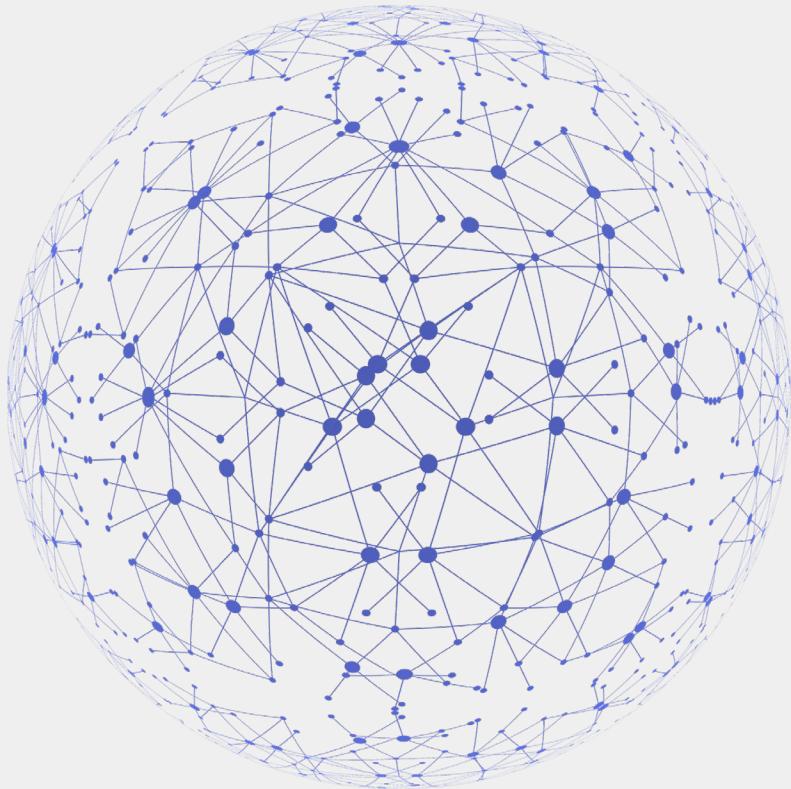
A BRIEF HISTORY



University of
Sheffield

Department of
Computer
Science

What is the Internet?



- A global network of interconnected networks and devices
- Grows exponentially
- Provides information and communication resources
- Uses the Internet protocol suite (TCP/IP) to communicate between networks and devices



University of
Sheffield

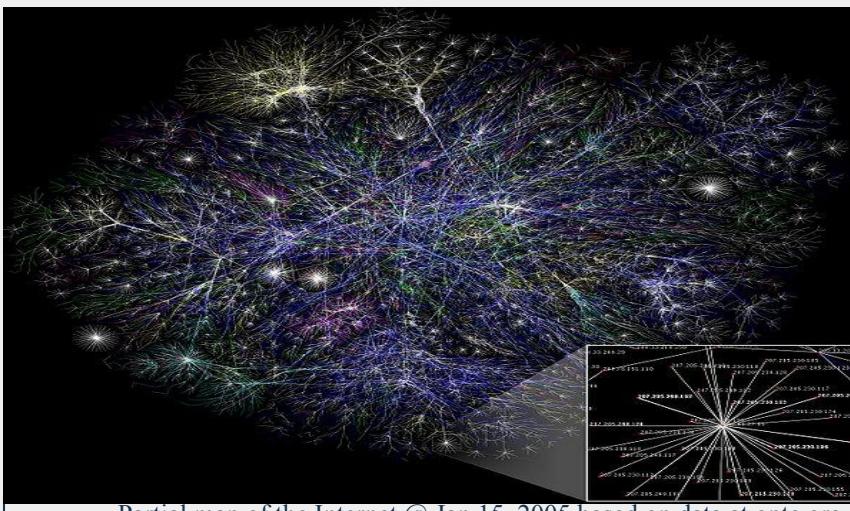
Department of
Computer
Science

The Internet and the World Wide Web

*They are **not** the same thing*

- The “Net” Internet

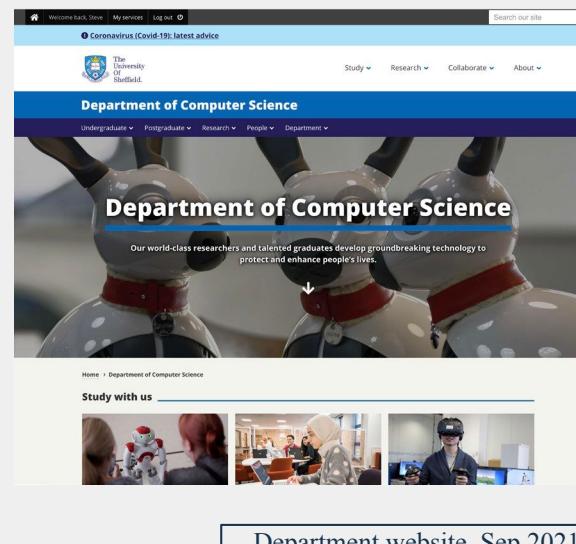
- Global interconnected collection of computer networks
- Uses standard communications protocols



Partial map of the Internet @ Jan 15, 2005 based on data at opte.org
[showing 30% of “Class C” networks]
http://en.wikipedia.org/wiki/File:Internet_map_1024.jpg

- The “Web”

- An information sharing model built on top of the Internet
- One of the services communicated via the Internet
- (Other services: e-mail, ftp, VOIP, instant messaging, ...)



Department website, Sep 2021



University of
Sheffield

Department of
Computer
Science

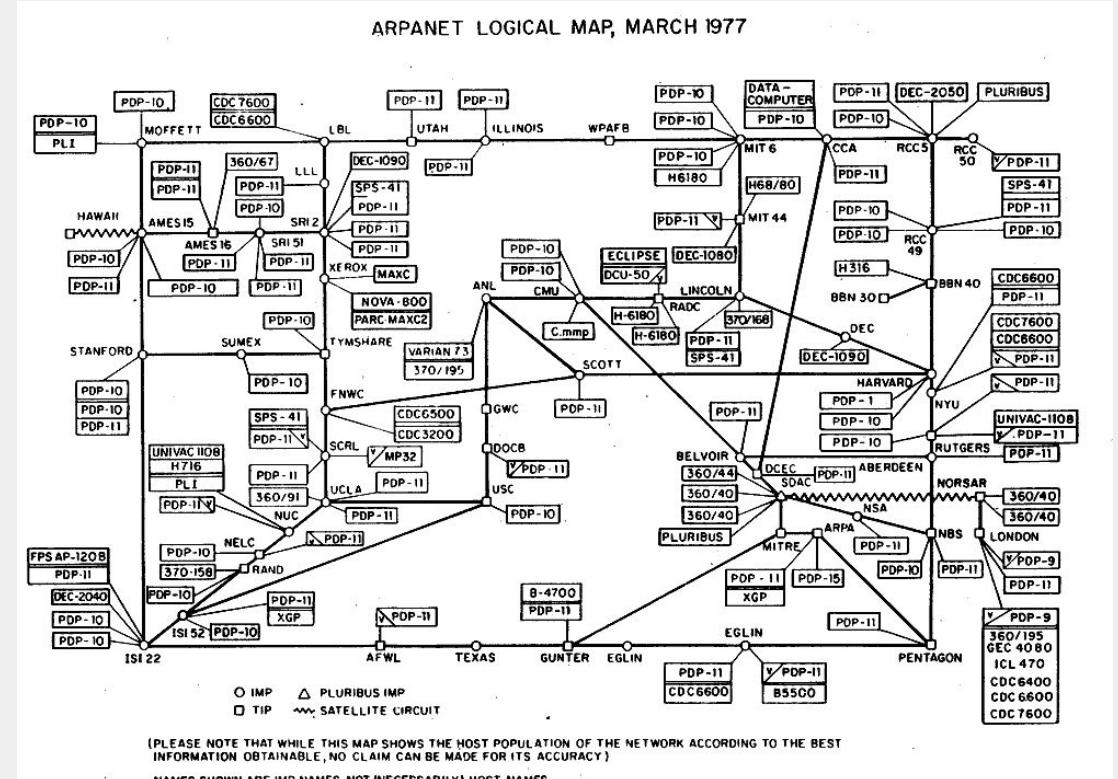
Precursors

- Whilst everyone recognises Tim Berners Lee as the inventor of what we know today as the Internet
- It is important to know the precursors
 - ARPANET
 - Hypertext



