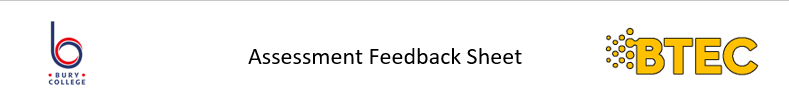
**BTEC Assignment Brief**

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| **Qualification** | | Pearson BTEC Level 3 National Foundation Diploma in Computing  Pearson BTEC Level 3 National Extended Diploma in Computing | |
| **Unit number and title** | | **Unit 9: The Impact of Computing** | |
| **Learning aim(s)** (For NQF only) | | **A:** **Understand the impact of developments in computing on an organisation**  **B - Investigate the impact of developments in computing technology** | |
| **Assignment title** | |  | |
| **Assessor** | | Niall Spence / Andy Hicks | |
| **Issue date** | | 7/12/20 | |
| **Hand in deadline** | | 17/1/21 | |
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| **Vocational Scenario or Context** | | You are employed by an IT consultancy firm and have been asked to prepare a report to local firms on the impact of developments in computing on organisations. You must outline the impact of various factors such as mobile computing, new software, market changes, emerging technology etc.  You must produce a written where you explain what these impacts are and if necessary why they occur. | |
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| **Tasks** | | 1. **(P1) Explain the impact that developments in computing have had on an organisation** 2. Explain hardware and software developments specifically the increasing power of hardware and sophistication of software, specifically:   • Focus on mobile rather than desktop computing.  • Maintaining or improving the competitive edge.  • Regular upgrading of hardware to take advantage of more sophisticated software and improved energy management.  • Developments in cloud and hybrid cloud technologies.  (b) Changing markets and new opportunities – explain how markets change over time, specifically:  • Decline in some traditional market sectors and developments in others.  • The need for organisations and businesses to develop and change to take advantage of new markets and opportunities.  • Balancing growth in some areas against decline in others, e.g. traditional retail, analogue music and photography versus digital.  • Potential provided by developments in IT for cost reductions, improved customer service.  • Opportunities and challenges represented by ‘big data’.   1. **(P2) Explain the likely impact of an emerging technology on organisations, specifically:**   • Internet of things (IoT) – ubiquitous computing and the opportunities and challenges it represents.  • Increasing integration and sophistication of applications.  • Increasing automation, e.g. robotics, exoskeletons, rehabilitation robotics.  • Current developments   1. **(P3) Assess the potential ethical and environmental impacts of developments in technology, specifically:**   • Unequal access, the ‘digital divide’ between those with and without network access (developing world countries and remote areas).  • Difficulties experienced by older people and people with disabilities in coping with changes in technology.  • Privacy issues as increasing amounts of data are collected about every aspect of an individual’s life and habits.  • Considerations relating to access to personal data and how it should be protected.  • Legal and ethical considerations applicable to the equivalent legislation in England,  Wales and Northern Ireland, e.g. copyright, computer misuse, data protection.  • Risk of the loss of control of personal data stored online, e.g. photos, videos, emails and instant messages.  • Potential dangers of artificial intelligence, e.g. possibility of smart systems or robots that could outwit human intelligence.  • Dangers and ethical issues inherent in robot weapon systems.  • Negative aspects of internet use:  o personal internet use problems, e.g. pornography, revenge pornography,  cyberbullying and trolling, the ‘darknet’ (peer-to-peer sharing of illegal materials)  o availability of illegal material and material that breaches copyright, e.g. films, videos, music  o use of the internet by terrorists and extremists to recruit members, communicate and spread propaganda.  **And**  **Environmental impacts**  • Electricity consumption and its environmental impact.  • Improvements in computing power per kilowatt of electricity, balanced by increasing  use of hardware.  • Increasing amounts of electronic waste materials creating pressure on landfill.  • Need to recycle dangerous chemicals, heavy metals found in batteries and other components.  • Issues relating to the export of waste electronic equipment for recycling to the developing world.   1. **P4** Explain how lack of understanding or access to IT can disadvantage certain groups of people (see above) 2. **M1** Analyse the risks related to implementing a new computer system in an organisation, specifically:   • Security considerations and the dangers inherent in extensive reliance on computing for  every aspect of life:  o the attractiveness of systems to criminals or terrorists, e.g. data theft or destruction, fraud, denial of service, blackmail  o difficulty of maintaining compatibility with existing internal systems  o difficulty of maintaining compatibility with external systems  o increasing complexity of IT systems controlling mission critical applications, e.g. transportation systems, energy generation and distribution, military systems  o difficulties associated with ensuring complex systems are reliable, fully tested and fail ‘safe’.  • Changes in working practices:  o remote working  o office practices, such as bring your own device (BYOD)  o upskilling of workforce to make use of more complex systems  o reduction in low skilled jobs due to automation  o working styles, focus on desk-based jobs, move away from traditional  manufacturing jobs.  • Increasing reliance on IT and the need to protect against failure, disaster recovery planning, consequences of failure.  • Information overload and the difficulty and expense of processing large quantities of data, danger of and consequences of data duplication.   1. **M2** Analyse the benefits and disadvantages of the social impact of computing technology developments, specifically:   **Social impacts**  Changes in the way people communicate.  • Increasing reliance on social networking for human interaction.  • Consequences in terms of lack of social skills and increasing isolation.  • Health and age-related issues.  • Ease with which contacts can be maintained, reduction in geographical barriers.  **Employment and business impacts**  • Increased home working and its benefits, e.g. reduced travel time, flexibility and disadvantages, e.g. lack of human interaction, isolation.  • Reduction in the number of unskilled or low skilled jobs.  • Creation of new markets and opportunities.   1. **(D1)** Evaluate the impact that implementing a new computer system can have on an organisation.   [link here](https://wakelet.com/wake/e4c6fe50-b223-43e7-8781-f4f1b3079307)   1. **(D2)** Evaluate the impact that the implementation of a specific development in computing technology has had on wider society.   [**link here**](https://wakelet.com/wake/e4c6fe50-b223-43e7-8781-f4f1b3079307) |
| **Checklist of evidence required** | |  | |
| **Criteria covered by this task:** | | | |
| Unit/Criteria reference | To achieve the criteria, you must show that you are able to: | | |
| **P1** | Explain the impact that developments in computing have had on an organisation. | | |
| **P2** | Explain the likely impact of an emerging technology on organisations. | | |
| **P3** | Assess the potential ethical and environmental impacts of developments in  technology. | | |
| **P4** | Explain how lack of understanding or access to IT can disadvantage certain groups of people | | |
| **M1** | Analyse the risks related to implementing a new computer system in an organisation. | | |
| **M2** | Analyse the benefits and disadvantages of the social impact of computing technology developments. | | |
| **D1** | Evaluate the impact that implementing a new computer system can have on an  organisation. | | |
| **D2** | Evaluate the impact that the implementation of a specific development in computing  technology has had on wider society. | | |
| **Sources of information to support you with this Assignment** | | Worksheets, websites | |
| **Other assessment materials attached to this Assignment Brief** | | none | |



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| **Overall Assessment Grade Achieved** |  |

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| --- | --- | --- | --- | --- | --- |
| **Learner Name** | | **Husnain Ahmed** | | | |
| **Assessor Name** | | **Niall Spence** | | | |
| **Qualification Title** | | Pearson BTEC Level 3 National Extended Diploma in Computing | | | |
| **Unit/Module No./Title** | | Unit 9: The Impact of Computing | | | |
| **Assignment No./Title** | | **9.1** | | | |
| **Learning Aim(s)** | | **Learning Aim, A:** | | | |
| **Issue Date** | **7/12/20** | **Planned Submission Date** | **17/1/21** | **Actual Submission Date** | **5/2/21** |
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| **First/Second Submission** | | |
| **Criteria** | **Criteria Achieved** | **Assessor’s Feedback** *Your feedback should include:*   * *What the learner has done well. (Knowledge, skills, etc.)* * *What the learner has not achieved and what was missing.* * *Information or guidance available to the learner they could have drawn on (e.g., class notes; handouts; resources in assignment brief etc.)* |
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| **BTEC Rules**  All resubmissions must be authorised by the **Lead Internal Verifier**. Only **one** resubmission is possible per assignment, providing:   * The learner has met initial deadlines set in the assignment or has met an agreed deadline extension. * The tutor considers that the learner will be able to provide improved evidence without further guidance. * Evidence submitted for assessment has been authenticated and accompanied by a signed and dated declaration of authenticity by the learner.   Any resubmission evidence **must** be submitted within 10 working days of receipt of results of assessment (BTEC only) | | |
| **Wider Skills (Linked to Positive Futures)** *Comment on the quality of the learner work, the learner’s process and practice during assessment, research skills, presentation, general behaviour and conduct, meeting deadlines, etc.* | | |
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| **Assessor Declaration** | *I certify that, to the best of my knowledge, the evidence submitted for this assignment/assessment is the learner’s own. I understand that false declaration is a form of malpractice.* | | |
| **Assessor Signature:** |  | **Date:** |  |
| **Learner Declaration** | *I certify that the evidence submitted for this assignment/assessment is my own. I have clearly referenced any sources used in the work. I understand that false declaration is a form of malpractice.* | | |
| **Learner Signature:** | **H.ahmed** | **Date:** | **4/2/21** |

**Learner Actions**

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| **Learner’s Targets/Actions**  *What needs to be developed to improve future work?* | *Actions linked to the following Positive Futures outcomes* |
|  | * Confidence * Commitment * Collaboration * Resilience |

**9.1: Explain the impact that developments in hardware and software have had on an organisation (P1 A)**

Developments in hardware and software have had significant impacts on organisations in all industries. Increases in the power of hardware and the complexity of software has granted access to a whole new world of possibilities for organisations and completely new ways to go about their work with much more efficiency.

**Focus on mobile rather than desktop computing**

One example of such a development is a new focus on mobile devices such as smartphones and laptops rather than traditional desktop computing, this change in the face of computing allows employees and managers to access their work and emails on the go from their mobile devices rather than be stuck at a single computer terminal in their work building. This allows for greater convenience as it is easier to read emails / do work and you don’t need to come into work to access your emails on a computer or mac.

This also allows for a more flexible timetable as you do not have to work 9 to 5 hours since you can do your work at any time that is suitable for you, boosting your efficiency and making it so that you can make the most out of your time. This also allows four the organisation to have more ways to contact you such as through videocalls and online meetings for conferences and such.

Mobile devices these days are small, portable and powerful. They can run sophisticated integrated applications like Microsoft Teams, Skype, Zoom, OneDrive and many more that can be of help when doing your work.

This makes doing work easier as there is multiple features such as file sharing and copying files to one drive or to your device, as well as editing them. You can also call people and make group calls for joint work collaborations.

Many applications have been created for the purpose of giving you a much easier working experience. Work is easier to share and monitor to see if the employees have completed it on time and met deadlines.

