



## 1.6 – Ethical, legal, cultural and environmental impacts of digital technology

### Sub topic

### Guidance

#### 1.6.1 Ethical, legal, cultural and environmental impact

- Impacts of digital technology on wider society including:
  - Ethical issues
  - Legal issues
  - Cultural issues
  - Environmental issues
  - Privacy issues
  
- Legislation relevant to Computer Science:
  - The Data Protection Act 2018
  - Computer Misuse Act 1990
  - Copyright Designs and Patents Act 1988
  - Software licences (i.e. open source and proprietary)

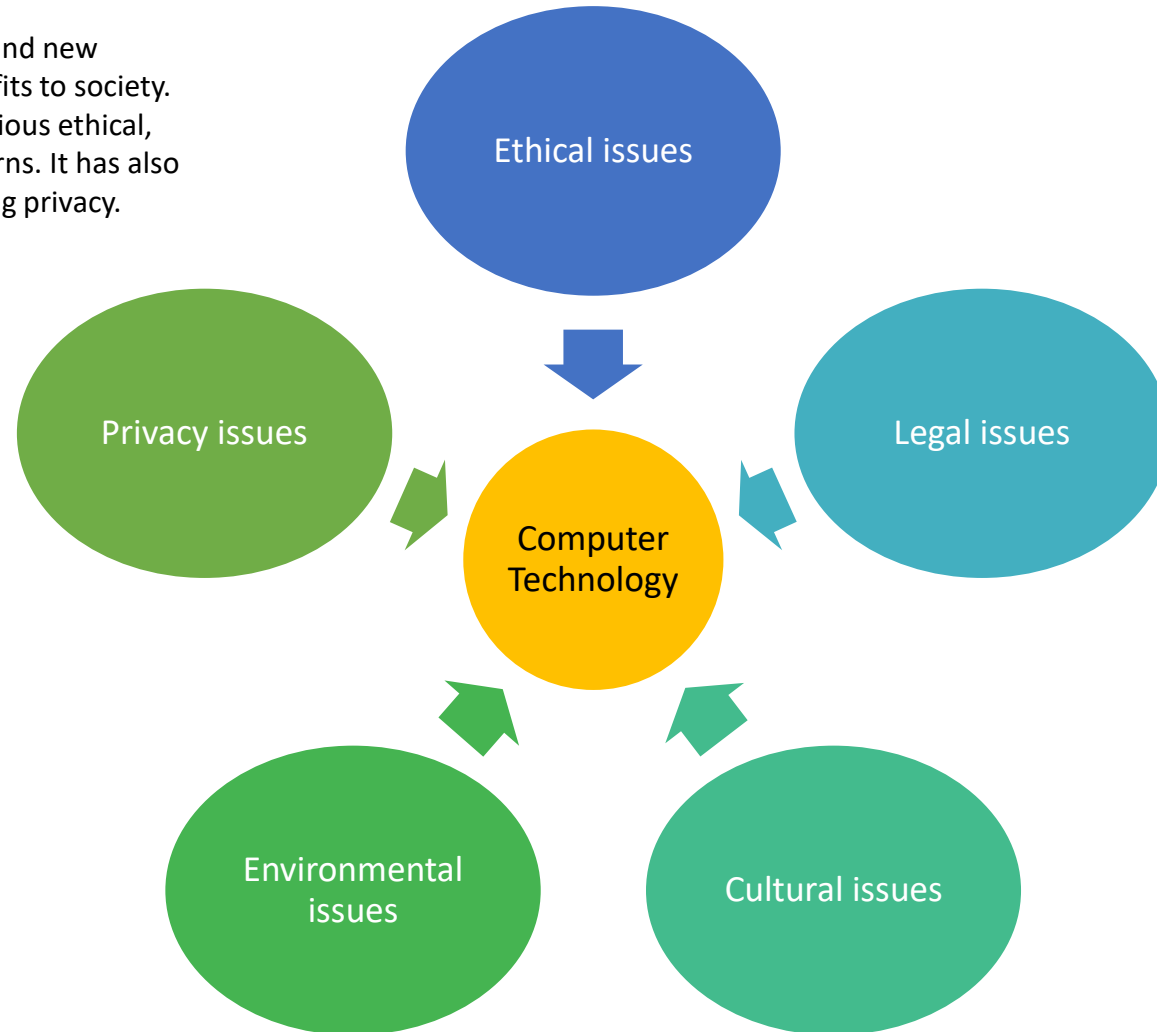
#### Required

- ✓ Technology introduces ethical, legal, cultural, environmental and privacy issues
- ✓ Knowledge of a variety of examples of digital technology and how this impacts on society
- ✓ An ability to discuss the impact of technology based around the issues listed
- ✓ The purpose of each piece of legislation and the specific actions it allows or prohibits
- ✓ The need to license software and the purpose of a software licence
- ✓ Features of open source (providing access to the source code and the ability to change the software)
- ✓ Features of proprietary (no access to the source code, purchased commonly as off-the-shelf)
- ✓ Recommend a type of licence for a given scenario including benefits and drawbacks



## Impacts of Computer technologies

Computer use in the UK is widespread and new technologies have provided many benefits to society. However, this technology has raised various ethical, legal, cultural and environmental concerns. It has also highlighted important issues surrounding privacy.





## Ethical issues

- **Ethics** are moral principles, or rules, which govern a person's attitudes and behaviour.
- Ethics apply to the use of computers as much as they do to other things in life. Ethical issues in computing include:
  - Ensuring public safety - the introduction of new technologies brings safety concerns. For example, driverless cars may soon be on the roads in the UK. The designers of driverless cars have not only had to ensure the safety of passengers, but also of other drivers and pedestrians.
  - Security of data - there are people that attempt to hack systems in order to gain access to other people's data. Social media accounts, phone mailboxes and networks that computers connect to are all prone to hacking.

### Ethics / Morals

- **Moral:**
  - behaving in ways considered by most people to be correct and honest
- **Ethical:**
  - in accordance with principles of conduct that are considered correct, especially those of a given profession