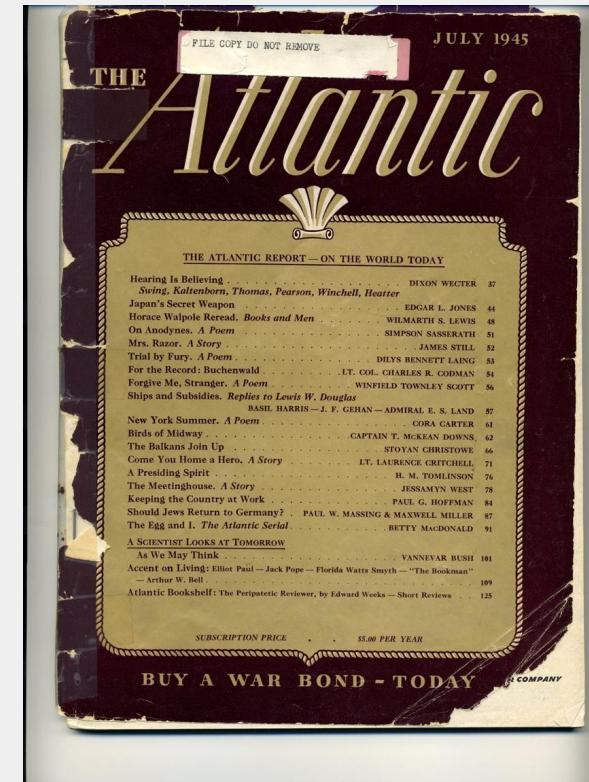
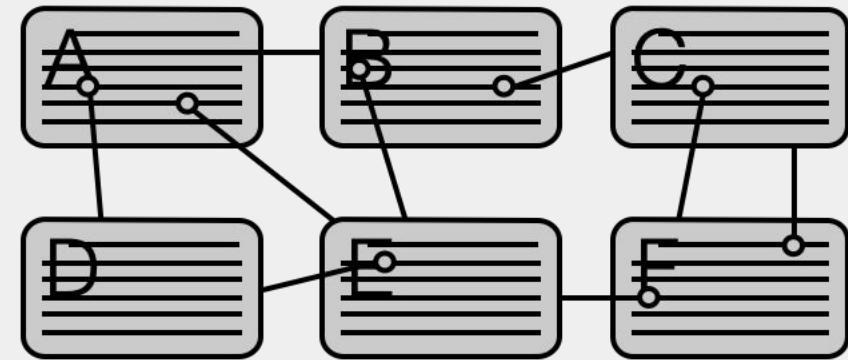
ARPANET

- Established by the Advanced Research Projects Agency (ARPA) of the United States Department of Defense
- First Computers connected in 1969
- Defense purpose
 - Communication network free from interference



Hypertext

- Vannevar Bush (1890–1974) first described the concept of hypertext in drafts papers in the 1930s and then published a famous article “As we may think” in 1945
 - A device that would create links between different documents/images etc
- <https://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/>

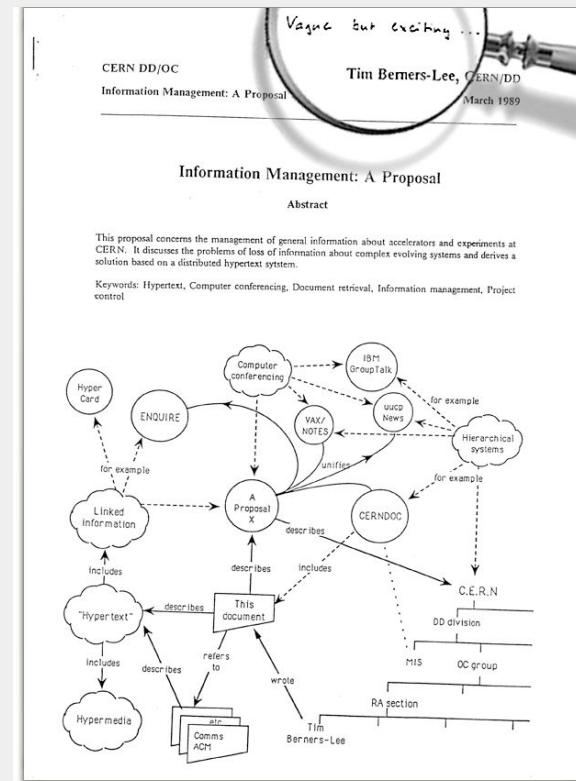


University of
Sheffield

Department of
Computer
Science

A proposal for the Internet

- In 1989 Tim Berners-Lee wrote a paper with a proposal for an information management system based on Hypertexts



University of
Sheffield

Department of
Computer
Science

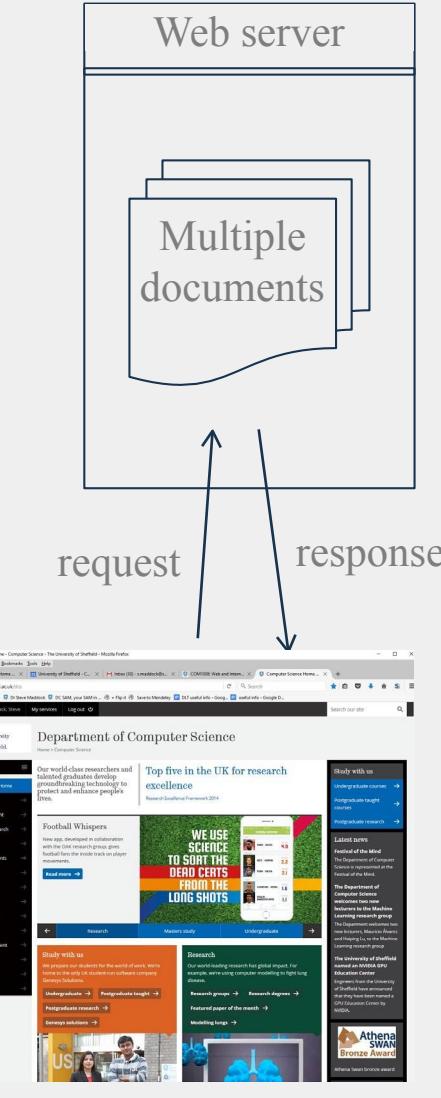
How does the WWW work?

- User runs a browser on a PC, Mac, mobile phone, tablet, games console, TV, wristwatch, car, fridge, ...
- Browser (client) makes a request for a ‘document’, using a Uniform Resource Locator (URL):

<https://www.sheffield.ac.uk/dcs/people/academic/fatima-maikore>
[https:// www.sheffield.ac.uk/dcs](https://www.sheffield.ac.uk/dcs)

Prefix  host name 

path 

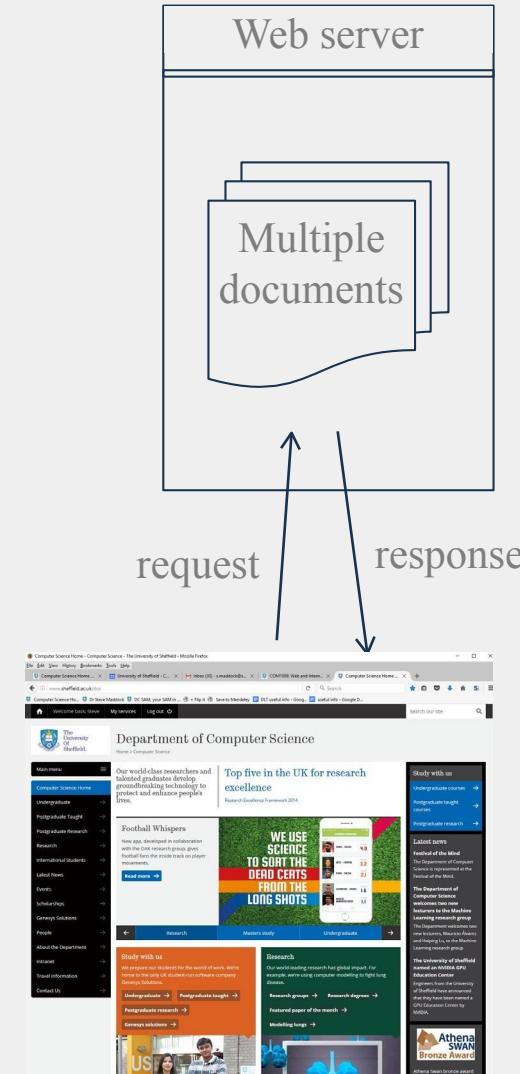


University of
Sheffield

Department of
Computer
Science

How does the WWW work? – cont.

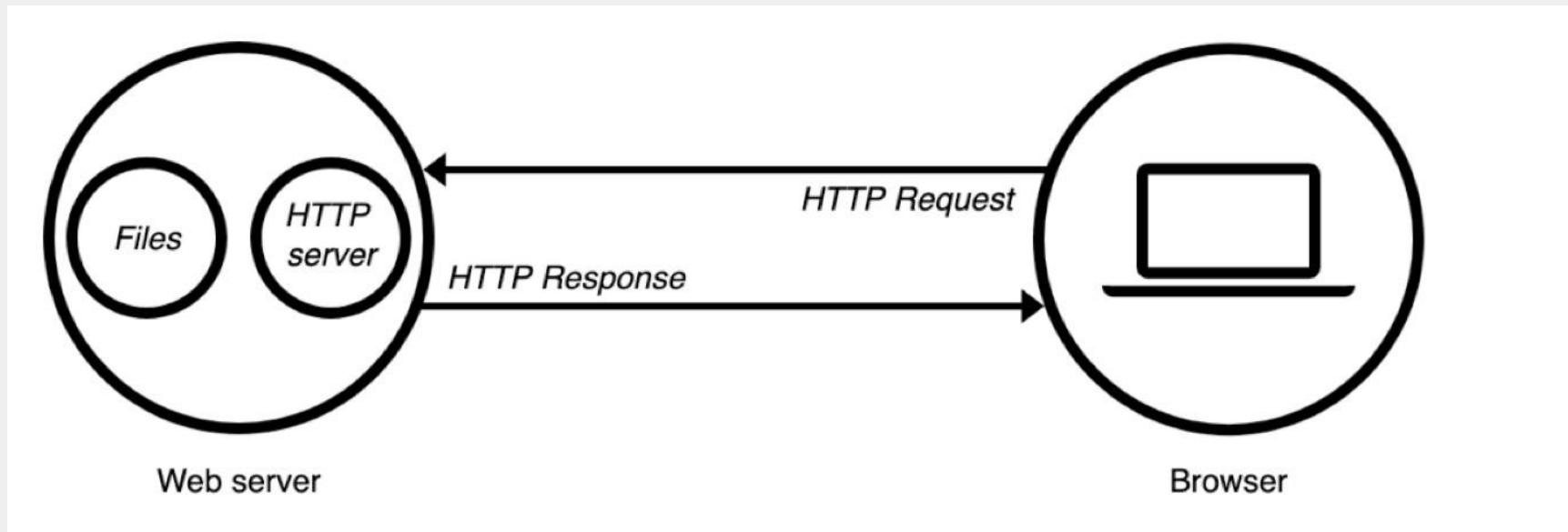
- Server responds with relevant (possibly dynamically-created) document(s)
- Communication governed by a *protocol*
 - **HTTP - Hypertext Transmission Protocol**
 - Security: **https** and **shtml**