**Maintaining or improving the competitive edge.**

With the increases in technological advancements companies need to make sure that they can keep ahead of the game and maintain a competitive edge so that other businesses in the same field do not overtake them in terms of influence and power, money etc.

There are many ways of doing this such as using targeted email application like ‘Mail chimp’, this application helps you to manage your business, emails, clients and potential business partners. This and other applications like it can be used to help companies maintain a competitive edge by getting their business online and reaching out to a wider audience by marketing their business much better.

Another development that can be used to help a company to maintain a competitive edge is a supermarket that makes use of a self-checkout till as opposed to human operated checkout tills, this removes the need for human employees and allows the customer to checkout themselves by scanning their own items and weighing them before putting them into a bag. With this change it would be faster to checkout, thus increasing customer satisfaction as they do not need to wait in long lines as much. It would also leave no room for human error or foul play where a cashier could give their friends a discount.

Another development that can be used to help a company to maintain a competitive edge is using an online AI chatbot instead of a human to resolve customer service issues, while this is not a universal problem solver as the AI may not have the answers to all questions and issues that customers may have it removes the need for human employees and will give the same answer to anyone who asks the same question, so there will be no room for discrepancies. If a problem cannot be solved by the AI chatbot the customer can be redirected to a call with a human employee that can help them out. This can help with more accurate replies and customer service, increasing people's views and opinions on the company.

Another development that can be used to help a company to maintain a competitive edge is using targeted ads to attract customers such as through services like Google, YouTube, Facebook and other social media platforms. Using adverts that are targeted to certain people who are assumed to be interested in the product, for example a beauty / makeup enthusiast getting lipstick ads would be a good way for businesses to get more customers as these people are more likely to buy their products. This form of advertising gives companies more publicity and a chance to get their brand name more well known.

**Regular upgrading of hardware to take advantage of more sophisticated software and improved energy management**

Increasing power and sophistication of hardware and software such as graphics cards, CPU's this advancement in hardware can allow your computer to run tasks better such as running code or rendering images / animations. This however can affect the organisation as employees will need to be trained to properly use the hardware to do their work and not damage the hardware. The company will also need to spend money on the sophisticated hardware which will increase budget costs.

Companies can also lower costs by improving their energy management, this can be done in many ways.

One of the ways this can be done is through server virtualisation, this is when you run multiple ‘virtual’ servers off of one terminal. This ‘virtual server’ is an application that runs applications and processes data just like a regular server.

Sometimes servers to not make full use of their allocated resources and operate at low utilisation, this can be remedied by using virtualisation as you can use those unused resources to run many more virtual servers with. This reduces downtime and allows for faster deployments as well as being able to back up much faster in the case of a disaster or moving of a server room.

As virtual servers do not make use of any extra hardware and run from a single terminal, they make use of less electricity when compared to regular servers, this plays a hand in lowering the costs of maintaining the server.

<https://www.energystar.gov/products/low_carbon_it_campaign/12_ways_save_energy_data_center/server_virtualization#:~:text=Virtualization%20enables%20the%20repurposing%20and,%241%2C500%20in%20hardware%20maintenance%20costs.>

Another way this can be done is through the decommissioning of unused servers, while some companies may like the idea of having spare servers on standby just in case there is a need for them such as an influx in new consumers, IT staff are busy enough doing the maintenance and upkeeping existing devices and servers, so they do not have the time nor the effort to expend on unused servers. Getting rid of these ‘dead’ servers is of the best choice and it also saves a lot of money on power as the servers are turned off or scrapped.

“"Comatose" virtual servers can be costly as well. One organization found that 42 virtual servers that had been offline for 90 days had cost them $50,000 in disk and licensing costs.”

<https://www.energystar.gov/products/low_carbon_it_campaign/12_ways_save_energy_data_center/decommissioning_unused_servers>

Another way this can be done is through proper management of data storage, by storing your data more efficiently you can effectively use less space and energy. There are many ways to do this.

One of the methods to better manage your data stage is ‘RAID’. There are many types of RAID storages but the most power efficient one is ‘RAID 5’. This is used for storing data that is not vital to the functioning of the organisation. It consists of guarding against the failure of a single drive by reconstructing the lost information from data on another backup disc.

Raid 5 does save energy, but it also sacrifices some performance and reliability and shouldn't be used for vital data.

Another method to better manage your data stage is ‘Data compression’, this is when you compress the data into smaller sizes to reduce the amount of space it takes up when stored. Data should be compressed before being encrypted and decrypted before decompressed. It is more convenient to only compress files that not accessed very often as the decryption process before reading a file takes time. The power saved from this causes costs to drop by 15% to 30%.

Another method to better manage your data stage is ‘Deduplication’, this eliminates redundant data that is repeated more than once. This can condense the amount of stored data by >95%. As less data is stored and takes up less space, less energy is used. The power saved from this causes costs to drop by 40% to 50%.

<https://www.energystar.gov/products/low_carbon_it_campaign/12_ways_save_energy_data_center/better_management_data_storage>

**Developments in cloud and hybrid cloud technologies**

Developments in both cloud and hybrid technologies that have been made in recent years grant access to your data through the internet or an application such as OneDrive. The place where the data is stored can span multiple servers or locations, and most of the times maintenance on it is done by the company that is hosting the server, for example Google for Google Drive and Microsoft for OneDrive.

Cloud computing gives a remote database/server that is off-site and away from your physical computer; it is the answer for storage on all platforms.

The benefits of this are ease of access and data retrieval as you can access your data from virtually any modern device that has internet or mobile data connection, this allows for people to work at home and easily do group work or projects with teams more efficiently.

Some cloud storage apps are free such as OneDrive and Google Drive but other you are required to pay for if you want to access them and may have extra instalments for giving you a higher amount of storage space the more money you pay. Some services may follow a pay as you go monthly plan and others may have a onetime large payment to permanently own a storage drive and a small payment for maintenance and security monthly.

Recent developments in cloud technologies have allowed for the introduction of cloud gaming as an entertainment option, this requires a good internet connection as it is needed to view the ‘streamed’ game from your device. As games are stored and played from the cloud there is no need for storage space in your local drives or any need for expensive hardware.

Some businesses even use a hybrid storage that uses both on-site local storage and off-site cloud storage, this is done by doing work on local storage then backing it up to the cloud for extra security. This gives you the benefits of both, fast speed and control over your data that local storage gives you as well as the increased accessibility for collaboration and sharing files.

- my unit 14.1 work

Hybrid computing is a combination of both cloud and service computing (it is both analogue and digital at the same time). Businesses can use hybrid cloud storage to have the increased cost effectiveness and scalability that comes with public cloud storage as well as the security that comes with private cloud storage making use of the best of both worlds. Companies can utilize this to expand, and develop, their infrastructure into the cloud.

One benefit of hybrid computing is its agility, you can combine multiple types of storage be they public / private cloud storages or on-site physical storage to adapt and change direction as needed granting increased flexibility and adaptability.

<https://www.netapp.com/hybrid-cloud/what-is-hybrid-cloud/>

One example of a development in cloud computing and hybrid computing is more people having the ability to work from home now as they have devices capable of doing so, this is due to the improvements in cloud technology such as sharing your work to your fellow co-workers through OneDrive or Google Drive or going on video calls with them whilst doing your work to ensure that you are doing it correctly.

**9.1: Changing markets and new opportunities – explain how markets change over time. (P1 B)**

Markets change over time due to external factors in society, such as the lockdowns and Covid outbreak causing a large increase in traffic for online shopping. When the markets change, companies will have to adapt to the new changes if they want to thrive.

**Decline in some traditional market sectors and developments in others**

An example of declines in traditional market sectors leading to developments in others is the fall of ‘brick only’ shops and the rise of ‘brick and click’ shops.

‘Brick only’ shops are stores that only have a physical presence such as take-away's or bakeries, due to current circumstances with lockdown people cannot always go to these stores in person to receive their products. This is where ‘brick and click’ stores come into play, they are much more accessible as the stores have both a physical presence as well as an online presence, an example of this is a take-away with just eat as you can order the food online instead of going there in person.

An ‘independent’ store is a standalone shop with a single branch, such as a Cornershop. These are currently going into decline as large retail companies are much more reliable and can keep up with demands much better as they have more resources.

An ‘Online only’ store does not have any kind of physical presence and merely has a website or an app for customers to interact with to place orders. An example of this is eBay or ASOS. These types of stores are currently developing as we are in a technological era where online is most people's go to for most things as it is more accessible and much easier than going to a physical ‘brick’ store as you can do your shopping from the comfort of your home.

A downside to the development of more online stores is that traditional courses will die out and jobs will not be taken as they do not pay much or appeal to people.

**The need for organisations and businesses to develop and change to take advantage of new markets and opportunities**

Companies are always looking to enter new markets and make profit. An example of this is Apple, they were originally known for making computers called ‘Macintosh’ and they branched out into making mobile phones known as ‘iPhone’. This was very successful as it is one of the biggest brands in the world now and it has a much larger influence than it originally had, they still make computers and laptops, but their primary product is iPhones.

Another example of this is Windows, they were originally known for making operating systems for PC, and they still are, but they have branched out into making phones known as ‘windows phones’ this is a new OS for mobile. This was very successful as it is still one of the leading operating systems in the world that is used by many due to its low learning curve and ease of use, the windows phone is one of the world's leading operating systems for mobile behind iOS and Android.

Another example of this is Google, they are well known for making the google search engine for exploring the internet, but they have branched out into 2 new markets, Google+ and Google Pixel. Google+ is a social network that was intended to be part Twitter and Facebook, but it died out as no one used it. Google pixel on the other hand is still a very famous line of phones that come out every year with top end flagship devices. Google+ was not successful as it is not used by anyone. Google Pixel was successful as it still has a market of users who buy the new devices.

Another Example of this is Amazon, they are mostly known for their online shopping platform, but they have branched out into media with Amazon Fire. Amazon Fire is a streaming device that can be connected into any tv with a HDMI port to essentially turn it into a smart tv and use apps such as YouTube and Netflix. This was very successful as it is one of the leading devices in this field along with Google Chromecast.

Another example of this is Apple, they were originally known for making computers called ‘Macintosh’ and they branched out into making mobile phones known as ‘iPhone’, but they also branched out into making ‘Apple Arcade’. This is similar to ‘Xbox game pass’ in that it allows you to play games across all your apple devices. This was not very successful, as although it has a steady stream of users it has not produced any large triple A titles or big hits.

**Balancing growth in some areas against decline in others, e.g., traditional retail, analogue music and photography versus digital**

Some jobs will always be made as new technologies are created, but some jobs will also be made obsolete as technology finds a more efficient way to do them. Some examples of these jobs and their replacements are:

Cashiers, this job is of a very low skill ceiling and is undertaken by supermarket workers who scan your groceries have been removed in many places and overtaken by self-service scanning and checkout.

