ETHICS IN COMPUTING

Advantages	Disadvantages
Computer-aided manufacture & design improves quality and consistency of manufacture.	Computers and hardware infrastructure has initial high costs.
Computer-aided design and in fact, any digital work material can easily be shared across the internet/in emails, copied or printed.	Computer's and technology have risks of failure and downtime in which money is not earned and customers may become dissatisfied.
It can take many, many years to train specialist craftsmen/women to perform tasks that require a consistent, high-quality (e.g. hand making cars).	Failure of computer systems can lead to serious data loss.
Workers require weekends, holidays, sick and maternity leave, lunch breaks and limited working hours. Computers are able to work 24/7.	Computer systems can be used to facilitate crimes and be misused in the workforce.
Employees may become trained but decide to quit and move to another company/workplace.	Computers have the potential to be hacked or their material distributed. This poses privacy, data protection and copyright issues.
Computers can increase efficiency with advanced processing power, algorithms and numerical manipulation that would take humans longer.	Computers and data centers require large amounts of electrical energy which is costly.
Computers are cheaper in the long term for a business/organization as they do not require salaries.	Computers and robot have led to redundancy with skilled workers who previously had reliable jobs out of work.
Computers can work in conditions that may not be suitable for humans – especially inhospitable ones.	People worry about not being able to use new systems. Learning how to use them takes a long time.
Computers can automate repetitive mundane jobs, leaving people free to focus on more interesting, creative tasks. These often have a better pay.	
Jobs are created in learning how to use technology, selling it and maintaining it.	
Employees can often work from home and submit their work over the internet. This cuts down the cost of commuting and childcare for employees while allowing employers to save money on office space and resources.	

Teachers:

While computers have opened up a world of opportunities without costing a significant number of jobs in schools, teacher's will now have to show competence in the use of technology.

Postal workers:

While fewer people are sending letters and postcard these days, the negative effect is quite blurred since there are more people buying goods online equating to more delivery parcels and so more postal workers are needed.

Publishers:

Computers can provide grammatical and spelling checkers that save vast amounts of time in the publishing industries. Computers can also scan documents that could have taken weeks to type up.

Secretaries:

Databases, spreadsheets and effective search algorithms mean that companies no longer need huge pools of secretaries to file and retrieve client records.

ARTIFICIAL INTELLIGENCE AI AND AUTOMATED DECISION MAKING

Artificial intelligence refers to computers with built-in intelligence that allows them to perform tasks that are normally undertaken by humans.

Digital technologies are spreading into our offline world in the so-called `internet-of-things'. Previously inert objects are expected to become networked and start making decisions for us.

In the medical department:

Computers would have no problem retaining data it is given and wouldn't get tired or hungry. Doctors and surgeons, however, must recall vast amounts of information, work long hours and make life-or-death decisions.

However, a computer may not always be able to make the correct diagnosis for patients and is not capable of more complex thinking.

In the military:

Robots are already widely in use in the military. In November 2012, the US Department of Defense tried to establish guidelines around minimizing failures and mistakes for robots deployed to target terrorists.

Artificial intelligence is not yet affected by emotions like passion or revenge and so can make decisions without these emotions clouding the decision. Military robots and drones operated by humans have been excessively used in counter-terrorism and war zones. However, simple image recognition software could be deployed which possess ethical issues of who the drone tries to shoot at? Who is responsible for accidental civilian casualties? How would families get justice?

Robots

There are concerns that robots may one day need their own rights if they become capable of thinking for themselves. Is it right to treat them as slaves? Should they be governed by law and regulation? Should they be allowed to vote?

Driverless cars:

Benefits include: Far fewer accidents, no drunk/reckless driving, very elderly or young people can reach their destination safely without the need to pass a test, it would become more convenient and people could increase their working time during transport.

However, drivers also need to make ethically based decisions – most drivers will avoid hitting a wildlife animal that appears on the road so long as they know their passengers are safe and it won't endanger other motorists. This is a complex ethical based decision determined on passengers, type of animal and the individual so it is hard for a computer to replicate.