University of
Sheffield

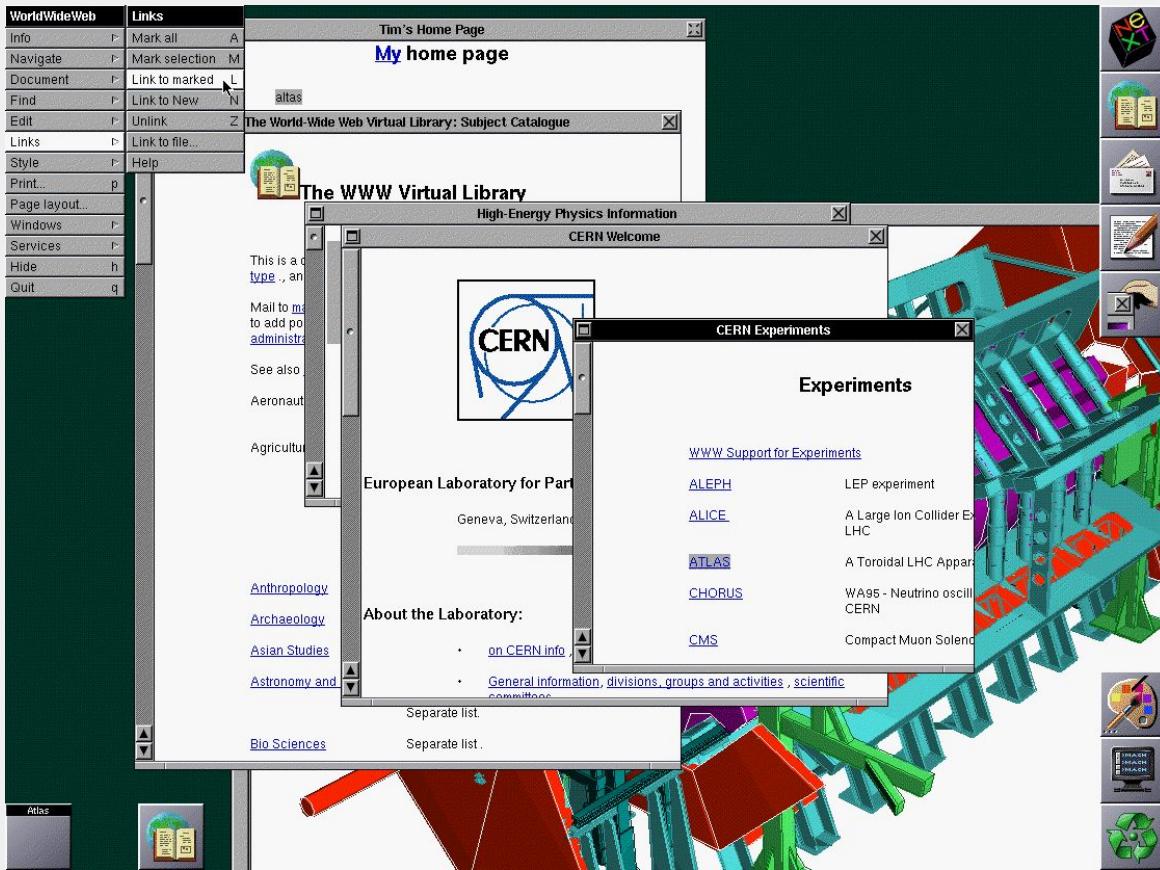
Department of
Computer
Science

A basic client server architecture



University of
Sheffield

Department of
Computer
Science



The first browser

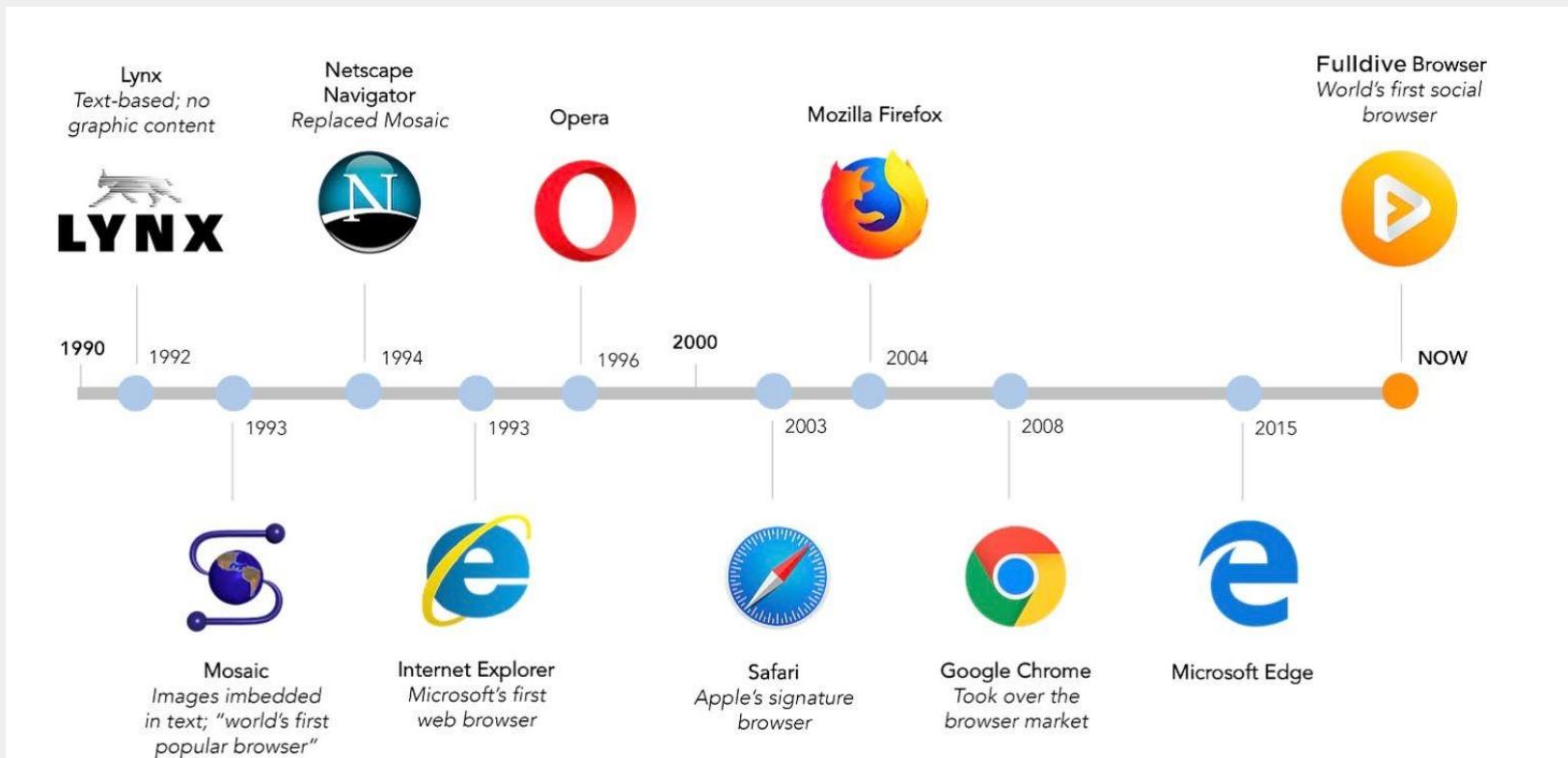
WorldWideWeb by Berners-Lee and colleagues