Factory workers, this job is very hard manual labour that is of low skill as it doesn’t require any qualifications or prior experience. The job consists of packaging many objects or assembling them. This has been overtaken by robotic devices that can automatically assemble and pack object at a much higher efficiency than humans can.

Lift operators who used to pull ropes to lift up the lifts to higher floors have been overtaken by machines that can do this which are much safer. This job was not of a high skill level however it was very demanding physically.

Bowling alley pinsetters were people who arranged the bowling pins before you played a round of bowling, this was a low skill job that has been overtaken by machines that collect and reset your pins at the end of every round.

One job that will be created by developments in computing will be an Ethical sourcing officer will be a mid-skilled job that will have to make sure that companies are being ethical.

Another job that will be created by developments in computing will be an Artificial intelligence business development manager, this is an average skilled job that will be used to market and sell AI to others as for the foreseeable future ai won't be able to sell themselves to consumers.

Another job that will be created by developments in computing will be a Master of edge computing, this is an average skilled job that will work on help companies store data in connected hardware devices instead of on a server or data centre.

Another job that will be created by developments in computing will be a Walker/talker, this will be a low skill job that consists of walking with people and talking to them when they feel lonely, the customers will mainly consist of the elderly.

In conclusion jobs of a low skill that consist of a lot of manual labour and heavy lifting will soon be overtaken by developments in computing and robotics and the jobs that will be created are jobs that can only be done by humans with no chance of being overtaken by AI.

**Potential provided by developments in IT for cost reductions, improved customer service**

There are many ways that developments in IT can result in reduced costs and improved customer service.

One of the ways to reduce costs is by removing physical data. By doing this it removes the need to file data away and store the physical sheets of paper which saves money and space as you do not need to buy paper and do not need to find somewhere to store it away.

Another way to reduce costs is by opting to use free apps, by doing this you can save money on app cost since the apps are free. A downside to this however is that you may not get some more specialised functions that paid apps offer.

Another way to reduce costs is by working remotely instead of in person, the reason for this is that there will be no expenses for the work building if people work from home. However, people may not be used to this and will take some time to acclimate to the changes in their workspace.

Another way to reduce costs is by automating wherever it is possible, by doing this there is less need to pay employees due to robots and AI doing the same job thereby saving money on labour costs.

One of the ways to improve customer service is by making a Social Media account, this can help manage a company's reputation and improve customer service by being an easy contact for customers who have issues that they do not know how to solve when using your services.

Another way to improve customer service is by making an Online help video, this is a video that someone can follow to help solve their problems such as a tutorial on how to use a new function or how to self-troubleshoot their device for problems.

Another way to improve customer service is by using an internet relay chat (IRC), this is an application layer protocol that is used for messaging and talking to customer support and online forums. This can be very helpful in improving customer support as they can directly ask an expert on how to fix any issues they may be having.

Another way to improve customer service is by creating a Frequently asked questions (FAQ) forum, this makes the customers life easier by showing some common questions that people have, an example of this is the popular searches on sites like Quora.

**Opportunities and challenges represented by ‘big data’**

Big data is large sets of data that is online, it can be viewed and analysed to find characteristics and trends about certain things. It is usually used for ad campaigns to see which kinds of people to target, improve traffic flow and to detect certain things like criminals and upcoming crisis’.

It is usually stored in data warehouses which contain large amounts of data from multiple sources and of many different types.

The way to gather data from large storages of it is called data mining, it is an automatic process with the purpose of making predictions and discovering patterns / trends. There are many data mining methods, some are:

Cluster analysis, this is a data mining analysis method that groups similar sets of objects together and is usually applied in advertising to target particular groups and in supermarkets to group together similar products.

Anomaly Detection (Outlier Detection), this is used to detect outliers that are completely out of the norm and acts that deviate from a device's regular behaviour. This can be explained as detecting things that are not normal. This is used to detect credit card fraud and in hacking to steal data.

Association rule, this is where you associate different variable with each other if they have something in common such as a meaning or purpose. This can be used to find synonyms for words in a thesaurus app.

Neural network, this imitates the way that humans think and is used to make artificial intelligence software's, it can adapt to unexpected circumstances and is very good at organising data as well as generalising it.

One of the many opportunities granted by big data is easy access to research and findings on many topics, like a huge online library that you go to if you need to know any information.

Another opportunity granted by big data is lower costs in analytics as it is much cheaper and easier to find data.

Another opportunity granted by big data is the ease for businesses to explore new options for revenue as they can easily gain insight on trends and customer preferences/wants, they can then use these insights to plan their next business ventures and predict future occurrences such as selling products that are in trend or people are currently in a need for.

<https://www.knowledgehut.com/blog/big-data/big-data-analytics-challenges-and-opportunities>

Big data can also have positive financial implications in the long term as they can increase your ability to invest in stocks and things that you predict will be trending in the future.

One of the challenges posed by big data is the privacy and security of your data, you can never truly trust someone to keep your data safe and private when its online and always at risk of being hacked, no matter how small that risk may be.

Another one of the challenges posed by big data is the fact that most people and some companies do not have sufficient understanding of it beyond knowing that it helps collect ang grant you access to data. Without a proper understanding the company risks wasting money on a function that they do not even know how to use properly.

<https://www.scnsoft.com/blog/big-data-challenges-and-their-solutions#security>

Data mining algorithms are sensitive to data that stands out from the norm, such as outliers and columns that vary in their content (such as birthdays and ages), as well as data that you have purposefully chosen to exclude.

Large amounts of data from multiple sources are stored in places called ‘data warehouses’, here the data is managed and analysed to provide insights on traits and trends.

The Key features of a data warehouse are:

Subject Orientation, a data warehouse offers the user information based on subjects. These subjects can be anything such as customer details, sales and marketing.

Data denormalisation, this is a way of improving the read speed of a database and making queries simpler by optimising them. The way of doing this is by removing redundant data and storing data all in one place so it can be easily accessed when it is needed. This happens at the expense of the write speed.

Non-Volatility, this ensures that your previous data is not lost as new data is updated. This is done by having the data stored on non-volatile memory such as a hard drive so that it is not erased when new data is entered.

Large amounts of historical data usage, all data can be identified via a timestamp, this is a sequence of encoded characters that can be used to identify when a certain event occurred. A lot of historical data is stored in a data warehouse which can be analysed to predict future events so you or your company can make the best decisions for the future based on these predictions.

Use of Queries, these are used to request for information in a data warehouse and can also be used to process data.

Controlling of data load, Timestamps on data can be used to identify when data was uploaded, using load and unload utilities such as adding rows to a table while retaining all current data and read it from a file. This data is retrieved from multiple sources before being combined and loaded into a storage area.

**9.1: Explain the likely impact of an emerging technology on organisations. (P2)**

Emerging technologies can impact organisations by making them adopt the use of them to improve their workflow, a new technology could be very useful in improving how the company works and one upping their competitors.

**Internet of things (IoT) – ubiquitous computing and the opportunities and challenges it represents**

The Internet of things is the phrase that refers to any and all technological devices around the world that are in some way connected to the internet. It is an all-encompassing network that connects all online devices.

The internet of things (IOT) has improved from requiring the user to search on their computer or phone with a keyboard to allowing an AI like Ok Google / Siri and Alexa or google home to search things for you, this can be done with a simple voice command and showcases how far the advancements in devices have come.

This is currently being used to transmit and view data globally and makes everyone's life easier. These devices remove need for human input and saves you a lot of hassle.

The IOT is not solely restricted to everyday household devices, an example of this is a wearable health monitor or autonomous farming tool. These devices both are geared towards two completely different goals but as long as they are in some way, shape or form connected to the internet they are a part of the IOT.

Large companies need data from the IOT for many purposes, this is where big data comes into play by analysing the masses of data generated and gained through the IOT and making it feasible for use.

One of the many challenges in the implementation of the IOT are the issues related to power supply, due to the enormous scale of the IOT there will be a large amount of power required to keep it up and running.

Another challenge that the IOT represents is security of sensitive personal data for individuals or companies. As quite a lot of the devices on the internet of things have access to a camera which can record, such as mobile devices, doorbells and security cameras. If these devices are by chance targeted and hacked into by a cybercriminal it can create issues due to sensitive data that should not be in outsiders' hands could be sold or held ransom.

Depending on what kind of device the hackers have gained access to there could be varying levels of danger being posed. A vending machine being hacked into could just be a minor annoyance but the doors of a building and its AC / heating systems being hacked into could cause major issues that could lead to all of the people inside of the building being held ransom.

<https://blog.avast.com/iot-security-business-risk>

One of the opportunities represented by the internet of things is cost reduction. The IOT can streamline many processes and make then many times more efficient than they currently are, an example of this is the lowering of maintenance costs by utilising the devices connected to the IOT that are responsible to sense problems with various pieces of equipment in real time and preventing problems from occurring.

As equipment can be troubleshooted before their failure causes any long-lasting damage to connected systems the costs of upholding their maintenance will be significantly lowered, thereby saving money.

Making the devices more efficient also boosts productivity as more can be done in the same amount of time. Using the IOT to cut down on repetitive, time consuming tasks is a way to boost productivity and lower costs in the long run as there will be more time to do more work and gain more money.

A large part of the internet of things is big data, this is the way data is stored and accessed through the IOT and can be used for many purposes. One of these purposes is to analyse the data to understand how to improve the way your business works, and which factory boost your employees' attitude towards working, such as different working times and conditions. Once you have gained the knowledge of what is impairing the function of your business you can improve upon it to boost your organisations productivity and efficiency.

Another opportunity represented by the internet of things is the new business opportunities in different markets. The analytics gained through the IOT can be sued to create a business strategy to follow which can result in greater revenue.

IOT technology can also influence the experience for customers by having them engaging with the company more, this results in a better user experience and a higher chance for the company to find out about problems with their services and remedy them.

<https://www.impactmybiz.com/blog/blog-5-benefits-of-the-internet-of-things-for-smbs/>

**Increasing integration and sophistication of applications**

Increases in the integration and sophistication of applications will impact organisations by making all the tech they use much better and more efficient and effective, these changes could range from more processing power to better power management. These improvements will have large effects on companies as they will have many more options and directions to take their businesses in as they will have better resources at hand to complete their tasks such as new functions that have been added to the application that they use for work.

If apps had better integration, they would be much more efficient and will be able to get more done.

Better integration would also grant real time visibility of what is going on in companies which allows company owners to make quick and calculated decisions to keep their businesses running in a competitive marketplace. Managers could view all the data pertaining to sales and marketing as well as product data which will make their jobs easier for them and help save time. This allows for quick decisions and faster sales to be made.

Integrated applications could also help with the management of power and resource allocation that would save you a lot of time, money and effort.

Some integrated applications can help optimise your revenue growth such as the self-quoting abilities of CPQ (configure price quote) software, this helps you increase the size of your deals by ‘upselling and cross selling your existing customers’. This software can also help you save money by decreasing your operational costs.

A benefit on having an integrated software system is that customers can access their data much easier and have their issues solved quickly. This has the effect of increasing customer satisfaction and increases the likelihood of them returning for future purchases.