If a car is involved in an accident who is at large. Should the company or programmer that developed the car be to blame? Should you be allowed to sue a driverless car when you are tired or under the influence of alcohol?

Artificial intelligence and automated decision making

Advantages	Disadvantages
Computers won't react differently based on their mood or lack of sleep.	Computers are unable to make ethical decisions.
Computers can retain a huge amount of information.	Computers are not responsible for their actions, so seeking compensation for mistakes is difficult.
Given the same inputs, a computer always produces the same outputs, offering consistent advice.	Computers are only as good as their algorithms, which are created by people.

Table 14.3 Advantages and disadvantages of artificial intelligence and automated decision making.

THE ENVIRONMENTAL EFFECTS OF COMPUTERS

Many computer systems aim to reduce paper usage and so deforestation by going paperless. This approach relies on using emails and cloud storage to share information and store documents, which in turns reduces paper usage. This saves trees and is just one of the ways in which computers soften their environmental impact.

Computers are also used to help fight against climate change. Computer models and simulations can be used to predict weather and climate patterns, modelling the effects of different initiatives and developments to see which will have the greatest impact.

Computers are abundant in rare metals and minerals that need to be mined from the ground. These reserves are running out fast. In fact, a ton of mobile phones contains more gold than a ton of gold ore.

The rare element indium is essential to all touchscreen devices yet there are fewer than 14 years of reserves left to mine. Indium tin oxide is a transparent conductor and is applied to glass to make touchscreens. Compounds of indium are relatively toxic if they enter the bloodstream.

Computers contain vast amounts of toxic chemicals that need to be disposed of when they break or people throw them away as it becomes obsolete. Much of today's electronic waste is deported to third world countries that care little for safety regulations. They will simply burn computer components to extract metals. This releases toxins and carcinogens that are inhaled.

Most computers from the West will end up in West Africa. They are placed in massive toxic dumps and children are involved in burning them to extract metals for cash. People regularly breaking down computers will suffer from nausea, headaches, respiratory problems and cancer.

Many chemicals also leak into the ground and contaminate local water supplies and natural springs.

Computers and other electronic devices use vast amounts of electricity to operate. The majority of this is supplied by combustion of fossil fuels that release greenhouse gases into the atmosphere.

Many data centres, server and network companies are keen to reduce their energy consumption as this not only reduces cost but aids the environment. They can do this by using more efficient components (SSDs compared to HDDs or more sophisticated smaller architectures of chips). They can also raise the temperatures slightly in server rooms so reducing the electricity consumed by air condition units.

Google seeks the use of renewable energy sources for its data centres.

Environmental impact

Advantages	Disadvantages
Computers can replace paper documents, saving trees and processing.	Computers are made up of rare chemicals that need to be mined.
Computer networks can be used to send products (such as films or music) that would otherwise need to be shipped in lorries and planes.	Computers are made up of toxic chemicals that are often not properly disposed of.
	Computers use electricity, most of which comes from burning fossil fuels.
	Computers require a great deal of intensive manufacture to create, all of which requires burning fossil fuels.

Cheap, unrestricted access to the internet has meant that people can access new ideas and share thoughts with people they would never otherwise have met. In the old days, people's social connections were limited by the geography of the area (those who live nearby). These days people can communicate from across the world who share particular views.

There is a great controversy between those who seek to control the content that people can access online and spread on posts and those who think that access to knowledge and free speech over the internet is a basic human right.

Governments try to assist with helping the economy of the country by encouraging and sometimes enforcing ISPs to block access to material such as illegal download and streaming sites. This helps enforce the Copyrights, Designs and Patents Act 1998.

Many religious groups believe that people should be prevented from seeking material which their religion or culture deems inappropriate (gambling, pornography, hate speech or alternative religious views).

Certain controlling governments (and dictators) will censor information from their country that they do not wish to influence the views of their country. This makes it easier to spread propaganda.