University of
Sheffield

Department of
Computer
Science

A history of browsers

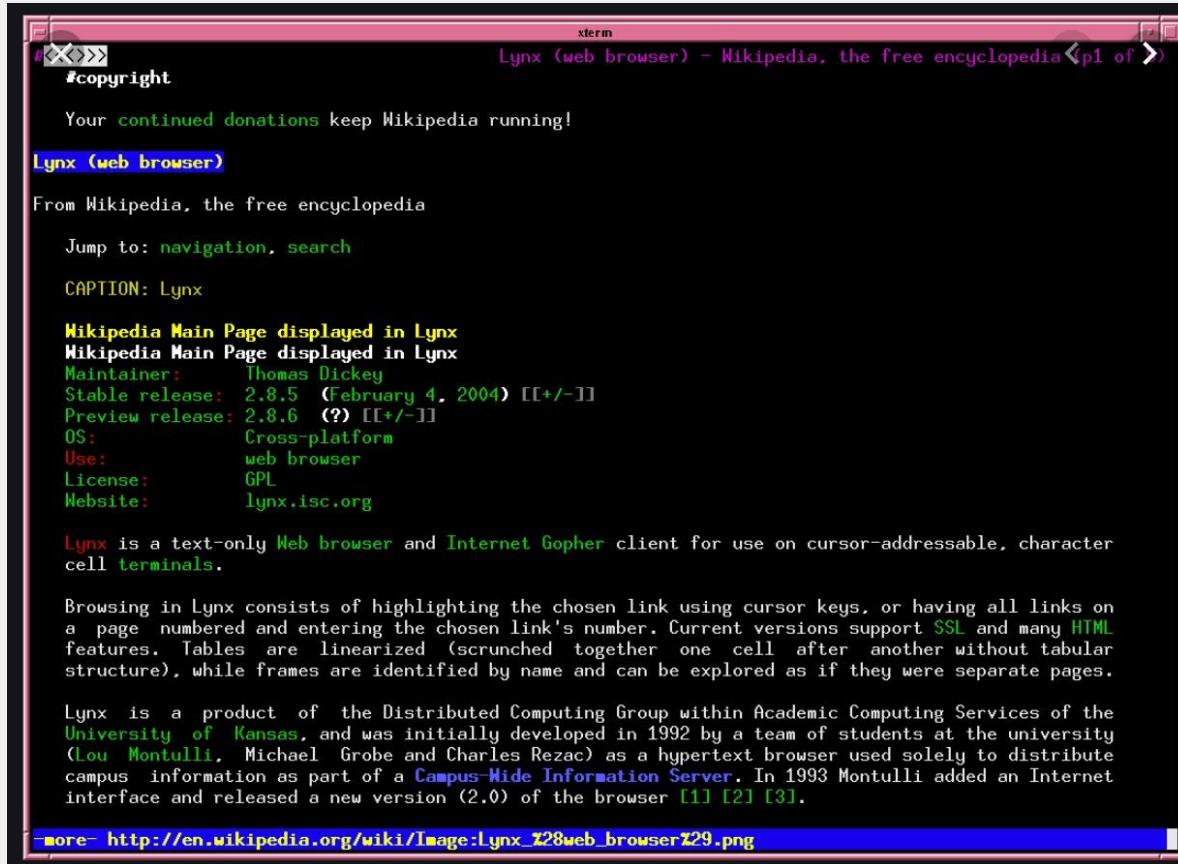


<https://medium.com/fulldive/a-brief-history-of-browsers-9e8f453dbf45>



University of
Sheffield

Department of
Computer
Science



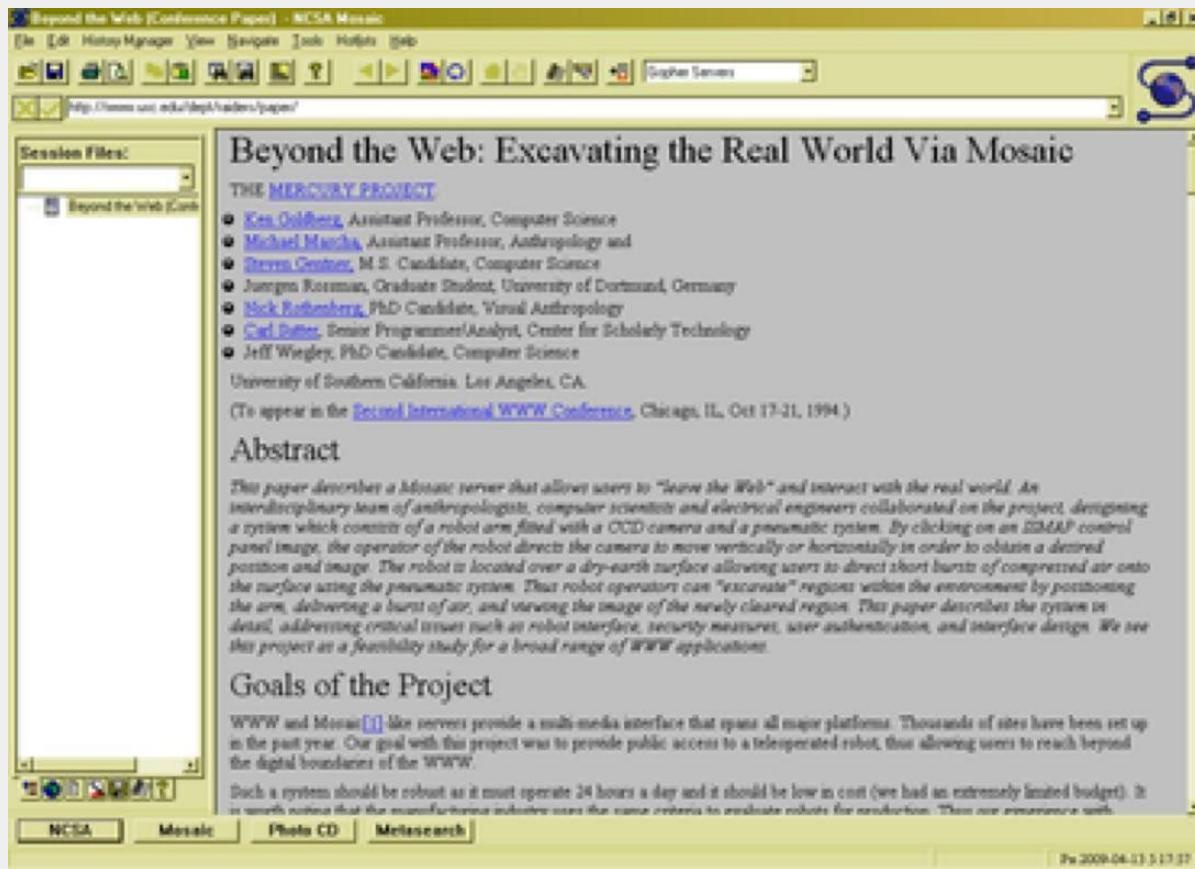
Lynx

[https://en.wikipedia.org/wiki/Lynx_\(web_browser\)](https://en.wikipedia.org/wiki/Lynx_(web_browser))



University of
Sheffield

Department of
Computer
Science



Mosaic

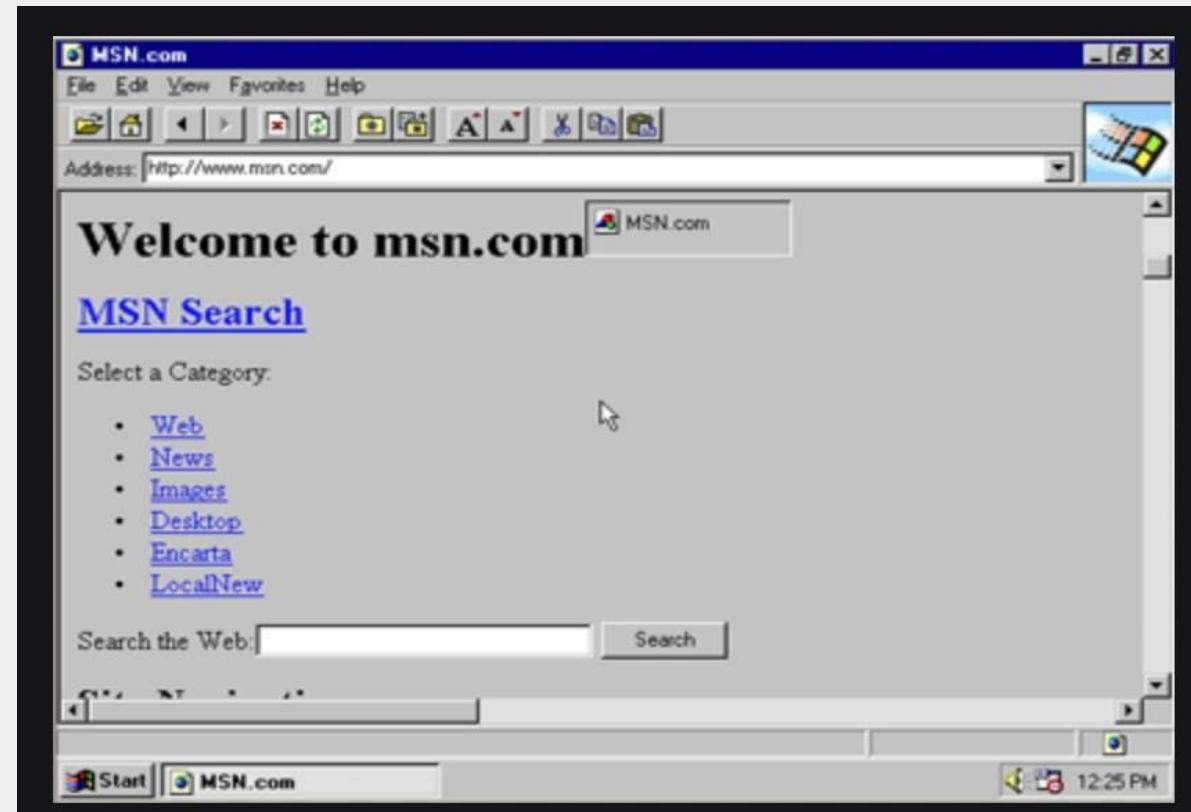
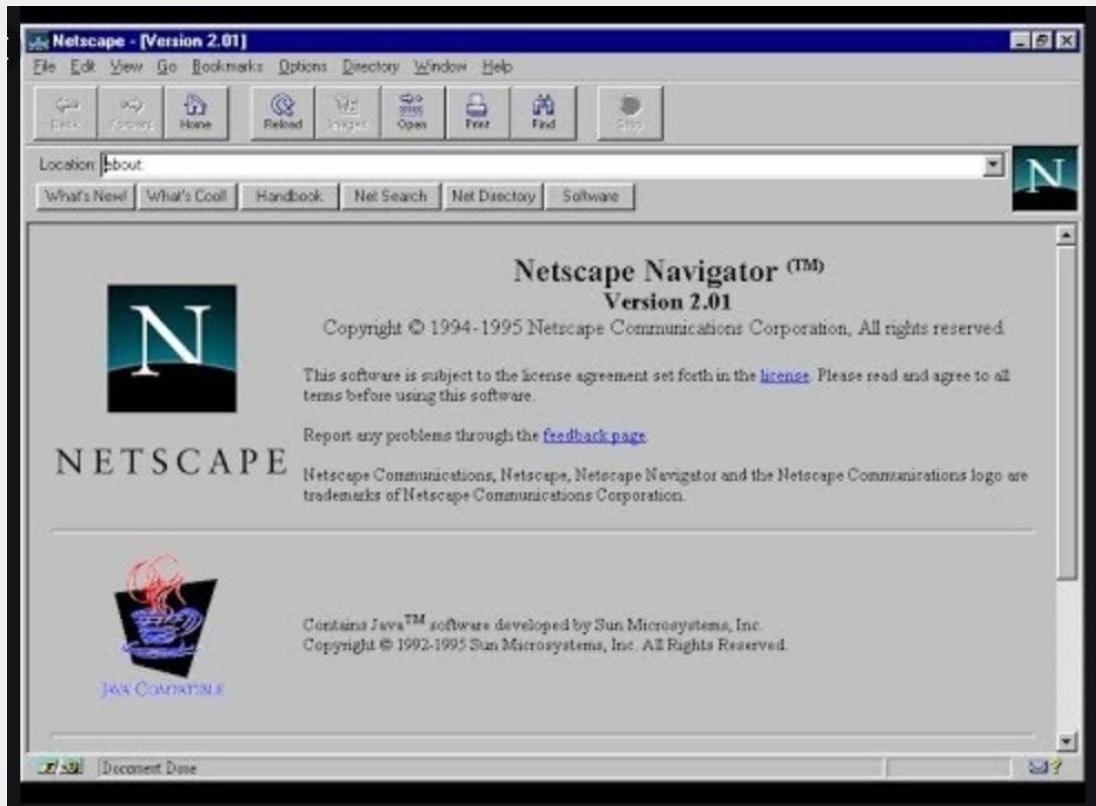
[https://en.wikipedia.org/wiki/Mosaic_\(web_browser\)](https://en.wikipedia.org/wiki/Mosaic_(web_browser))