<https://www.verenia.com/cpq-configure-price-quote-blog/five-advantages-integrated-software-applications>

The more sophisticated apps get the more things that they are capable of, these additional functions can be very useful for companies in many ways as they can help them stay ahead of the game and have an edge on their competitors in the same markets by using more advanced software’s.

An example of a sophisticated application is a digital library, this is an improvement from file transfer and physical means of storing information on paper. This allows for users to search and browse for any information that they may want to find. The benefit of this is that it can save you time and effort in looking for data which will boost your productivity.

In the future sophisticated applications will not be solely restricted for business use but also for the common people who do not use them professionally. These apps will make use of devices on the internet of things and will connect more devices to it such as medical devices and small gadgets such as alarm clocks, sensors and cameras. This will make it so that we head towards a completely connected world that is not restricted to local devices but also devices and servers on the cloud.

One of the major improvements in sophisticated applications in the future will be the implementation of AI’s to improve the efficiency of businesses and to manage workloads and resources. AI can also play a role in analysing traits in big data and predicting future probabilities. This will be useful for businesses soon as they strive to become more data driven and tech savvy so as to not be left behind.

The increase in sophistication in both hardware and software has influenced businesses as they are required to upgrade computers with more up to date equipment that can run the new programs. Equipment that is being used by companies and businesses needs routine upgrading so that they can run the most powerful and sophisticated new software. The more sophisticated that software grows, the stronger hardware is required to run it.

**Increasing automation, e.g., robotics, exoskeletons, rehabilitation robotics**

Automation has improved from simple robots like remote controlled toys to self-driving cars that don’t require human input. They can take up jobs that usually need humans to do them and they can help with rehabilitating people after injuries.

An example of emerging technology in robotics is Elon Musk’s ‘Neuralink’, he explains the device as “a Fitbit for your brain, with wires”. It charges wirelessly through electromagnetic radiation and will be installed into the human brain by a custom-built surgical robot, it would drill a hole into your skull and insert the piece of tech in your brain then pull the skin of your scalp over the hole, hiding it from sight. The goal of it is to merge humans and ai, like an advanced version of the google glass.

This is likely to have a large impact on organisations in the future as it would make information gathering and retrieval much easier as you simply need to think something and the Neuralink could search it. Musk promises the ‘downloading of new skills’ which makes learning something like how to drive or be a surgeon or play an instrument easy and requires no actual effort.

This can help study the electrical signals of the brain and help cure various medical problems and can help us understand how the brain works in more clarity.

The ‘Neuralink’ could possibly be hooked up to an exoskeleton or robotic limb to control it by intercepting your brainwaves, converting them into instructions for the robotic limb and controlling it.

There have been some ethical concerns about privacy and security as this device could potentially be used to monitor people. It is said that the companies behind tech like Neuralink are “in danger of getting so wrapped up in what they can do, that they lose sight of the ethics behind what they should do”, ethics are of utmost importance in the field of neuro technology as it interferes with the brain, which is seen as the place that defines your very being as it stores all of your memories, emotions and consciousness.

One such concern is the potential risk of paralysis or lasting brain damage in the case that the implementation of the device via surgery fails, this is the case with anything that tampers with the brain and is always a risk with things such as brain surgery. There are also concerns with essentially ‘turning your brain into a computer as you could be ‘brain hacked’ or ‘mind jacked’, some people imagine a dystopian future where the world is ruled by machines and their worries are the fact that this could be the gateway to that possibility occurring.

Another concern is the risk of potential physiological impacts occurring due to the act of embedding hundreds to thousands of miniscule metal electrodes into the human brain when setting up this device. It will be very hard to ensure that this is a safe task which is why there is a custom-made surgical device to use for it to minimise the risk of human error as even the best surgeons can have slightly shaky hands.

There is also a chance of the neural interfaces altering or somehow influencing your behaviour and mental state, but this will be more of an issue in the future when neurotechnology moves on from remedial purposes for helping fix or train people to enhancements such as removing the limiters on a human's body or granting eidetic memory.

An example of behavioural impacts could be the possibility of behavioural changes or being addicted to the gains from the tech. There is the fear of a long-time gap between this technology being widespread and the risks of this technology on the user's mental state and psyche being discovered. There is a great risk if people start to be reliant on this tech in their everyday lives before any drawbacks and issues that result from them are understood.  
  
Finally, there is the severe societal impact that this technology could potentially have once the Neuralink moves on from its current role of developing the medical field to the company’s end goal of ‘artificial internet-connected overlay to the brain that enables users to interface with future intelligent machines’. This audacious goal will most definitely shake society if it is properly implemented.

<https://onezero.medium.com/neuralinks-technology-is-impressive-is-it-ethical-812afb38b19e>

**Current developments**

One of the current developments in technology is the creation of smartwatches, these can take calls and do everything that phones can do in a smaller form and are strapped to your writs to not get lost.

Another wearable technology is Body-mounted sensors that monitor and transmit biological data for healthcare purposes these are more sophisticated and has greater use in the scientific and medical fields. They can, however, be used for recreational purposes mor motion tracking VR games to make your in-game avatar more accurately resemble your movements. This can be used for meetings or conferences through virtual reality.

This impacts organisations and individuals by making tech easier to use and more accessible, the increase in portability also allows for it to be used on the go.

Some current developments in technology that will have impacts on companies in the future are:

An increased demand of edge computing, this is where information is handled by the device the data is on itself or by a nearby computer or server, instead of being sent over to be processed at a data centre and then sent back. Soon there will be a greater need to process data and deciding what to do with it without sending it to the cloud. To help with processing this data many companies have made high end advanced processing chips that imitate the way the human brain works (known as neuromorphic or brain chips).

There are also some companies that are looking into creating aerospace technologies that can create a new method of travel. These will be used for inter-continental travel via space which will significantly decrease travel times. One of the private companies that is developing these rocket starships is called ‘SpaceX’, they claim that they ‘may shorten intercontinental trips to 20-30 minutes via space’. This will be a revolutionary technology as it will make travel much easier, but for a long time may only be available to the rich and wealthy due to the high costs of accessing such a way of travel. Most people will simply not have the money required to make this a feasible option for travel, that is until it is improved upon to become more efficient and cheaper.

Companies that are specialised in agriculture will see innovations in technology that grows and harvests crops. it will become common to be able to monitor crop growth through computers, these factors will play a hand in improving the efficiency of crop growth and will yield a greater amount of profit.

Another technology that will become controversial in the near future is self-driving cars or autonomous driving technology. Although fully autonomised cars haven't yet become a reality we are very close to this as the cars can drive on simple terrain such as highways and large roads. The complications with self-driving cars at the moment is that they cannot be utilised in complicated terrains without being at risk of crashing.

<https://venturebeat.com/2019/12/30/10-technology-trends-that-will-impact-our-lives-in-2020/>

There will also be large improvements in AI soon as we will move on from simply attempting to automate everything to collaborating with the AI’s for greater results. By this we will make the best out of what only humans are capable of and what the AI’s have an edge in. This will fully utilise the potential of both AI and humans to reach a greater end result. AI’s will also become more mainstream and be available to not just businesses but also regular citizens.

There will also be ‘Citizen AI’s’ this Is the concept that AI could eventually progress so far that they could become fully functioning members of society that are both responsible and productive.

Another thing that will come into place soon is the ‘Internet of thinking’, this is an intelligent system that uses AI, robotics and immersive experiences to bring intelligent environments to life. This will be done by replicating real world, dynamic environments and having them be interactable.

<https://www.consultancy.uk/news/23750/the-top-technology-trends-for-2020-and-2021>

**9.1: Assess the potential ethical and environmental impacts of developments in technology (P3)**

The ethical impact that can occur due to developments in technology at the moment is mainly the loss of job roles because of the creation of robots that can overtake some of the lower skilled manual labour jobs, in the future there may even be no room for human labour as robots overtake us in usefulness which would create a large dilemma.

Another ethical problem is that once AI’s become as smart as humans will they have human rights? As even animals have some rights to not be abused and mistreated due to their level of intelligence will AI’s with intelligence comparable to or even surpassing humans have the same rights as us?

There is also the issue of companies sharing and using our private information for their own personal gain.

As technology improves there is a need for more resources to create the new tech, these resources come at the cost of damaging the environment by taking its natural resources such as ores and oil.

On the other hand, developments in renewable energies such as solar power and tidal power can provide clean energy which will not harm the environment by depleting the worlds natural resources.

**Unequal access, the ‘digital divide’ between those with and without network access (developing world countries and remote areas)**

Across the world there is different levels of internet access, for example in South Korea you can have the fastest broadband speeds in the entire world whilst in some 3rd world countries there could be little to no internet connection at all.

In a society that is growing closer and closer to being completely dependent on technology there is a gap between those who can acquire the latest technology and those who must make do with out-of-date devices that can just barely suit their needs, or maybe even underperform due to how old their devices are. This is called the ‘digital divide’.

“Inequality in access to the Internet and ICT is known as the digital divide and affects 52 % of women and 42 % of men worldwide”

The digital divide can be summarised as 3 types: ‘Access’, ‘use’ and ‘quality of use’.

‘Access’ refers to the possibility that people simply do not have access to the resources required to use the internet such as a lack of money or living in an area that does not have internet access.

‘Use’ refers to a lack of digital skills, this is usually the case with young children and some older individuals and impedes their use of technology not allowing them to make the use of it.

‘Quality of use’ refers to people who have the ability to navigate the internet but are not very skilled at doing so and as such are losing out on a lot of features.

<https://www.iberdrola.com/social-commitment/what-is-digital-divide>

Some of the main causes of the digital divide are:

Money, the latest devices cost quite a lot of money sometimes surpassing £1000 which is not an option for a lot of people as they simply do not have the spare money laying around. This creates a gap between the rich and poor as some people cannot afford new devices and must make do with cheaper alternatives that do not perform as well.

Internet access, having access to the internet can grant a multitude of opportunities such as online shopping, studying, job seeking and banking. Especially in the current circumstances that plague the UK with lockdown in operation, if people do not have internet access, they will be severely restricted as they will have a much harder time doing many things such as essential shopping and retrieving money from the bank. Students without internet access at home could usually go to an internet café, library or go to their place of education to study in their free time but now that is also not an option for them which is a severe disadvantage which can jeopardise their future.

Location, depending on the area you are in you will have varying levels of internet connection. As stated, before people who live in South Korea have the fastest broadband speeds in the entire world, this means that their experience whilst surfing the web will be much more satisfactory. Rural areas and 3rd world countries can have little to no internet coverage at all which is a severe downside.

“In Africa only 39.3 % of its inhabitants had Internet access, compared to 87.2 % of Europeans and 94.6 % of Americans.”

IT literacy, even in this day and age not everyone has the knowledge of how to navigate the web and make the most use of it. People who do not know how to use the internet are at as much of a downside as people with no access to it at all and have severely limited opportunities, the internet makes our lives a lot easier for a myriad of things whether it be shopping or job searching so not being able to use it properly is a shame.