On the other side of the debate are human rights and privacy campaigners who argue that everyone should be able to access any (legal) material.

The transmission of over the internet predominantly uses packet switching protocol (TCP/IP) making it hard for governments to intercept information. The Internet also offers new ways to transfer information such as newly developed encryption algorithms. It is impossible to prevent their use.

However, many governments have successfully blocked access to lots of material deemed inappropriate, criminal or a threat to national security. Even when the material is not blocked, many government agencies such as GCHQ in the UK and the NSA in the United States have the power under the Regulation of Investigatory Powers Act to carry out surveillance and monitor people accessing criminal material.

Those against the censorship of inappropriate material say that such filters imposed by ISPs harms free speech and are not reliable enough to ensure that all inappropriate sites are restricted but some perfectly safe sites could become blocked. They also argue that it is up to the parents of children to inform them of the dangers online and not for the government to intervene.

WikiLeaks is a site with a known representation to publish sensitive material that has been stolen from government organizations. WikiLeaks remains controversial, with some believing it is necessary to expose the secrets that governments keep from us and expose their abuse of power. However others are outraged to see such material which could be essential to national security and economic well-being being published openly online.

There is also controversy over encryption technologies. On the one hand, there is the argument that it allows terrorist and rebel groups to communicate and plan attacks without the worry of government interception. It also makes crimes over the internet, such as the distribution of underaged pornography, drugs, and explosives easier and less detectable by filters and monitoring algorithms. There is also the

argument that if you have nothing to hide then there should be no need for encryption on a trivial thing like instant messaging services.

It can be argued Encryption should only be in use for the government, military and password/bank detail transmissions. This would make it even easier to stamp down on online cyber crimes.

Then again, there is the argument of privacy. Without encryption on messages, there are possibilities of personal, sensitive data and messages being hacked and exposed online. Moreover, if our data is not encrypted then ISPs may be selling off sensitive information to advertisement companies. There may

Advantages and disadvantages of unrestricted access to the internet

Advantages	Disadvantages
People can share and access information that would be very difficult for them to obtain without the internet.	Automated filters make it easy for governments to monitor millions of citizens.
People can spread news of atrocities and corruption very quickly, ultimately helping to bring those responsible to justice.	Computer networks are ultimately owned by governments and large corporations that can control the knowledge to which people have access.
	It is easy to disseminate false information or unconfirmed rumours.
	People can access vast amounts of illegal information and products such as extreme pornography.

Table 14.5 Advantages and disadvantages of unrestricted access to the internet.

be issues of people finding it hard to get a job due to their religious, political or interest views.

MONITORING BEHAVIOR

Monitor behavior

Another area of controversy is the power for governments and certain public bodies to monitor and store data about users and the public using the internet.

In 2013, Edward Snowden leaked classified files that showed the US/UK governments were storing vast amounts of data without people's consent in the name of national security. Snowden used his position and password provided by colleagues to gain access to classified material and leak it to the world, revealing government espionage. Edward Snowden had been an intelligence analyst working as a contractor for the NSA (National Security Agency).

Snowden's leaks have revealed that the NSA and GCHQ are using a secret program called PRISM to collect foreign communications traffic from the servers of 9 leading US internet companies. The UK's security service GCHQ was monitoring up to 600 million communications every day.

Snowden revealed that the NSA and GCHQ were using apps such as Google Maps, and Angry Birds to monitor people's browsing history, contacts and visited locations. In fact, the NSA was monitoring locations of 5 billion mobiles worldwide. The NSA had used such capabilities to spy on foreign leaders and diplomats at the 2009 G20 summit. Most recent leaks highlighted NSA's plans to develop a quantum computer capable of breaking all forms of encryption known.

It is important to note that while Edward Snowden's acts went against the Espionage Act of 1917 and theft of government property. However, these two charges were later unsealed by the US Department of Justice and he fled to seek asylum in Russia.