University of
Sheffield

Department of
Computer
Science

Netscape and Internet Explorer



University of
Sheffield

Department of
Computer
Science

Today's browsers



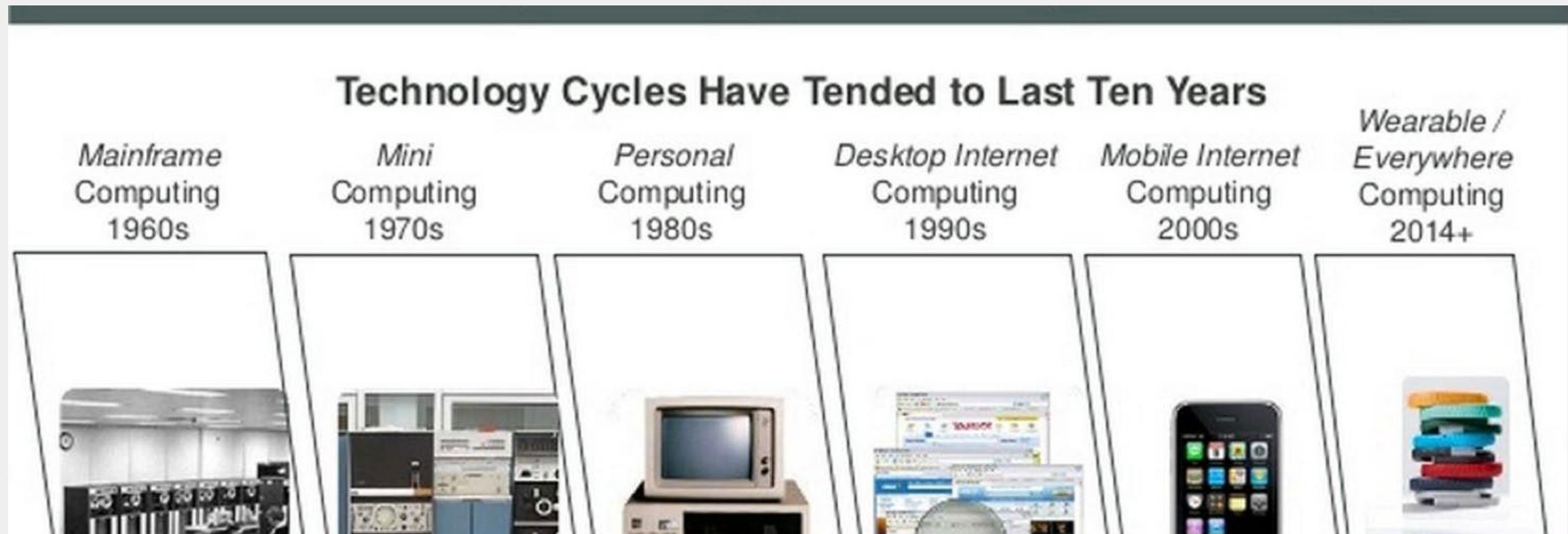
amazon echo
amazon.com/echo



University of
Sheffield

Department of
Computer
Science

A history of devices



Mobile devices



University of
Sheffield

Department of
Computer
Science

THE DIGITAL WORLD



University of
Sheffield

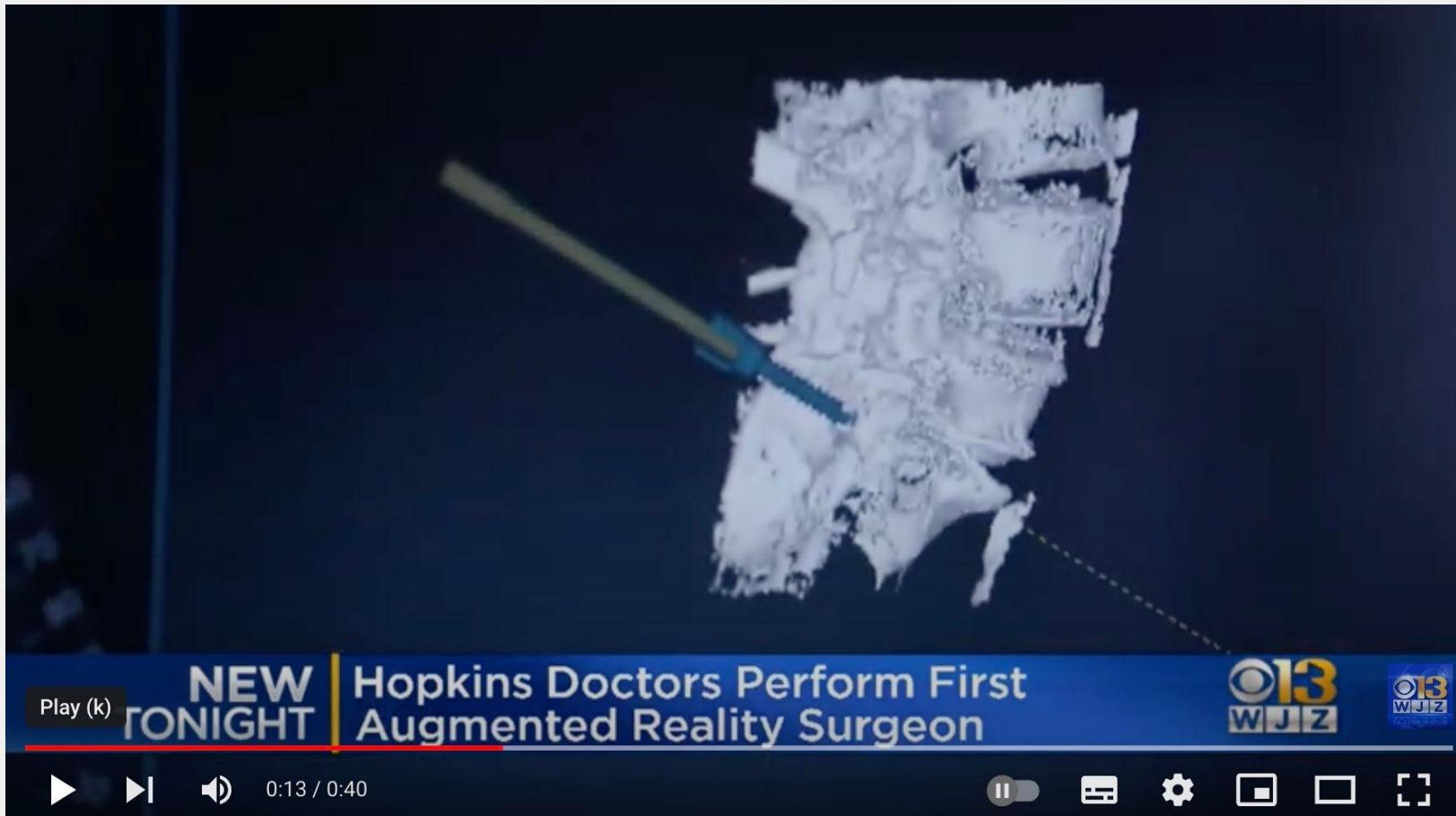
Department of
Computer
Science

The digital world

- The digital world is not (only) about developing digital technologies
- It is about PEOPLE having those technologies
 - With you
 - Around you
 - 24/7
- It is about those instruments communicating
 - To create a global communication system
 - To provide the right information at the right time