  - You will often find that professional bodies have "Code of Ethics" which members must follow.





### Privacy issues

Personal information can be hard to keep private on the internet.

- Websites may ask for a name and date of birth to set up an account.
- Social media encourages users to share photos, job details etc.
- Cloud servers store personal files on their servers.

Privacy agreements say what a company can do with your information. You have to accept before using their service.

Privacy settings can sometimes be changed to make data more private. They're often fairly relaxed by default.





## Cultural issues

The introduction of computers has changed society, sometimes for the better, sometimes for the worse. 'Cultural issues' is the term used for computer matters that have an effect on the nature and culture of society. Some of these issues include:

### The digital divide

#### The inequality caused by unequal access to technology.

- Devices and an internet connection can be too expensive.
- Urban areas often have great network coverage than rural areas.
- People may have difficulty adopting new technology – usually due to not being taught how to use it properly.

### The changing nature of employment

Many companies now allow employees to work from home and communicate with them via technology. Cloud-based document storage enables workers to share documents with their employer, and communication can be via email or by video.

Many technology-based jobs have been moved abroad, where costs are cheaper. Many organisations have call centres/support centres in other countries. The cost of communicating with people in those countries is outweighed by the savings made.

The use of technology within the workplace has changed the nature of employment. Automation of processes using technology has led to a fall in manual, low-skilled work, such as warehouse packing. On the other hand, more high-skilled work is now available, which includes the maintenance of automated systems.

### Wellbeing and Health

Eyestrain from looking at screen for too long.

Repetitive strain injury.

Back pain from poor posture or bad seating.



### Environmental issues

Environmental issues are those where the manufacturing and use of computers has had a negative impact on the environment.

Resources are needed in order for computers to be produced, distributed and used. Metals and plastics are used to manufacture components, while energy is expended in distributing equipment and in using it.