<https://www.bbc.co.uk/bitesize/guides/zkhykqt/revision/5>

**Difficulties experienced by older people and people with disabilities in coping with changes in technology**

While technology can offer a wide variety of new experiences and opportunities to people the elderly and people with disability may have trouble with acclimating to the changes it brings.

As the elderly do not have much experience with technology, they find it harder than young people to adjust to it. Many older individuals have a sense of frustration as they are looked at as frail beings who need to depend on others for their needs, this feeling is amplified by the fact that many services are not user friendly enough to be able to eb understood by them with their limited knowledge on the subject. They generally do not have the same drive and motivation to understand the internet as young people do with all their interest and curiosity in the subject.

Older people are more at risk of having problems with their sight and hearing, it is important to note that this can be remedied with glasses and hearing aids. Glasses are fairly straightforward to use but due to a lack of understanding on how hearing aids work they may not be able to properly use them which would cause them issues in their everyday lives.

Autonomy is an important aspect of technology for people who are blind as they will have issues with navigating through the web and using technology in general, this can be fixed with the help of an AI assistant like Amazon’s Alexa who can take voice input and search the web for you.

Older people are also at risk of “developing cognitive decline and dementia” and of being afflicted with any neurodegenerative processes which can be harmful to them. When this happens technology can be of help to them, but it may also be a catalyst that causes them to spiral even further into their illness, this is because technology could be seen not as an improvement but a limit or a restriction imposed on these people's lives as well as a breach of their privacy as everything they do could be seen by others and could lead to paranoia and the feeling that they are always being watched.

When introducing technology to people with cognitive issues and dementia it is best to limit the learning process and stick to something that looks fairly familiar to them and doesn’t take control away from the user.

However, IT and technology could also be sued as a support tool for individuals with issues, be they physical, cognitive or medical. They could for example, help older adults who have been afflicted with a neurodegenerative disease to continue living in their homes or healthcare facilities whilst maintaining their sense of independence so as to not feel useless and feeble.

People with dementia should try to prioritise their own autonomy over anything else and as such it is best if they do not rely on things like AI assistants and voice inputs and instead do the searching themselves. This is because instead of supporting them the AI will constrain the number of things that a person with dementia is willing to do themselves.

<https://journals.sagepub.com/doi/full/10.1177/1460458219899590>

**Privacy issues as increasing amounts of data are collected about every aspect of an individual’s life and habits**

As increasing amounts of data pertaining to every aspect of our lives is collected there is an issue with the privacy of said data. If the data is not properly secured it can fall into the hands of people who you may not want knowing every detail about your life, from your habits to what time you go to work every day.

Big data is the name of this collection of data, and it has the potential to revolutionise the world as we currently see it, but it comes with its fair share of issues due to the possibility of malicious use of the data that can affect us all especially with the increasing amount of time we all spend on the internet.

The scale of this problem is enormous as it's not just one or two pieces of data that could be stolen together, no it is millions of maybe even billions of pieces of data pertaining to people that could be stolen all at once which has the potential to cause a great crisis if this data is compromised by third parties with malicious intent.

It is very hard to completely protect this data as it is generally stored in off-site data centres that are at risk of both physical attacks and cyber-attacks. Large companies like amazon have multiple data centres around the world that could be at risk.

An example of one such incident happening is the breach of Target’s customer data in December of 2013. The credentials of more than 70 million customers were stolen once the network was hacked into and stolen, this data included names, emails, phone numbers, addresses, credit/debit card information. This data could be used to scam the customers who had their information stolen and could even be used for identity fraud.

The government already has a lot of data on us as every single person could be a potential criminal or terrorist and they use this data to protect the public from actual criminals and to help with ongoing crime investigations. The government could also purchase decrypted information that large companies have on us to use in these investigations. This is a severe breach of our privacy and we can't do anything about it. Many companies however have stated that they do not sell their customers details at all which is reassuring but the problem comes into play when hackers steal this data from companies then sell it to other for their own uses. This data could be sold to analytics companies who will use it for predictions, or it could be sold to other criminals to use against you.

However, when big data is used properly it can actually enhance your privacy by letting the companies know when future attacks may happen and they can take precautions against this.

An example of this happening would be an analytics engine so powerful and precise that it can filter through the emails in your inbox and remove the scam emails and phishing emails that have malicious intents, so you are not bothered by them.

<https://theconversation.com/big-data-security-problems-threaten-consumers-privacy-54798>

There is also the risk of internal threats such as company employees abusing their power and selling your data which is much harder to prevent, The BYOD act of using your own devices could pose a problem for this as if the device has a virus on it such as a key logger or screen recorder other people could gain access to whatever they see at work.

**Considerations relating to access to personal data and how it should be protected**

Your personal data is not something that you want in someone else’s hands as it can be used against you for a myriad of purposes, many of which aren't good. As such there are many countermeasures put in place to protect the data from falling into the wrong hands.

One of the considerations relating to access to personal data and how it should be protected is the data protection act. This both ‘provides individuals with rights, including the right to know what information is held about them and the right to access that information’ and ‘states that anyone who processes personal information must comply with the principles in the Act’. These principles are:

1 – Data should be processed fairly, lawfully and transparently. This is so that the original owner of the data is not misled or deceived and that they know what their data is going to be used for. The original owner of the data should also be legally authorised to supply their data.

2 – Data should only be processed for specific, explicit and legitimate purposes. This is so that the data should not be used for other purposes that the original owner is not aware of and did not agree too. Data should also not be disclosed to a third party without permission of the original owner.

3 – Data should be accurate and up to date. This is so that the data is not misleading as it could have dire outcomes.

4 – Data should be processed securely. This is so that no outsiders get their hands on private data that could harm and/or cause disadvantage to the original owner of the data.

5 – Data will not be kept longer than necessary. This is so that it is secure and so that there is no chance of it being used maliciously.

There principles make sure that data is protected properly and not abused.

<https://www.bath.ac.uk/guides/data-protection-act/>

One way to help increase security for the collected ‘big data’ is by having less access points to the data centres (Access control), this can be done by having one large data centre instead of multiple smaller ones distributed in many locations far from each other. This could limit the number of attackers as there will be less areas to attack and this one area will be better protected as the cyber security team of the company will concentrate their efforts on it instead of spreading their attention on multiple servers.

To protect your personal information companies, encryption is a fairly common counter measure that works by scrambling your data according to a key to make it unreadable to any 3rd parties that manage to get their hands on it. This makes it so that unless you have the correct key you cannot ‘decrypt’ the data to read it.

Cyber security teams also have many methods to detect when an intruder has infiltrated their servers through use of hacking or malware. They have people dedicated to protecting your information against this.

There is also a need to prepare backups of the server data in the worst-case scenario that there is no way to prevent intruders from gaining access to your data and they take the servers offline to prevent the data from being stolen. The backups of data can be set up with better security to prevent anyone from gaining access to it.

**Legal and ethical considerations applicable to the equivalent legislation in England, Wales and Northern Ireland, e.g., copyright, computer misuse, data protection**

The legality and ethics of laws pertaining to copyright, computer misuse and data protection have many things that need to be considered.

The UK copyright law covers all types of media and literary / artistic work. It lasts for 70 years. If you wish to make use of copyrighted material that does not belong to you, you must receive the permission of the original owner and they must be credited as the original owner of the work.

When using copyrighted material ethical and legal constraints should be used to make sure that content is suitable for its intended audience and that it, for educational purposes any content can be used without permission, but you can’t use them for commercial purposes (commercial without modifications) unless you have consent from the owner, in that case you can sell it and make money off of it. If it is commercial with modifications such as editing you need permissions from the owner or pay them money. - my unit 11 work

The computer misuse act is a legislation of laws that act to prevent the misuse of computers through hacking and distribution of malware. It states that it is illegal to access data that does not belong to you without being allowed to do so by the rightful owner of the data, accessing this data without authorisation is called hacking. It is also illegal to make changes to the files on a computer that belongs to someone else without their permission such as installing a virus or malware. It is also illegal to access data with the intent to break the law such as committing fraud.

The computer misuse act also covers interactions with people over the internet. It is against any forms of cybercrimes, cyber bullying, trolling and the like. The maximum penalty for breaking the computer misuse act is 10 years of imprisonment and a fine.

The data protection act is in place to protect data and make sure that it is not mishandled, it also gives the original owners of the data the right to know what the companies who have collected their data will be using it for. The ethical considerations for this act are the main principles that it is based around which focuses on making sure that your data is not mishandled or abused in any way without your knowledge and express permission.

**Risk of the loss of control of personal data stored online, e.g., photos, videos, emails and instant messages**

Any data that you put on the internet is no longer private, an example of this is social media if you put a picture of yourself up on your social media account and then delete it, it will never truly be deleted as it has already been uploaded to the internet and can be found by anyone.

When data is stored online on cloud storage such as OneDrive or google drive there is a risk of losing control over that data as it is now out of your reach. These cloud storage platforms are very convenient but also come with security issues as they are much harder to protect than regular local storage.

If a messaging platform such as WhatsApp or Snapchat is hacked into all your private conversations and messages could be compromised. There is also the fact that even if the company says that they will keep your messages and data secret you can never be too sure whether to not an employee is reading your messages or looking through your personal information.

**Potential dangers of artificial intelligence, e.g., possibility of smart systems or robots that could outwit human intelligence**

If artificial intelligence can grow to the point that they are smarter than humans, then many potential problems will arise in our society. Even now when AI are not as smart as humans, they play a huge role in our lives and take over many job roles, in the case that AI’s truly do become more intelligent than us we may become obsolete as anything that a human can do could be done by an AI, this means that there will be significantly less job roles as companies won't have a reason to hire humans since AI do not need to be paid.

There is a theory that AI could take over the world once they become smart enough, this may very well be a potential outcome as we are in a technological age where we use technology and computers in our everyday life. If our everyday items that we use such as phones and cars are to be hacked by an uprising of incredibly smart and hostile AI we will be caught unaware and that is not a very good outcome.

A potential danger of AI in the future could be Biased algorithms, this is where biased information against a certain type of people or goal is fed to the AI which takes it as fact and derives its calculations from it. As the input data was not accurate and was biased against something the output will also be biased, this could create a greater inequality in our society as we know it.

If AI become smart enough in the future, there will also be a problem of how to judge AI legally. Will we treat them as humans or as property? Will the errors of a self-learning AI be its own fault or the fault of its creator? This brings morals into the equation as ethically we should treat them as well as we do humans if they are as intelligent as us.

With the increasing intelligence of AI there will be a lack of privacy in our lives as AI will control all aspects of technology for convenience sakes. A common sight will be security cameras and street cameras that are piloted by AI equipped with facial recognition software. Is this giving AI too much power over our lives? Currently companies that are investing in self learning AI are doing all they can to get their hands on our data so that they can use it to better improve their algorithms and create profiles to be used in databases.