It is about health



https://www.youtube.com/watch?v=OPJ73FmCL_4



University of
Sheffield

Department of
Computer
Science

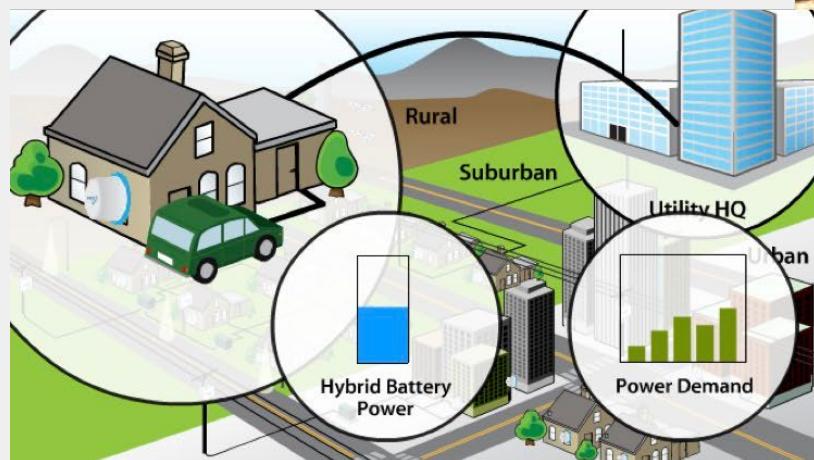
It is about movement



University of
Sheffield

Department of
Computer
Science

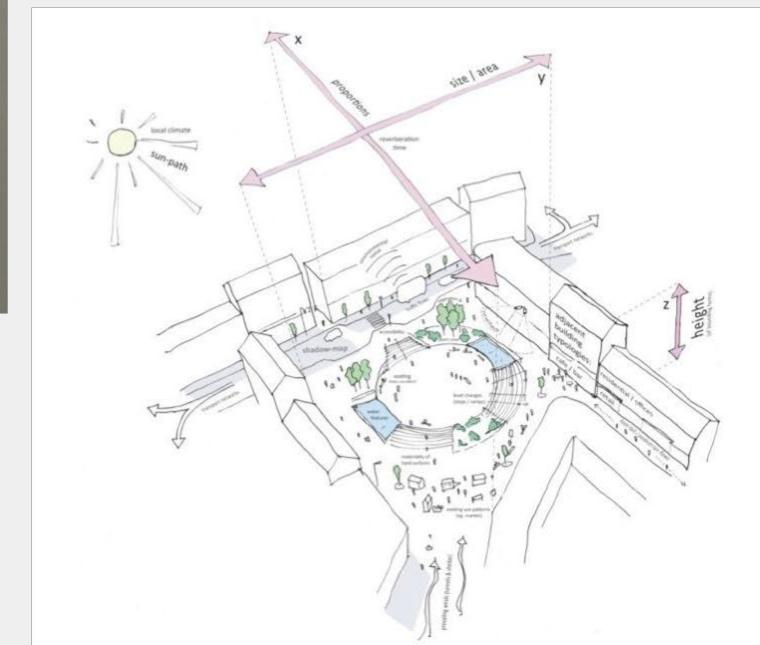
It is about urban spaces



University of
Sheffield

Department of
Computer
Science

It is about new multimodal experiences



INTERNET USAGE

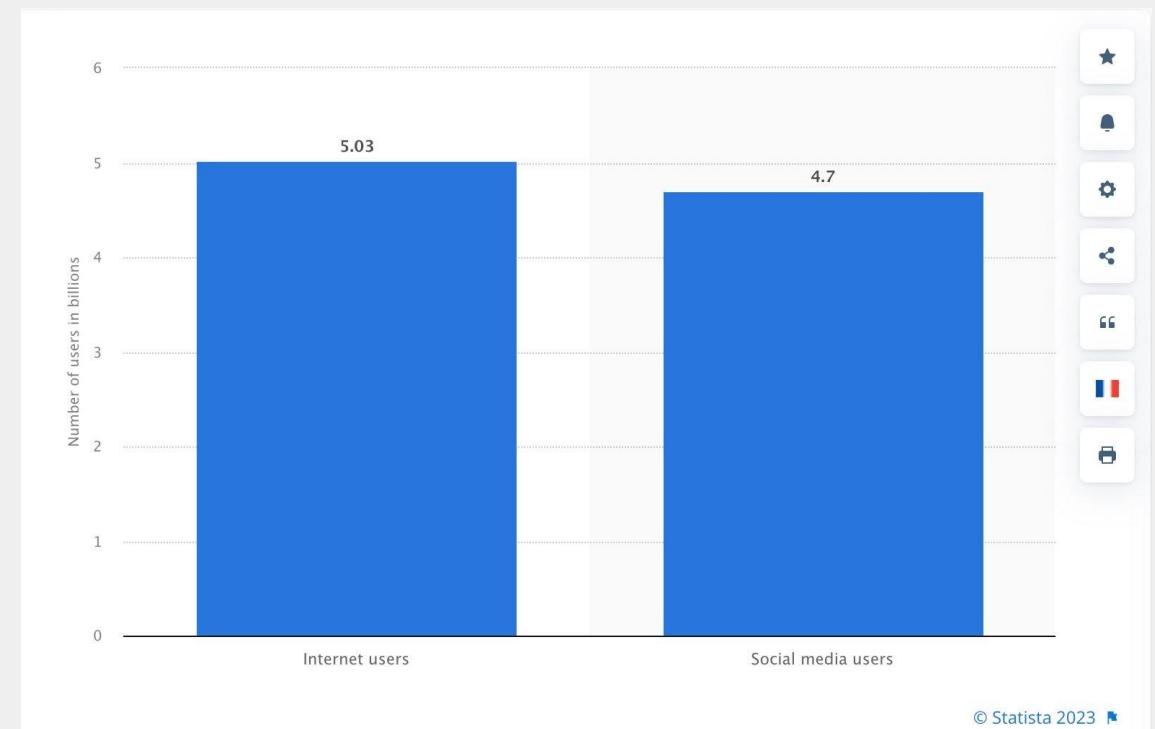


University of
Sheffield

Department of
Computer
Science

Worldwide Internet Users

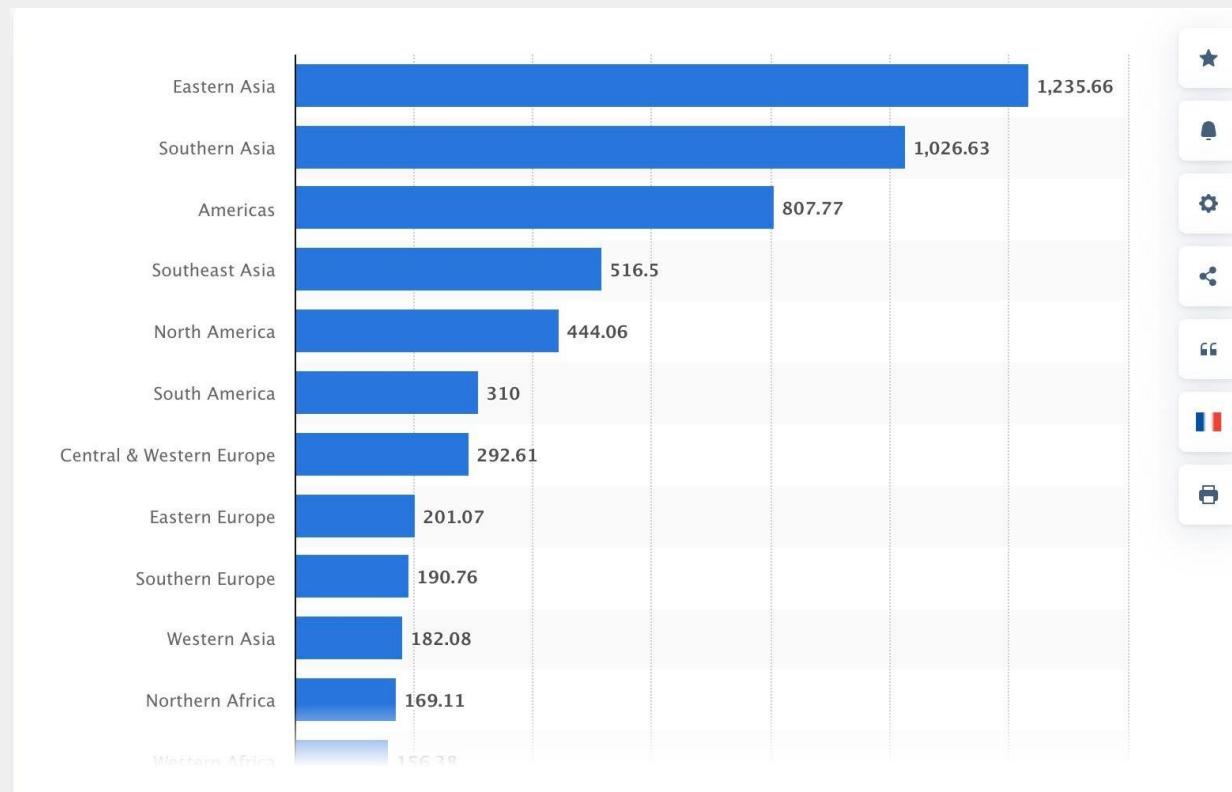
- There are **over 5 billion Internet users** in the world as at July 2022
- 5.04 billion are active internet users
- 4.7 are active social media users



University of
Sheffield

Department of
Computer
Science

Number of internet users worldwide as of 2022, by region



University of
Sheffield

Department of
Computer
Science

Number of websites worldwide

- In 2021 there were 1.83 Billion websites worldwide
- <https://www.vpnmentor.com/blog/vital-internet-trends/>