The intelligence community argued that this information was vital and effective at monitoring the behaviour of people who pose a threat to national security. Many people are against this type of mass surveillance power.

PIRACY

Piracy has long been a problem for the film and record producers but the invention of the internet has led to an explosion in the amount of pirated material. Computers make it easy, free and virtually untraceable to instantly copy and share copyrighted works.

It has become so common that most law-abiding people don't even view it as a crime anymore.

 The Motion Picture Association of America estimates that piracy costs the US movie industry around $20.5 billion (£13.3 billion) per year. However there si the argument that people with less money may never have gone out and watched or brought the film in the first place if they could not pirate it online (has the film industry actually lost money from that person).

Creative industries work with governments and ISPs to block access to pirated material and enforce fines and prosecution for obtaining or distributing copyrighted material. The main issue with trying to eliminate piracy is the sheer numbers of people pirating media. It is too costly to track down and prosecute all individual file sharers – many of whom are teenagers without any means of paying a fine.

LAYOUTS AND DIFFERENT CULTURES

Websites designed in one country are viewable all over the world, so if they are intended for an international viewership, it is a good idea to give consideration to the layout, colour and character sets. To people from different cultures, the same piece of information may be interpreted in many different ways.

In the West, websites are designed with a linear structure of information with multiple blocks of text that a Western viewer is likely to skim over. The text is read from left to right so menus commonly appear on the left.

Japanese websites prefer to include less information per page which, as a whole, is easier to absorb.

In countries that speak predominantly Arabic, the convention is to read from right to left. Menus and other page features will appear on the left side of the page.

Maps commonly show nationalistic bias in their layout. A world map is frequently shown with the Country it was created in featuring in the centre.
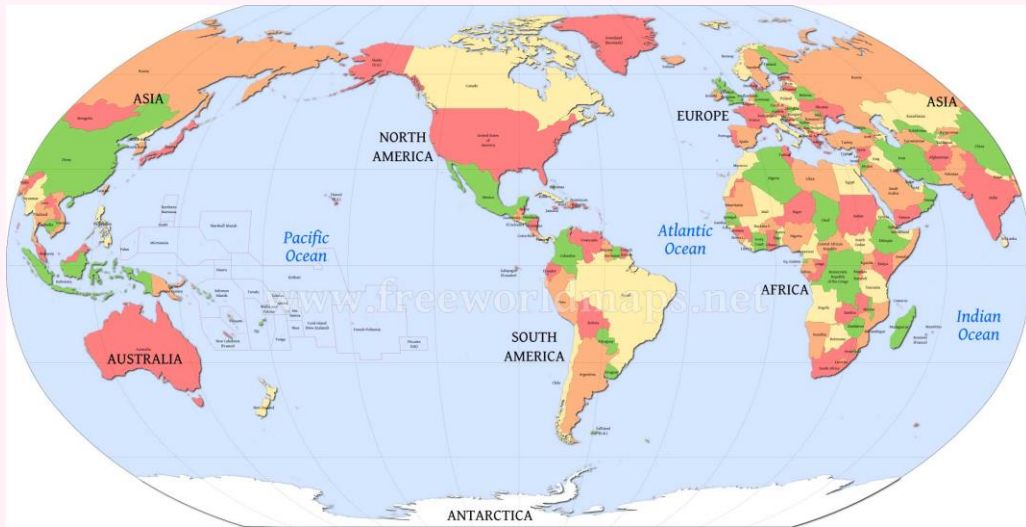
A paradigm = a typical example of a pattern of something.

In general, blue is considered as the safest colour to use for content; it has many positive associations.

In North America and Europe, blue represents trust, security, authority and is considered to be cool, soothing and peaceful.

