Databases

Contents

Legislation

Laws can be national or international. A lot of EU law has been adopted by the UK and carried through even after Brexit.

A civil case may end up with one side being awarded damages. A criminal case may end up with a fine or a prison sentence.

It is illegal to:

- Store or process personal data without keeping it secure, among other conditions
- Make or trade in hack tools - hardware or software
- Make digital copies of other people's work without permission
- Intercept messages such as phone calls or emails without legal authority to do so

The Big Four Acts

The **Data Protection Act 1998** controls the way that data about living people is stored and processed.

The **Computer Misuse Act 1990** makes it an offence to access or modify computer material without permission.

The **Copyright, Designs and Patents Act 1988** covers the copying and use of other people's work.

The **Regulation of Investigatory Powers Act 2000** regulates surveillance and investigation, and covers the interception of communications.

The Data Protection Act 1998

This act controls the way that data about living people is stored and processed.

Storage and processing of personal details must:

1. Be fair and lawful
2. Relevant and not excessive
3. Accurate and up to date
4. Only kept as long as needed
5. Only be used for the stated purpose
6. Be kept securely
7. Handled in line with people's rights
8. Not be transferred to countries without protection laws

'Personal details' refers to living, identifiable people. This act includes paper and digital records. Exceptions are:

- National security, like data about suspected terrorists
- Crime and taxation, like policy surveillance
- Domestic purposes, like an address book

This is not foolproof, however. Companies experience data breaches on a semi-regular basis and the results are not good for the customers.

Computer Misuse Act 1990

This act makes it an offence to access or modify computer material without permission. It makes 'hacking' a crime.

It covers:

- Unauthorized access to computer material
- Unauthorized access with intent to commit or facilitate a crime
- Unauthorized modification of computer material
- Making, supplying, or obtaining anything which can be used in computer misuse offences

Examples include:

- Making or intentionally spreading a virus
- Attempting to login without authorization
- Using someone else's login
- Reading, changing, or deleting data without permission
- Obtaining or creating a 'packet sniffer'

Copyright, Designs and Patents Act 1988

This protects creators of books, music, video, and software from having their work illegally copied. It applies to all forms of copying.

Digital storage hardware is very small and efficient, and fast broadband means that copies can be shared around the world very quickly. It is very easy to spread copies of digital media.

The software industry can take some steps to prevent illegal copying of software. For example:

- The user must enter a unique key before the software is installed
- Some software will only run is the CD is present in the drive
- Some applications will only run if a dongle is plugged in
- Some applications have always-online-DRM, which means they need a continuous internet connection

Tools used to create software may require fees if the software is then sold. Applications, games, books, films, and music are all protected, but algorithms cannot be copyrighted.

Regulation of Investigatory Powers Act 2000

This act:

- Requires ISPs to secretly assist in surveillance

- Enables mass surveillance of communications in transit and monitoring of internet activates
- Enables certain pubic bodies to demand that someone hand over keys to protected information
- Prevents the existence of interception warrants and any data collected with them from being revealed in court

As technology develops, laws may change. The UK Government has proposed an Investigatory Powers Bill to deal with interception of communication and acquiring bulk personal data. It's not good.

Ethical, moral, and cultural issues

Commerce

Photography was once a big employer because a lot of people were needed to process photographs. Kodak employed 145,000 people in 1989, but only 8000 in 2015. In 2013, Instagram had only 13 full time staff and was sold to Facebook for $1bn.

Music, video, and publishing is open to anyone who uses smart technology. Consumers pay less, or nothing, therefore the artists make less, or nothing.

3/4 of British consumers purchase goods online. The UK spends the most money per capita per year than any other country. Even higher than the US.

You no longer need inside knowledge to find the best deal, just a price comparison site. There are comparison sites to compare comparison sites. Economists describe **competition** as working best when buyers and sellers all have **perfect information** about price, usefulness, quality, and production methods. This is obviously much easier with the advent of the internet.

Questions about production methods should include:

- Country of manufacture
- Use of child labour
- Use of animal testing
- Use of recycled or organic ingredients
- Renewable energy use
- Charitable or community activity of producers

Social media

In 2015, Facebook had a total revenue of $18bn, but it's free to use, so most of that money came from advertising and selling personal data. Advertisers pay to target particular types of users.

Facebook's assets are its huge userbase and the data it stores about each individual user - their likes, locations, age, and friends. A famous saying in advertising is 'Half the money I spend on advertising is waster; the trouble is I don't know which half.' But with data mining and digital tracking, the platform knows who clicked which advert.

Estonia has developed a sophisticated system of e-Government, from national to local levels. 95% of Estonian tax declarations are filed electronically. In the 2015 Parliamentary Elections, internet voting accounted for 30.5% of the votes cast. Estonians worldwide cast their votes from 116 different countries. A nationwide e-Health system integrates data to create a common record for each patient.