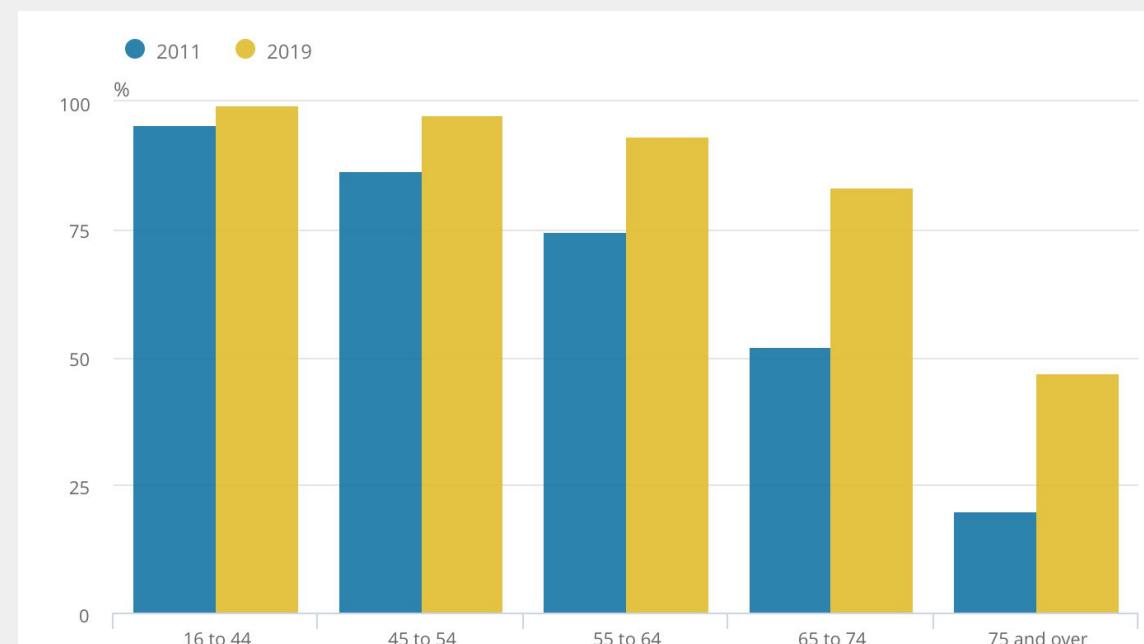
University of
Sheffield

Department of
Computer
Science

Internet Usage by Age Group in UK

- According to the UK Office for National statistics
 - all adults aged 16 to 44 years in the UK were recent internet users (99%) in 2019
- There is still an age bias
 - 47% of adults aged 75 years and over were recent internet users
 - recent internet use in the 65 to 74 years age group increased from 52% in 2011 to 83% in 2019, closing the gap
- The age gap will gradually disappear

<https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/internetusers/2019>



Source: Office for National Statistics - Labour Force Survey



University of
Sheffield

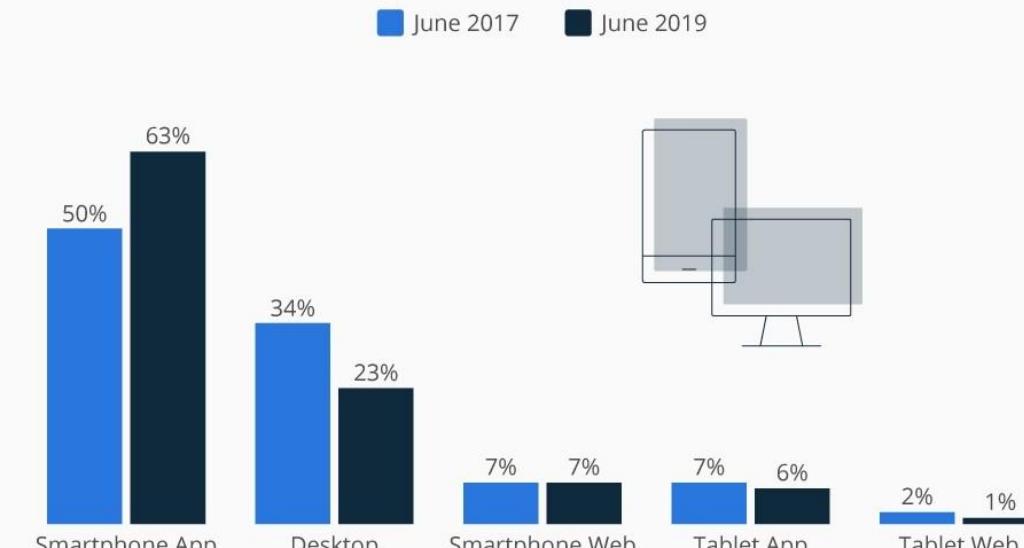
Department of
Computer
Science

The mobile takeover

- Smartphone apps have become in 2019 the main device used by Internet users in the US

The Mobile Takeover Continues

% of time spent with digital media in the United States, by platform



CC BY SA
@StatistaCharts Source: Comscore

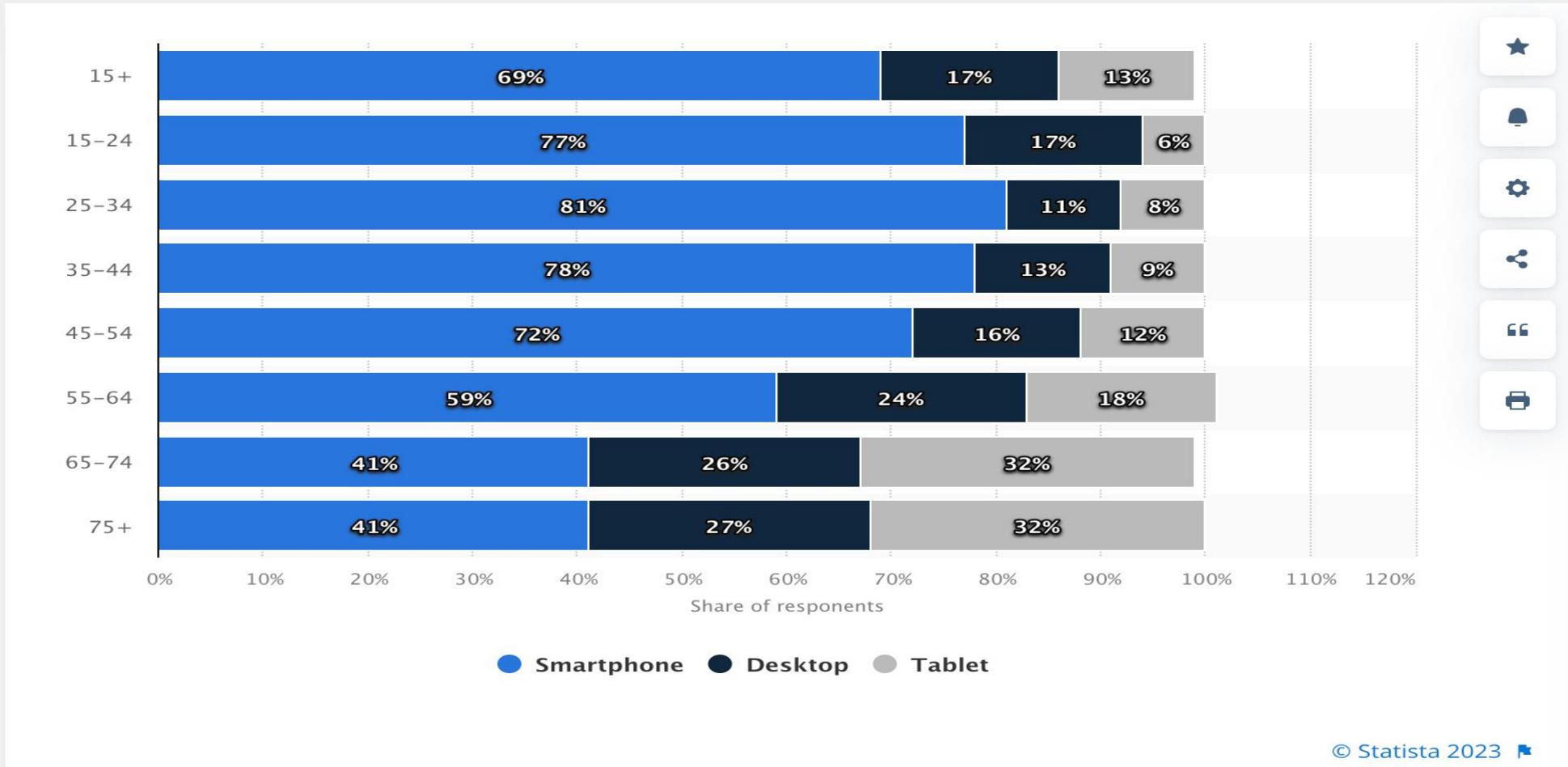
statista



**University of
Sheffield**

Department of
Computer
Science

Usage by Device & Age - UK



© Statista 2023



University of
Sheffield

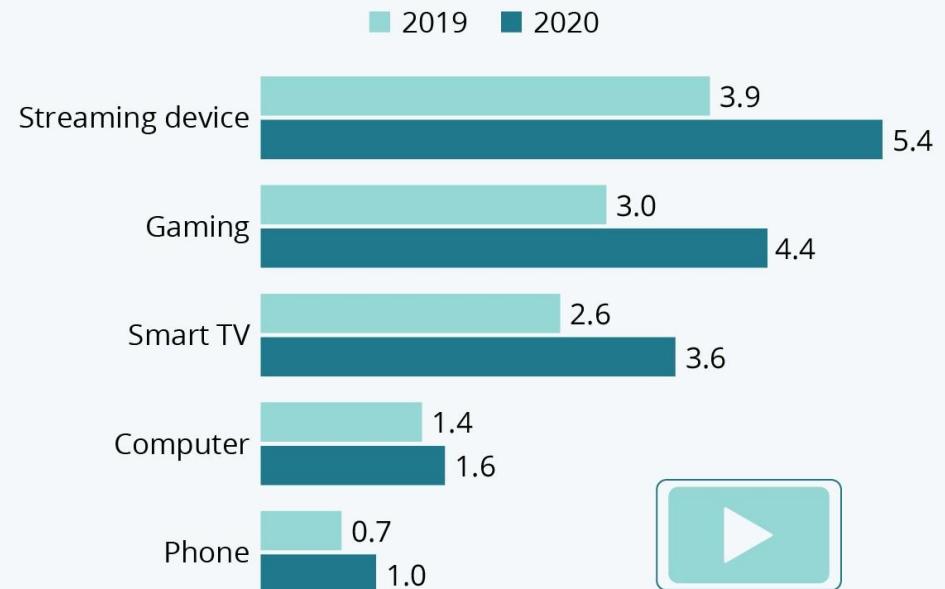
Department of
Computer
Science

Users and Devices

- Recent data shows how alternative streaming devices, Gaming Consoles and Smart TV have overtaken Computers and Phones as means of using the internet