<https://jarnoduursma.nl/blog/the-risks-of-artificial-intelligence/>

**Dangers and ethical issues inherent in robot weapon systems**

AI are ever improving, and it won't be long until they are used to create autonomous weapons, armies are already making use of remote-controlled drones with access to weapons such as guns and missiles which asks the question, how long do we have until AI which have only been useful to us so far become weapons of murder?

AI can be programmed to do many things one of which is to harm people.

A Potential danger is that these autonomous weapons will grow sentient and rebel, this will be a grave danger to us as they will not only be able to act on their own against us, but they will also be armed with the means to harm, main and even kill people. AI won't have the same morals and values as humans and will not see any problem with mass killings and other horrific deeds that are seen as unethical or even downright evil so they will be very difficult to fight against should that occur.

As the ‘thought processes’ of AI are based off data there is a possibility to feed robots data on what is morally and ethically acceptable and unacceptable in the hopes of having them make the correct choice. This data could include but is not limited to information of consent, privacy, laws, values and ownership.

As robotic weapons can ‘think’ for themselves it will be for the best that we install ‘ethical black boxes’ inside of them that can be used to monitor the devices and better understand how they make their ethical choices in the line of fire (Military use). Understanding this is the first step to making these devices more ethically aligned with our interests as humans and to preserve human lives without causing mass destruction. If a device had no ethics at all it would be cold hearted, calculated and logical; uncaring whether or not hundreds of innocent lives are lost as long as the end result is satisfactory.

<http://centredelas.org/actualitat/armed-robots-autonomous-weapons-and-ethical-issues/?lang=en>

Soon there will be a future where it is possible to mass produce weaponised drones and other harmful AI’s to be used as warfare as all that is needed will be some electronical components which the world has en masse. This means that if wars happen to be fought solely with autonomous weapons in the future these weapons will not be restricted to only first world countries and superpowers, even third world countries will have these weapons at their disposal which could shift the military power balance of the world. This could lead to two possible outcomes, the worst possible outcome that a new world war will spark due to the rapid rise in power that all countries have access to or the best possible outcome that all countries that have access to these weapons will sign a pact disallowing the use of these weapons as happened with nuclear weapons.

**Negative aspects of internet use**

The internet is a wonderful invention that has a lot of opportunities and benefits, but it can also be misused for malicious intentions and can be used negatively.

People can use the internet for personal problems such as trolling, cyber bullying, traversing the dark net and revenge pornography.

Cyber bullying is when you bully someone over the internet and is not a pleasant thing as sometimes it goes too far and can result in people being devastated in their day to day lives and falling into depression and even committing suicide. Trolling is when you intentionally upset someone over the internet because you find it funny, this could also be classed as cyber bullying.

Revenge pornography is when you post explicit images and/or videos of someone as revenge. An example of this would be someone posting a sex tape or nude picture of their ex-boyfriend or ex-girlfriend. This is likely to upset the person in the video/image as it was posted without their consent and can be used to bully them. If people see the video/image of them they may judge them and think of them badly.

The dark net or dark web is a part of the internet that is not indexed by search engines and can only be accessed by a special browser called ‘Tor’, it is used for a lot of criminal activity such as selling drugs, weapons, organs, stolen credit cards, fake identities and much more.

The internet can be used to purchase illegal media and material that breaches copyright such as films, videos and music.

Illegal media could be things such as videos of gore and murders to even inappropriate images of underage children, these things are against the law in many places and thereby seen as negative.

Material that breaches copyright is seen as negative as it isn't supporting the creators. This is called ‘pirated’ media, viewing this is looked down upon as time and effort went into making the copyrighted content and you are just viewing it for free.

The internet can also be used by terrorists, extremists and the like to recruit members, communicate and spread propaganda. This is an illegal activity and can be punished by the law. Terrorists use the internet to spread their teachings and brainwash young people to follow in what they believe which usually ends in a violent outcome.

**Electricity consumption and its environmental impact**

Electricity generation, in any form, has a varying impact on the environment. Both producing using fossil fuels and using electricity can result in some greenhouse gases and air pollution but if it is done efficiently the amount of air pollutants can be minimised as much as possible. Electricity produced via renewable energy sources such as solar or tidal power do not contribute to air pollution and climate change as no fuels are combusted which means that there are no harmful greenhouse gases being produced.

<https://www.epa.gov/energy/learn-about-energy-and-its-impact-environment#:~:text=All%20forms%20of%20electricity%20generation,and%20land%2C%20but%20it%20varies.&text=Producing%20and%20using%20electricity%20more,pollution%20emitted%20as%20a%20result>.

The most common form of electricity generation is through the combustion of fossil fuels, which contain trace amounts of radioactive material. As such burning large amounts of these fossil fuels releases the radioactive material into the environment in the form of smoke which leads to low levels of radioactive contamination in the local area. This is actually more than is released by a nuclear power plant as those have procedures to contain the radioactive materials put in place to prevent them from being released into the environment and doing harm.

The consumption of electricity does not create greenhouse gases and as such does not partake in global warming. If electricity is generated from a ‘clean’ energy source it can be said to be 100 percent harmless to the environment. Or that would be the case if you were only referring to the increase in carbon content in the atmosphere and global warming.

Wind turbines are a renewable energy source that generate electricity without causing irreparable harm to the environment, but they can cause noise pollution which disturbs nearby citizens, and they take up large plots of land due to their immense size and the fact that many wind turbines are needed to generate a substantial amount of power.

**Improvements in computing power per kilowatt of electricity, balanced by increasing use of hardware**

As energy efficiency increases with the improvements in computing power so does the rise in increasingly more complex pieces of hardware that uses up this energy. These complex pieces of hardware require more energy to run as they are more powerful than older hardware.

One of the ways that energy efficiency has been increased is by reducing the amount of wasted energy that is transferred as heat as that is one of the biggest unwanted by-products that comes with all types of electrical components.

**Increasing amounts of electronic waste materials creating pressure on landfill**

The waste of electronic equipment, referred to as E-waste, is increasing in this age of technological improvements where we create more and more devices to better our lives. This increase in waste however is not always properly disposed of and is sometimes illegally dumped into landfills.

Toxic E-waste has been filling landfill sites for decades and expelling toxic materials into the surrounding ground and leading to health problems.

The large amounts of E-waste collectively contain a lot of toxic and dangerous materials which can be harmful to the environment and workers on the landfill. If these hazardous materials leak out into streams and water sources the damage they spread will be on a much wider range and could harm a lot of people and animals that drink from these sources of water.

**Need to recycle dangerous chemicals, heavy metals found in batteries and other components**

There is a need to recycle the dangerous chemicals, heavy metals found in batteries and other components from electronic equipment that is thrown away. These can be very useful in refurbishing products or can be resold for further use in making products but if not disposed of properly it can be very dangerous.

When batteries are not properly disposed of the casing will eventually disintegrate and the toxic chemicals contained inside it can spill out and pollute the environment. If these can build up inside humans and animals, they can cause a lot of health problems.

The dangerous chemicals found in E-waste can harm both humans and the environment, these chemicals can be absorbed into the soil and cause poisoning to the crops that are planted in the nearby regions. These can alco cause severe harm if breathed in or if they encounter the skin. Some chemicals can also be flammable so if they are not properly stored, they could spill or leak and become a fire hazard, if this happens inside of a landfill its contents could all be burned which would result in a lot of air pollution.

The heavy metals found inside of batteries such as lead, and mercury can be absorbed through the skin of animals and humans. These metals are very toxic and if too much is absorbed it could be lethal. These metals are also very reactive and dangerous anyone and anything.

The problem with batteries in general is that they almost always use some sort of compound or chemical that has the potential to be harmful to the environment, and whilst a single batter is too small to cause, and substantial harm batteries are manufactured by the thousands and all of those small amounts of dangerous chemicals can accumulate into a large amount of chemicals that are very harmful to the environment and anyone in the vicinity.

Batteries and other electrical components are sometimes disposed of by being dumped into the ocean, this is harmful to the aquatic lifeforms and plants in the surroundings and can end up poisoning them which can cause a spiralling effect as the chemicals are eaten by them then they are eaten by bigger fishes which are eaten by humans which culminates in diseases and health problems due to the improper disposal of the E-waste.

**Issues relating to the export of waste electronic equipment for recycling to the developing world**

E-waste is an increasing problem for all developing nations in the world as we are currently in a technological age where we are attempting to revolutionise the world with technology. This means that there is lots of electronic equipment that is newly created that outperforms older equipment that is eventually thrown away as E-waste.

E-waste contains many valuable materials and components that are worth money if recycled or can be reused. However, it is an unfortunate fact that the recycling of E-waste is not always done properly which causes these valuable materials to just lay around in 3rd world countries and posing a risk of toxic exposure to anyone who comes to collect them.

Only a quarter of all E-waste is properly recycled by workers with the proper safety methods and protective equipment's in place.

If E-waste is not properly recycled it can be a major problem as it pollutes the environment. The air pollution caused by the improper method of recycling can be very harmful to humans as is seen in some parts of China such as Guiyu. Many of the residents of Guiyu have problems with their bones, respiratory system, digestive system and nervous system due to improper recycling of E-Waste that causes toxins to be released into the air and water supplies.

When E-waste is thrown into landfills it can cause the toxic materials to pollute the ground and surrounding areas which can cause damage to any organisms in the area including but not limited to plants, humans, sea animals and regular animals.

In 2012 nearly 50 million tons of e-waste were generated worldwide, that is a monumental amount of waste that is incredibly wasteful as it is merely thrown away into landfill sites instead of being repurposed. in that very same year China alone had generated around 11.1 million tons of E-waste.

If it is possible E-waste should be reused as many times as possible to prevent waste of useful materials as well as pollution, in the case that it is not possible to refurbish the E-waste into a working product it should eb dismantled by trained workers who are wearing the correct safety equipment inside of dedicated recycling facilities so that there will not be any harm to the environment or the people recycling the E-waste.

**9.1: Explain how lack of understanding or access to IT can disadvantage certain groups of people (P4)**

As explained above, different areas have different levels of internet coverage with first world countries having better access than developing countries. With rural areas sometimes having little to no internet connection the people are losing out on the benefits that can be brought to them by the internet and are even being severely disadvantage as they cannot make use of these benefits.

The fact that we are heading towards a completely digital era cannot be ignored as a lot of things that we are currently able to do in person will be changed to tasks that can only be completed online and if people do not have access or the ability to use the internet, then they will be at a loss of certain services (internet banking, remote access to healthcare, etc) which will be of large detriment to them.

One of the many disadvantages that can come to people who do not have an adequate understanding of IT is not having access to online shopping, as a lot of shops are mainly online businesses such as Asos and Amazon not having access to them will restrict your access to certain object that you may want to purchase. There is also the fact that you will miss out on a lot of deals such as discounts on black Friday and Christmas sales. The reason this is a disadvantage is due to in person stores marking their prices up more to make up for employee wages, building maintenance etc. So, without access to the competitive prices online, people will be spending more money/be limited in what they can buy.