However, some deeper interpretations say it represents depression, loneliness and sadness (hence having the blues).
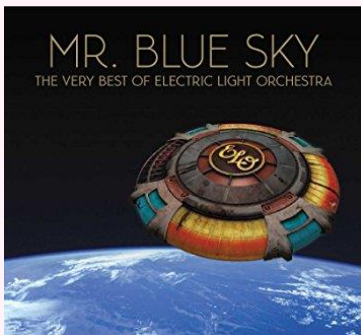
In Western culture, green represents luck, nature, freshness spring, environmental awareness, wealth, inexperience, and jealousy.

In Indonesia, green has traditionally been forbidden, whereas in Mexico, it is the National colour that stands for independence.

In In the Middle East, green represents fertility, luck and wealth, and it's considered the traditional colour of Islam.

In Eastern cultures, green symbolises youth, fertility, and new life, but it can also mean infidelity. In China, green hats for men symbolises their wives have comitted adultery – makign it a taboo.

In Western culture, orange represents autumn harvest, warmth, sunshine.

In Hinduism (a soft orange colour) is symbolised as auspicious and sacred. In Eastern culture, it symbolises love, hapiness, humility and good health.

Yellow is considered as a bright, energising and warm colour. However, it can also mean cowardness (yellwo belly) and deceitfulness. Yellow can also symbolise hope, with ribbons being tied around tries symbolising hope for missing loved ones.

In Egypt, yellow is considered with mourning. In Japan it is the colour associated with trade. In Islam it is associated with wisdom.

In Germany it symbolises envy. In China it signifies neutral/good luck and was the colour of five legendary emperors of ancient China.

From the perspective of someone born in the West. Red is a hot colour. It can be associated with danger, violence, blood, war, fire, cupid and the devil, anger or being held in high esteem (red carpets at ceromonies) and even romance.

It is linked to happiness, good luck and prosperity in Chinese societies, and of course Communism

In South Africa, red is a colour associated with mourning for a loved one as well as HIV / AIDS awareness.

In India red is associated with purity, sensuality, and spirituality
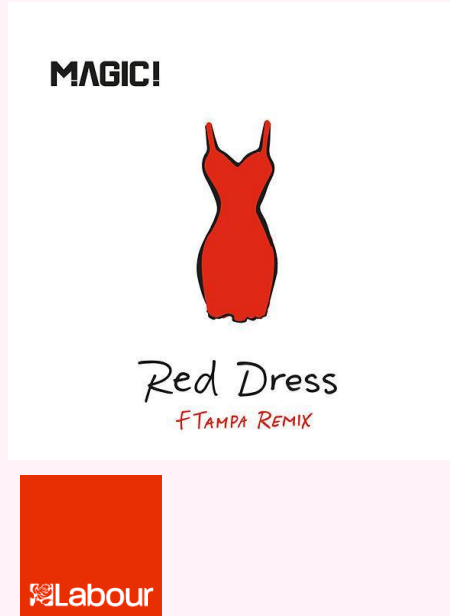
Purple is often associated with royalty, wealth, independnace, spirtuality and nobility aroudn the world. In Japan,only the hgihest ranked Buddhist monks will wear purple robes. In Cathloith symbolism it shows pateince. However, in Brazil and Thailand purple is the color of mourning.

The Purple Heart is also the colour of honor, the oldest ranking military award given to US military members.

More colour paradigms found at:

https://www.shutterstock.com/blog/color-symbolism-and-meanings-around-the-world

ASCII uses 8 bits but the last bit is an error checking parity bit. Therefore it can only use 7 bits to represent up to 128 different characters (0 is null).

Unicode (UTF-16) has been developed to represent over a million characters including those of most languages, and symbols used in mathematical, scientific and musical notation.

Unicode allows for 16 planes, each of 65,536 characters. Unicode 17 has also been developed and only 10% of the bits have actually been allocated characters.

Key definitions

 # Unicode = an **international encoding standard** for use with **different languages** with each character being assigned a **unique numeric value** that **applies across different platforms and programs.**

#ASCII = (American Standard Code for Information Interchange) is the **most common format for text files** each **alphabetic, numeric, or special character** is represented with a **7-bit binary number.**