Data Increases By Device

Average daily data usage by device in the U.S. (in gigabytes)



Data from January to May each year
Sources: VerizonSpecials, Wall Street Journal



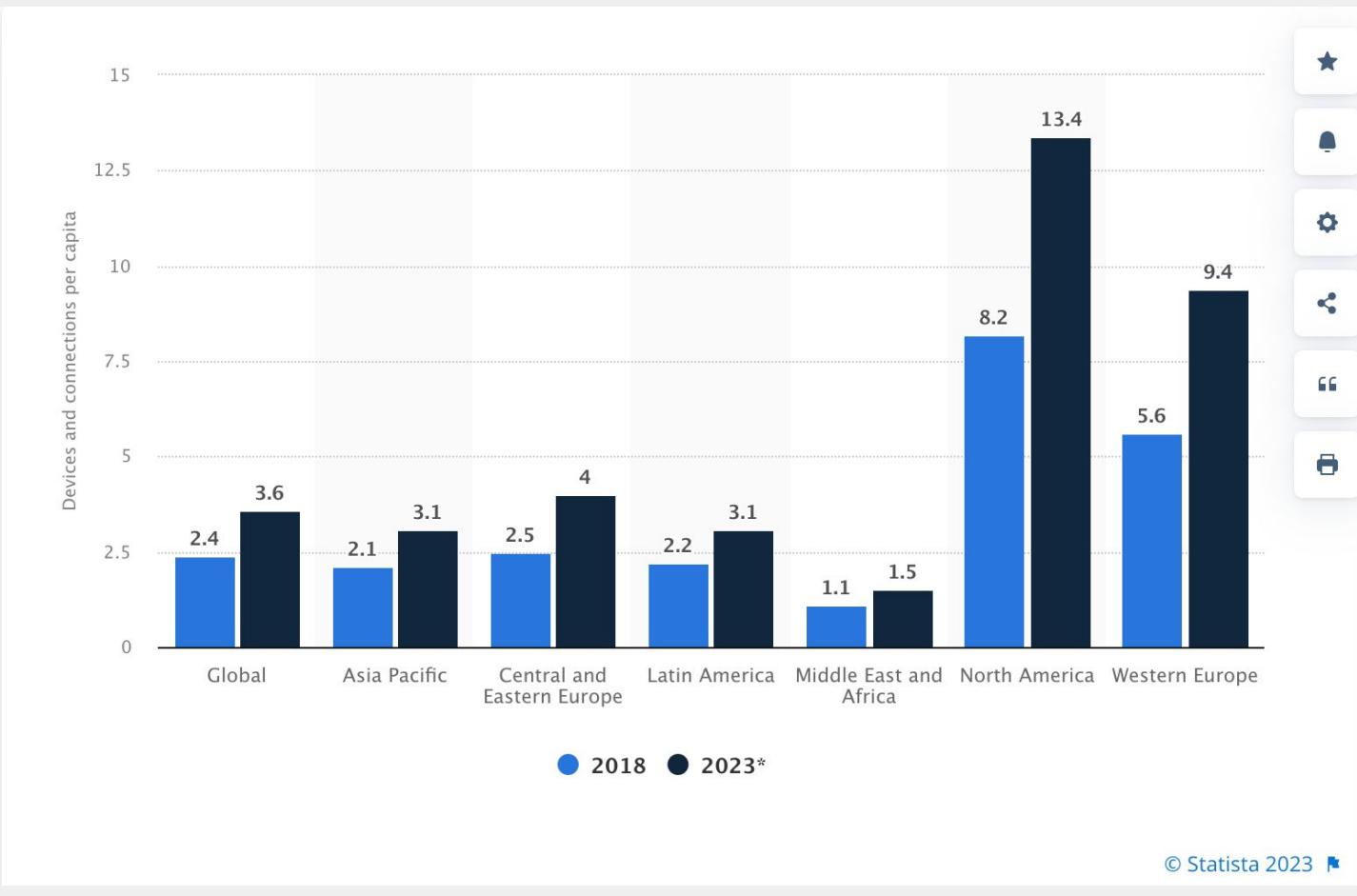
statista



University of
Sheffield

Department of
Computer
Science

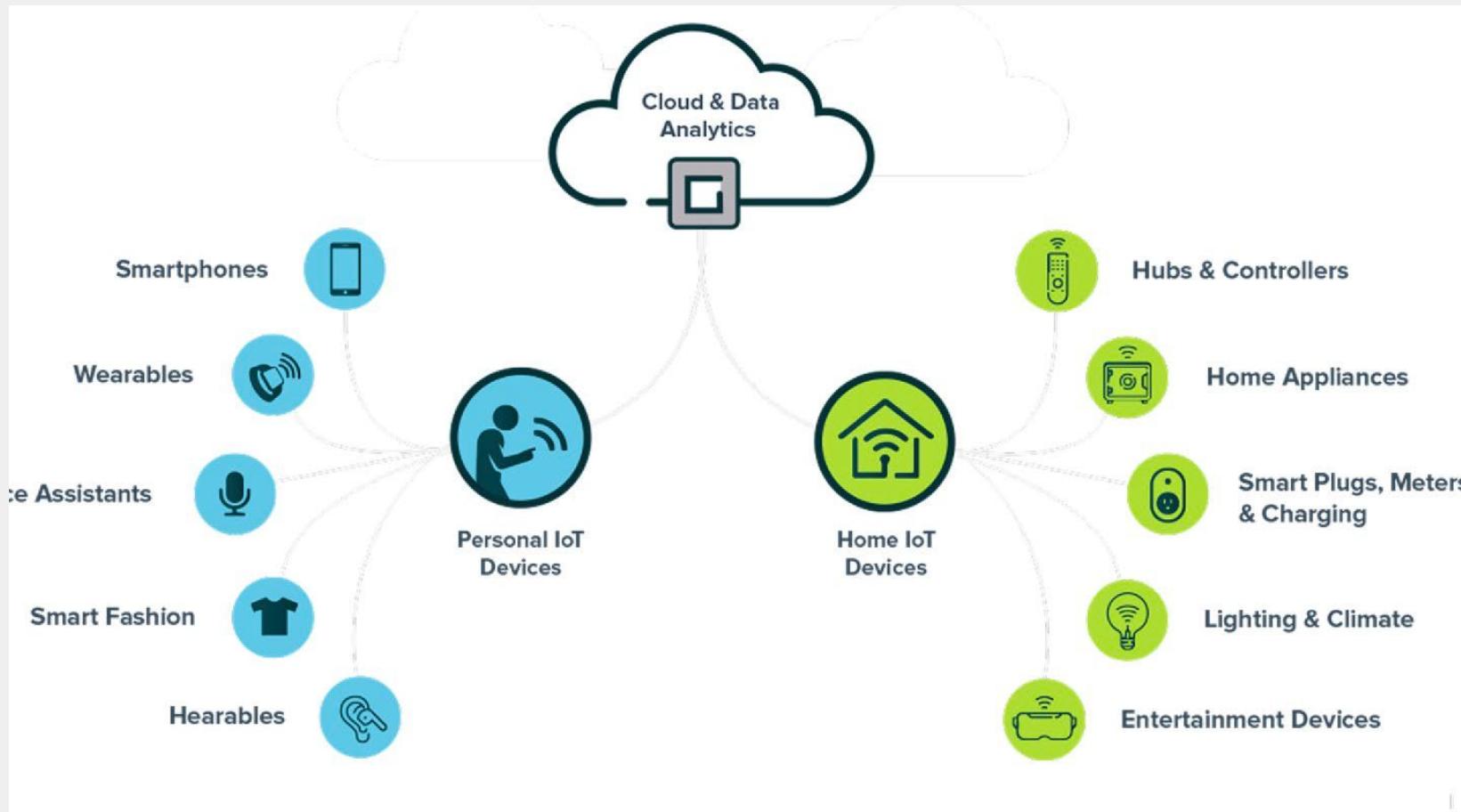
Connected devices



University of
Sheffield

Department of
Computer
Science

Some examples?



University of
Sheffield

Department of
Computer
Science

WEB1.0->WEB2.0->WEB3.0



**University of
Sheffield**

Department of
Computer
Science

The evolution



Web1.0

- Unidirectional
- Static
- Read only
- Centralised
- Curated
- Company/institution oriented
- Low portability (desktop)
- Dedicated infrastructure



Web2.0

- bidirectional
- dynamic
- read and write
- Decentralised
- Crowdsourced
- Community oriented
- Medium portability (mobiles)
- Cloud infrastructure

Not mostly text now!



Web3.0

- bidirectional
- semantic
- Read, write and execute
- Decentralised
- Machine and human sourced/curated
- Individual oriented
- High portability (wearable, sensors)
- Edge infrastructure



University of
Sheffield

Department of
Computer
Science

Questions