Many computers, such as **web servers**, **domain name servers** and **data centres**, need to be left running continuously. This requires lots of energy to maintain. Additionally, businesses, organisations, schools and homes all now have greater access to technology.

Many computer components are either hard to recycle or contain toxic materials, such as lead. Also, users discard ICT equipment quite quickly:

- People have new smartphones every couple of years.
- Many organisations replace computers after three or four years.
- Many people replace older technology before it fails simply because they perceive it to be old-fashioned or out of date.



All of this means that computers have a heavy impact on the environment, which is unlikely to decrease in the near future. However, many devices are now more power efficient than their predecessors and some companies have come up with innovative ways to save power.



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## Legal issues

### Six principles of the Data Protection Act 2018:

1. Personal data must be fairly and lawfully processed.
2. Personal data must be obtained for specified, explicit and legitimate purposes.
3. Personal data must be adequate, relevant and not excessive.
4. Personal data must be accurate and up to date.
5. Personal data must not be kept for longer than is necessary.
6. Personal data must be handled in a way that ensures security.

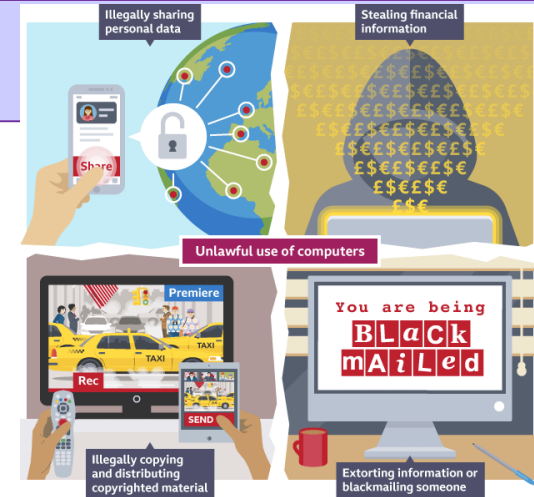


Data Protection Act  
2018

### Computer Misuse Act 1990:

It is illegal to:

1. Make any unauthorised access to data,
2. with the intent to commit further offences;
3. with the intent to modify data, e.g. viruses.



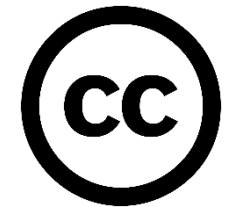
### Copyright Designs and Parents Act 1988:

It is illegal to copy, modify or distribute software, music, video or other intellectual property without permission of the author.



### The Creative Commons Licensing:

This is a standardised way to grant copyright permissions to creative work. It allows an author to retain copyright while allowing others to copy, distribute, and make some uses of their work.



### Freedom of Information Act 2000:

To provide the public with access to information held by public authorities.

1. Public authorities are obliged to publish certain information about their activities.
2. Members of the public are entitled to request information from public authorities.







## Open source vs proprietary software

Software may be developed to be freely distributed, or protected by copyright. This is known as open-source and closed-source (proprietary).

### Open source

### Proprietary software

Open source software can be free of copyright and is usually available to anyone.

Proprietary software is copyrighted and only available under licence.

#### ADVANTAGES

- It costs nothing.
- **Source code** so that anyone can modify it.
- It can have many authors. So programmers can all contribute to the development of a program over time, refining and improving it and adding extra features.

#### DISADVANTAGES

- There is no guarantee that it works properly as there is no requirement for anyone to ensure it is **bug** free.
- Support might not be readily available, especially if the program is not in widespread use.

#### ADVANTAGES

- The product should be free of bugs.
- Help can be sought from the organisation who supplied the software if problems occur.
- Software updates are often available, although usually at a cost.

#### DISADVANTAGES

- There is an initial or ongoing (subscription) cost.
- Software cannot be adapted to meet the needs of the user.
- It can be limited to a single **network**, so unless the licence allows it, a user may not redistribute the software.