Another disadvantage that can come to people who do not have an adequate understanding of IT is not being able to study properly, not having the knowledge of how to use the internet will make it a lot harder to revise if you do not have a physical textbook for your studies. It will also restrict your possible job options in the future as you will not have the qualifications and skills needed to do a job relating to technology such as being an IT support technician or a Database analyst. Nowadays, online lessons and studying is a much more prevalent thing as your studies would be put to a halt and completely ruined If you could not do them online.

A disadvantage that can come to people who do not have an adequate understanding of IT having a harder time when seeking jobs, this is because you will not be able to use the online job seeking websites which are used to make your job seeking journey much easier, instead you will have to look for people who are hiring in person and hand them a physical copy of your CV which a lot of companies do not do anymore.

A final disadvantage that can come to people who do not have an adequate understanding of IT is the hardships you will find when attempting to store money or withdraw money from your bank, the biggest problem would be when you are trying to transfer money to someone as instead of having the convenience of a mobile banking app on your mobile device that can allow you to transfer money at any time you will have to go to your closest bank in person and ask someone to transfer money for you. Not being able to use online banking also restricts you from using online shopping as you will not be able to pay for your orders.

**9.1: Analyse the risks related to implementing a new computer system in an organisation (M1)**

When implementing a new computer system in an organisation many risks arise that could cause the new system’s installation to be postponed or even downright fail. Poor planning and managements are usually the main cause of failed system implementations but there are many more risks that can occur.

**Security considerations and the dangers inherent in extensive reliance on computing for every aspect of life**

Due to the increase on our society's reliance on computing and technology for almost everything in life to make things easier for ourselves we have put ourselves at risk of having low security that can be accessed by other people. Having our personal data leaked for the nefarious purposes of hackers is not something anyone wants but it is a risk that comes with the use of technology.

There are many other dangers inherent in the extensive reliance on computers, such as:

The attractiveness of systems to criminals or terrorists, e.g., data theft or destruction, fraud, denial of service, blackmail is a large risk to the privacy of the data stored on these systems. Criminals who are enticed by the potential value of the data could decide to steal important data to sell or hold it for ransom. An example of this happening recently is the WannaCry NHS ransomware attack.

The difficulty of maintaining compatibility with existing internal systems is a large risk as some newer or older software might not be supported by your new operating system and could not integrate well and cause bugs / errors. This has happened when Upgrading to windows 10 was new as there were errors with applications that were designed to run on older versions of windows.

The difficulty of maintaining compatibility with external systems is a large risk as some newer or older software might not be supported by your new browser and possibly not run at all. An example of this is when some web games go out of date due to the engines, they run on not being supported not being supported anymore such as adobe flash player.

The increasing complexity of IT systems controlling mission critical applications such as transportation systems, energy generation and distribution, military systems is a large risk as more complicated systems require training to be used by staff. An example of this is a manager of chemical manufacturing plant.

The difficulties associated with ensuring complex systems are reliable, fully tested and fail ‘safe’ is a large risk as complex systems are harder to test due to their complexity so there is a need for extra precautions to be taken when testing to ensure that there will be no problems with the systems. An example of a complex system is the new NHS test and trace software that has been implemented due to the COVID 19 virus, if this system was not properly tested and deemed safe people could get back incorrect results from their virus tests and not get the adequate healthcare and protection, they need which could result in many deaths.

**Changes in working practices**

Changes in working practices can occur due to external circumstances in society and the environment such as the weather, a pandemic, a natural disaster and many more.

Remote working is a change to working practices that is currently being used due to the COVID 19 epidemic. This is when you work from home over the internet on your connected device. A positive aspect of this is the flexibility of your timetable as you can work at different times of the day. A negative aspect of this is reliance on the internet as if you lose your internet connection you can't do your work.

Office practices, such as bring your own device (BYOD) were also used recently before lockdown conditions became more stringent. BYOD is when you bring your own device to your workplace to use. A positive aspect of this is the ability to continue your work from anywhere with the increased portability from work, home or on the go. A negative aspect of this is the possibility for security breaches from foreign devices putting viruses on the organisations network.

Upskilling of workforce to make use of more complex systems. This is when systems get more complex and require more skill to use so employees are trained to effectively use them. A positive aspect of this is that the new system can have more benefits and is more efficient. A negative aspect of this is that it costs the company money to train their staff.

Reduction in low skilled jobs due to automation. This is when low skilled jobs such as manual labour can be done by robots instead of people and as such there are less jobs available for people to do. A positive aspect of this is that the jobs are done more efficiently and there is no labour cost. A negative aspect of this is that there is less jobs for people to do.

Working styles focusing on desk-based jobs are becoming more prominent as opposed to traditional manufacturing jobs. This is because new jobs are focused on computers more than manual labour. A positive aspect of this is the manoeuvrability and flexibility of the timescale in which you can work at your own whims. A negative aspect of this is that the new jobs require a much different skill set than the older ones and require a training period for people to work.

**Increasing reliance on IT and the need to protect against failure, disaster recovery planning, consequences of failure**

Due to increasing reliance on IT, there is a need to increase security on the data that has been updated to our servers, in the case that the safety of the data is compromised by external means such as hackers or natural disasters there is a need to have a disaster recovery plan in place.

Hardware can be damaged due to wear and tear. This can be avoided by regularly performing maintenance.

Software can be damaged by malware or hackers, having an antivirus and firewall installed can prevent this.

Natural disasters such as earthquakes or tsunamis can cause damage to hardware or loss of data. This can be avoided by keeping the computer terminal that has data stored on it in a safe area.

To plan for disaster recovery companies could store their backup data on an alternative site. There are 3 types of alternative sites: hot, warm and cold.

A hot site is where a complete duplicate of the company's systems that is usually synchronised is stored. This has all systems ready to be started at all times and only awaits the loading of the latest backup. This cost the most money out of the 3 site options, but the backup server can also be up and working ready within a few hours.

A warm site is where data is stored in another location that already has the required hardware for the server’s backup is installed, to get the system working all you need to do is restore the latest backups onto the storage drives on the system.

A cold site is an empty room at another location far away from the main site of the company. In the case that a disaster occurs the company will have to purchase new equipment and set up their new server with a backup of their data. These are the least expensive sites as they do not need maintenance to be kept up and running when there are no problems with the main site. A cold backup site is essentially an empty room so while it is the cheapest option it will also take the longest to set up.

The consequences of failure are that the company could lose their data, or it could be compromised and sold to their competitors. If some scandalous data on the company is found and released it could also ruin the reputation of the company and maybe even cause it to close down indefinitely.

**Information overload and the difficulty and expense of processing large quantities of data, danger of and consequences of data duplication**

Information overload is when you have too much data on a server and require a lot of storage space which can cause CPU's to be stressed which can lead to a reduction in the quality of decision-making ability, it can also lead to an overload and crash.

There are 3 main types of information overload: Excess data, lack of time and irrelevant data.

Excess data, as the name states is when there is simply too much data to process which leads to inefficiency in work and can make it hard to find the relevant data that you are looking for.

Lack of time, this is when you do not have enough time to process all of the information at your disposal. Due to time constraints, there can be a pressure to hurry up which can cause inaccuracy in your work.

Irrelevant data, this is when the data you have is of poor quality or is completely useless not pertaining to the topic it was meant to be about in the first place. This makes it much harder for you to get anything useful out of it once it is processed.

<https://www.cmswire.com/digital-workplace/information-overload-comes-in-3-flavors-heres-how-to-combat-it/>

Information overload can result in you being overwhelmed with the large amount of data in front of you without being able to properly understand and make use of it. This can even create the illusion that you have more work at hand than you actually do due to the large amount of data in front of you that is not simplified and properly understood. This leads to weakened decision-making skills as well as a decrease in productivity and efficiency which could be avoided entirely.

A large part of information that you can be overloaded with is data duplicates, this can range from the least harmful complete carbon copies of the data that is exactly the same to partial duplicates that may contain the wrong data which could cause you a lot of harm.

Having duplicate data is a waste of money in your budget as it takes up space in your storage that you are paying to maintain, this data is useless and unneeded but can sometimes take up to 20 – 30% of the area in a database.

It can also waste money if a customer purchases one item and you send them 5 or more due to duplicate orders that you have in your database, if the customer is charged for this as well when they clearly did not order more than one of the duplicate items they can be upset, and this will cause a drop in customer satisfaction.

Duplicated data also affects interactions with customers as customer service employees will have to sift through multiple duplicates and useless files of data to find the correct records that they need to help a customer solve an issue. This can lead to customers being dissatisfied and not doing further business with the company due to their bad experiences with them.

Duplicate data can also cause you to miss out on sales opportunities as poor quality or irrelevant data makes your work much more inefficient and wastes precious time that could be used instead to make money.

<https://www.qgate.co.uk/blog/10-reasons-why-duplicate-data-is-harming-your-business/>

**9.1: Analyse the benefits and disadvantages of the social impact of computing technology developments (M2)**

Developments in technology have resulted in large social impacts over the years. From phones and emails to make communication easier to new ways of transport to make it so that you can visit your friends and family in person, technology has greatly improved our society as we know it leading to both benefits and disadvantages to us.

These developments in computing technology have both social impacts, and business impacts creating tons of new job opportunities and opening up new avenues of employment.

**Changes in the way people communicate.**

With the recent changes in computing technology our methods of communication have been changed too. People used to communicate via landlines and sending letters, this has been replaced by mobile phones and emails as they are a much better form of communication.

The improvements in technology related to communications also have a much larger range and are much quicker than in the past. An example of this would be telephones being able to make calls abroad instead of being region specific, or emails sending letters and media to people instantly regardless of their location instead of waiting weeks or possible months for a physical letter to get to someone.

This has allowed for people to be able to get information and data from many sources as well as making it much easier to find a potential partner due to the ease of access of online dating services such as ‘tinder’.

This has helped to bring people closer as they can keep in touch much more easily, but it has also created a divide as less people go to meet in person as there are much easier alternatives like video calls or texting which lack the personal touch that you get when meeting face to face. This could result in a lack of social skills as people do not have the experience in meeting up in person.

**Increasing reliance on social networking for human interaction.**

As said previously the increasing reliance on social networking could potentially be a bad thing as it could be detrimental to peoples social and interpersonal skills such as talking or presenting something due to a lack of experience. This would also make it harder for people to understand non-verbal communication such as gestures as they are not used much online.

Some people have also become addicted to the internet which is a serious problem as it can cause major issues in their life due to them choosing not to interact with others at all.

The reason for this increasing reliance on social networking for interaction is due to the ease it grants over in person physical communications as well as the benefits it grants such as communicating over longer distances and at much faster speeds all from the comfort on your own home.