- How are users authenticated?
- How is data kept safe from hackers, including those from enemy nations?
- How reliable is the technology?
- Will citizens trust the authorities and their technology?
- Will costs be matched by savings?

Robotics

Solving the technological problems of robotics can bring a focus onto ethical questions. Ethics is concerned with what is good for individuals and society and is also described as *moral philosophy*. An example is how we program autonomous robots: driver-less cars, drones, robotic surgeons, and security systems all raise questions.

Isaac Asimov described three laws for robots[1]:

1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm
2. A robot must obey the orders given to it by human beings except where such orders would conflict with the first law
3. A robot must protect its own existence as long as such protection does not conflict with the first or second laws

Ethical frameworks and AI

If a manufacturer offers different versions of its moral algorithm, and a buyer knowingly chooses one of them, then who is to blame when the algorithm makes a harmful decision?

AI algorithms can analyse social media, CVs, credit ratings, buying history, postcode data, and more. These processes were previously done by hand. Employers, universities, law enforcement, and insurance companies all use algorithms and data to some extent.

In a society with a social credit system, or simply mass corporate surveillance, assessing people becomes much easier due to the vast amount of data that is collected on them.

When can it be said that a computer is intelligent? What does it mean for a computer to be intelligent? Perhaps we could use the Turing Test. But not all humans behave intelligently, and not all intelligent behaviour is performed by humans.

Environmental effects

Digital devices use up vast quantities of precious metals and other resources. Data centres around the world ('the cloud') use more energy than the whole of the UK uses for heat, light, and transport. Data servers have a bigger carbon footprint than the global aviation industry. Do the positive effects of modern technology outweigh the negative environmental effects?

Digital control systems allow control of energy use in the home, industry, and transport.

In 2014[2], 14% of 30 million working adults (4.2 million people) worked from home. About half were managers or professionals. Fewer commuters means less energy used for travel. Heating individual homes may mean more energy being used than heating a shared office. Less travel may mean less stress. Lonelier people and indirect communication may mean more stress.

Summary

There are moral and ethical questions including:

1. Computers in the workforce
2. Automated decision making
3. Artificial intelligence
4. Environmental effects

[1] Asimov was an author, and his laws were designed to be used in his books and shown to be ineffective as a service to the narrative. These laws will designed to show that no reasonable set of moral laws can be fully consistent and appropriate for the real world.

[2] This was pre-COVID, so these numbers have only gone up.

Privacy and censorship

Free speech

The UK Human Rights Act protects free speech - but there are many exceptions such as incitement to racial or religious hatred, encouragement of terrorism, 'Official Secrets', and aspects of court proceedings. Films and video games are age-rated by non-governmental bodies. Court injunctions can prevent stories being printed, broadcast, or otherwise published.

Some countries make it illegal to criticise the Government or its leaders. Is it right to censor opinion? Is it right to censor anything? If so, who decides what to censor?

China, as well as other countries, regulates what information is available on Chinese internet.

In 2014, there were early 2000 convictions for threatening, offensive, or indecent messages, including tweets.

Twitter is US based and obviously not subject to UK law, but people in the UK who tweet do have to keep within UK law.

The volume of traffic makes monitoring impractical: it is up to users to report, block, unfollow, or take legal action against abusers. Some Facebook groups and newspaper comment forums are moderated. Moderation is about not letting anyone's agenda ruin the conversation or rant about irrelevant issues, as well as blocking trolls.

Twitter **did** manage to keep control of copyrighted TV footage of the 2016 footage from NBC, but they **don't** bother to keep control of harassment.

Monitoring behaviour

Internet services such as Google are free at the point of use, but Google's main business model is advertising, and they use user data to target their adverts. Scott McNealy, chairman of Sun Microsystems said "You have zero privacy anyway. Get over it." Is he right? Should we care?

In 2011, the Association of British Insurers warned people "not to disclose their summer holiday plans online, as criminals are increasingly going online to target unoccupied homes." A McAfee Labs report found stolen credit cards with full supporting customer details on sale for $30 - $45.

Digital media makes distributing copies much easier. Videos, music, and software are all attractive targets for pirates.

Design, colour, and layout

Colours have different meanings in different cultures. Different languages read text in different directions, so encoding the direction of the text is important. Thankfully, this is handled quite well by Unicode. However, things like tables and charts should match the primary direction of text as well. Unicode should be used everywhere in modern design - UTF-8 is best for western languages, but UTF-16 might be better for non-western languages.

Summary

It is very hard to censor the internet. Governments, advertisers, and criminals may all be watching our behaviour. Digital technology makes piracy easy. It is tempting to be more offensive online than you would be in person. Layout, colour paradigms, and character sets are all affected by cultural expectations and traditions.