As the internet is the main method of acquiring information and data on all types on subjects, from something as trivial as how to cut your nails to something as convoluted as rocket science, people can easily create their own news and spread it far and wide without much problem. This allows us to be informed of issues around the world and keep up to date on worldwide news.

People can also leave reviews on many things such as products or media for others to see and form their own conclusions on, this shows how social media impacts the thinking process of its users as they are influenced by other peoples ‘experiences’ with the products without knowing whether these so-called experiences are truthful or not. This also shows a disadvantage of being too reliant on social networking as it can be misleading and untrue which could be detrimental to you.

Due to the usefulness of social networking, we are growing increasingly reliant on it and we are making more use of it now than ever.

**Consequences in terms of lack of social skills and increasing isolation.**

**Health and age-related issues.**

Due to the increase in the use of social networking and social media for many things, people are growing increasingly more isolated and lacking in their social skills due to not using them much. This can cause issues with your health as you age.

These effects on your health increase gradually as you age due to other factors such as depression, the inability to move around such as needing crutches or a wheelchair and other pre-existing health conditions.

One of the health-related issues that can occur due to isolating yourself from social contact is an increase in stress. This stress on both your body and mind can cause your overall health to decline.

People who have been isolated from certain social groups may be at greater risk of developing symptoms of mental illnesses such as depression and anxiety. This could lead into an excessive eating disorder that can have adverse effects on the body and physical health.

Mental health issues that stem from isolation and a lack of social skills can result in people being reliant on harmful vices such as smoking and drinking which are not good for their overall health.

**Ease with which contacts can be maintained, reduction in geographical barriers.**

Due to the improvements in technology, there are virtually no barriers between people regardless of their location in the world. This change means that contacts with people you know or have met can easily be maintained.

Communication overseas is accessible for anyone, even the everyday man which shows just how widespread it is. It can be utilised for many purposes including business use which is made much easier since there are methods to communicate regardless of the language barrier such as translation software and applications.

**Increased home working and its benefits, e.g., reduced travel time, flexibility and disadvantages, e.g., lack of human interaction, isolation.**

Working from home has many benefits over working in a workspace designated by an organisation.

One of the benefits is the reduced travel time, due to not needing to travel at all you save a lot of time in your everyday schedule and can spend more time being productive doing things such as working or researching.

Another benefit of working from home is the fact that your work schedule is much more flexible as it does not have to conform around the opening and closing hours of the organisation’s building. You can start and finish work much earlier than usual or if you want you can work later than usual to have more relaxing time, you can also choose when to take your breaks from working. This makes the mood of the workers much better and increases their work efficiency and productivity.

A downside however of working from home is the lack of any kind of human interaction as you work from the confines of your own home instead of an office used by multiple co-workers who you see and interact with on a daily basis. This, however, is not the case with jobs that require group work such as programming projects as you will at the very least be on a voice calls with your co-workers.

Another downside of working from home is the sense of isolation that can happen due to not being accustomed to working from home as you do not have small chats with people around the office and do not have distractions from your work.

**Reduction in the number of unskilled or low skilled jobs.**

The number of low or unskilled jobs is decreasing nowadays due to these jobs being done by robots that are programmed to do these simple tasks such as manual labour.

Employers choose to use robots instead of human employees for these jobs as they do not have to be paid and they are much more accurate and efficient in their work.

One example of the jobs that are overtaken by robots is factory workers, this job is very hard manual labour that is of low skill as it doesn’t require any qualifications or prior experience. The job consists of packaging many objects or assembling them. This has been overtaken by robotic devices that can automatically assemble and pack object at a much higher efficiency than humans can.

Another example of one of these jobs is a supermarket cashier, this job is of a very low skill ceiling and is undertaken by supermarket workers who scan your groceries have been removed in many places and overtaken by self-service scanning and checkout.

The impact that this will have on society is that there will be less jobs that require low skill levels or a minimal amount of training to be carried out as they will be done exclusively by robots or AI.

**Creation of new markets and opportunities.**

With the improvements in computing technology there are also many new jobs being created to do with using the new pieces of tech.

There are many new opportunities that come about due to developments in tech such as a wider range of audience for businesses due to an ever-increasing amount of people using technology in this day and age, companies can have their advertisements and marketing campaigns reach out even further than ever before. They can use social media platforms to do this by promoting their products and any services that they may be offering as well as interact with potential customers on a more personal levels to answer any questions they may have which can do wonders for their reputation as a whole.

Technology is creating jobs in all markets that have anything to do with technology such as science, medicine, coding, social media, etc. These new jobs take the place of the jobs that are taken over by technology such as agriculture and manual labour.

A lot of the new jobs have a lot to do with piloting and making use of new technology that is not automated such as controlling drones or developing apps.

Drones have the potential to take over the delivery markets for services such as amazon delivering packages could be done much easier, but they could also replace take-away’s delivery services and the post office.

Every single app that was ever made had a developer, without these people apps wouldn’t exist and the apps that they create can impact our lives greatly.

Another new job opportunity will be to market new technology and apps, this job would involve creating advertisements and marketing campaigns as well as communicating with potential customers.

**9.1: Evaluate the impact that implementing a new computer system can have on an organisation (D1)**

There can be both positive and negative impacts that come with implementing a new computer system in an organisation, these impacts can consist of many things from lowered efficiency in work to an increase in customers.

‘Implementing a new computer system’ mainly refers to a software upgrade but it could also refer to a hardware upgrade such as increasing the size of the storage drives or increasing the processing power / ram so that the system runs faster and with less errors.

This can come with positive impacts such as improving the speed and efficiency of the staff’s capabilities when working once they have acclimated to the new system and can properly make use of it in their work. However, if for some reason the staff are not properly trained to navigate and handle the systems there may be a visible decrease in their productivity and there will be a need for them to be retrained which can waste time and resources.

Some new computer systems also have a higher requirement for the hardware that they need to run off of due to their goals, rendering videos and images for example would require significantly more advanced hardware than writing text documents due to the increase in processing power needed for the task.

If the software is too advanced and is bottlenecked by the low capabilities of the hardware it will not run properly or may even fail to run at all, this could reduce the efficiency and productivity of work. If the system fails to run it would cause the customers to be greatly upset as they did not get what they paid for which could have many implications such as a lowered reputation for the company and a drop in potential customers, on the other hand if the system was not bottlenecked and worked perfectly you could see an increase in potential customers and satisfied customers may come back for more purchases.

When systems get more increasingly more complex, they require more skill to use, so employees are trained to effectively make use of them. A positive aspect of this is that the new system can have more benefits and is more efficient. A negative aspect of this is that it costs the company money to train their staff.

A larger and more complex system however comes with its own fair share of issues such as the increased difficulty of keeping the software maintained and safe as well as ensuring the security of data. Due to the increased size of the system, it will be harder to spot issues of it as well. A way to fix this issue would be to regularly update the systems and reduce the chance of large changes happening at once that could compromise the system, but this would cost more money in exchange for the increased reliability and security.

One of the many benefits from implementing a new computer system is the increase in automation, this can result in saving money due to the reduction in manpower needed to perform maintenance on the system as well as increasing the overall efficiency of the system resulting in less work for employees so that they can spend their time doing more work in shorter periods of time as well as a better way to manage them.

Upgrading the systems can affect the organisation as employees will need to be trained to properly use the hardware to do their work and not damage the hardware. The company will also need to spend money on the sophisticated hardware which will increase budget costs. Without proper training the staff will not be able to properly do their jobs which would result in lowered efficiency and a higher likelihood for human error in their work which could cause adverse effects to the organisation.

There will be a need for the upskilling of the workforce to make use of more complex systems. This is when systems get more complex and require more skill to use so employees are trained to effectively use them. A positive aspect of this is that the new system can have more benefits and is more efficient. A negative aspect of this is that it costs the company money to train their staff.

New roles would also be created due to the new system such as maintenance work or security work.

The staff may also be unhappy about the changes that they have to acclimate to with the new system so this should be considered when training them, it should be taken into account that they may have a harder time learning a lot of new information at once so it could come in small portions or they could be delegated to a low skill role.

**9.1: Evaluate the impact that the implementation of a specific development in computing technology has had on wider society (D2)**

Many current developments are being made that will have a significant impact on our society, from changing things such as our basic conveniences to opening up a whole new avenue of possibilities to us.

One of these developments is the ‘Internet of things’, an all-encompassing network that connects all online devices. Due to the greater access we all have to internet in our everyday lives and the increased reliance that we have on it, it has become an integral part of our society and our everyday lives.

As all technological devices around the world that are in some way connected to the internet are considered part of the IOT it has an incredibly vast range and variety of devices and data in its grasp.

One of the positive impacts of the IOT is that it is easy to search for information and share it due to the ability to retrieve data from many different sources, this allows for greater efficiency in your searching and in work. Making the devices more efficient also boosts productivity as more can be done in the same amount of time. Using the IOT to cut down on repetitive, time consuming tasks is a way to boost productivity and lower costs in the long run as there will be more time to do more work and gain more money. The everyday man can save quite a lot of their time by using the IOT as it is very efficient and optimised for searching purposes.

Another positive impact of the IOT is the new business opportunities that have been created due to it, from enhanced analytics to AI many features of the IOT are a game changer to businesses. Allowing them to better understand their customers and prospective customers better through the use of analytics allows companies to better tailor their products and advertising towards them and increases the chance of gaining new customers.

One of the negative impacts of the IOT is that it requires constant network connection, this is due to the fact that all of the data is accessed over the internet and is not stored locally on your own device. While this is usually a benefit as it does not waste space and slow your device down it is a detriment when you do not have access to it. Not having internet connection is more than a minor inconvenience as you will not be able to perform or save any of your work on cloud networks.

The need for a constant internet connection also means that in some areas with little to no connection to the internet you may not be able to access the IOT from your device and will lose access to your data. Due to the increasing amount of use of the internet if it ever were to go down there would be chaos and mass panic due to people being unable to access their data in all areas of the world which could have dire consequences since many technological systems that have important roles in our society use the internet to function.

Another negative impact of the IOT is the higher risk of data being breached and the issues with security, due to data being more online than ever it is at risk for hackers to infiltrate into and steal it. They could sell the data to others or hold it for ransom until you pay them, if they hack into devices, they could also sabotage them.

As quite a lot of the devices on the internet of things have access to a camera which can record videos, such as mobile devices, doorbells and security cameras. If these devices are by chance targeted and hacked into by a cybercriminal it can create issues due to sensitive data that should not be in outsiders' hands could be sold or held ransom.

Depending on what kind of device the hackers have gained access to there could be varying levels of danger being posed. A vending machine being hacked into could just be a minor annoyance but the doors of a building and its AC / heating systems being hacked into could cause major issues that could lead to all of the people inside of the building being held ransom.

Overall, the IOT plays a large role in our society nowadays as we are heading towards a digital era where all of our data is stored online, the IOT is growing increasingly more convenient for everyday things such as searching for data and research, but it is also a liability due to the heightened vulnerability to hackers.