HCI sustainability and the impact of technology on the environment

The digital world has been developing at an incredibly fast rate. With the constant production of new innovative products and IT markets broadening their spectrum to the less developed areas of the world, we are seeing more and more people using technology. Although this is a big step into making the world a more connected place, there are also some downfalls, particularly involving sustainability and the environment. However, the effects of this can be lessened by making small changes such as altering the design of interfaces. Research on sustainable HCI has only become prevalent over the past few years and we can see certain improvements in the design of devices and interfaces. The main focus of sustainable HCI is to try use design techniques which result in a more environmentally friendly system. In this report I will be discussing how the environment has been impacted by technology and the relationship between sustainability and HCI.

The current coronavirus pandemic has been detrimental to people’s livelihoods and caused distress among society. Restrictions on travel and work had resulted in the cut of non-renewable energy resources. Therefore, the carbon dioxide emissions resulting from the combustion of these resources have decreased by almost 5%, which is at its lowest level in a decade. (Ambrose 2020) Since the 1850’s carbon dioxide emissions have been increasing at a concerning rate however this recent decrease should not be seen as a triumph. The reason for this decline is because of the economic crisis, not because of the change societal behaviour and views on environmental sustainability. Therefore, we must still work hard in improving the way we work to ensure a heathier, more sustainable planet. HCI designers can make an impact by improving the ways in which they design interfaces to make them both human and environmentally friendly. (Idress, 2014)

Impact the IT industry has on the Environment

The carbon dioxide emissions produced by the IT industry is equivalent to 1.4% of the overall global emissions. (Ericsson, 2020) In the grand scheme of things, this may not seem like much, but by changes such as using renewable energy resources, the emissions could be reduced by 80%. (Ericsson 2020) Mitigiating the carbon emissions by even a small amount is beneficial for the environment. Therefore, managing the carbon footprint is becoming increasingly important and is seen as a key factor to take into consideration by IT designers.

Devices we use on a daily basis consume a lot of resources and power than necessary. This contributes to carbon dioxide emissions. A study conducted at the University of Bristol found that HCI can help tech companies reduce their carbon footprint. They also discovered that 10 million tonnes of carbon dioxide are generated from streaming 1 billion hours of YouTube videos a day for a year. (Murphy 2019) This is an extortionate amount it can be reduced dramatically from a few changes in design. The amount it could potentially be lessened by is equivalent to the carbon footprint of 30,000 UK homes. (Murphy, 2019).

E-waste is another important HCI sustainability issue which has an adverse effect on the environment. The rapid development of new devices has caused an increase of digital waste around the world. In addition to this, although it is a great step forward economically for IT markets to cross over into the less developed countries, there is also a downside to this. Due to the lack of funds, these countries tend to use more chemical based consumables (Idress, 2014). These are not very durable and therefore devices will not have the same longevity as a device from a more developed country and will be disposed of quicker. This causes there to be more waste production. Electronic waste is not the only form of waste which needs to be reduced. Paper wastage is equally as important however it isn’t given the same amount of attention in comparison to E-waste. Designers have to pay more attention to this and try to think of more sustainable ways for systems output.

Due to these environmental concerns, designers were forced to face the reality and come up with a new designing philosophy. This ‘new philosophy’ would involve coming up with a new approach to HCI design and take into consideration any sustainability issues. (Idress ,2014). This deemed difficult for the more traditional HCI designers to adapt to as they are more confident comfortable with their ways and aren’t kept as up to date with environmental/sustainability issues. This caused for an immediate evaluation and reform of the software design curriculum (Idress,2014).

The re-evaluation resulted in discussions about the following topics: sustainable interaction design (SID), revisioning consumption and citizen sensing. (Goodman, 2009) SID and the revisioning of consumption are both concepts which enabled designers to focus on ways to alter designs in order to reduce negative impacts on the environment. HCI design takes into consideration many factors including hardware and software issues which contribute to the power consumption of devices. In order to mitigate this issue, designers have had to understand both user needs as well as the impact on the environment.

Implementing features such as power saving mode/ low power mode helps in reducing the power usage of devices. This is beneficial for both the environment and the user as the battery life will last longer if placed on low power mode. This feature will decrease the amount of background activity running as well as slightly dim the brightness of the phone. Another factor which can contribute to the amount of power consumption of a device are the colours used in an interface. (Idress, 2014) Colour Theory is a widely known and important concept in HCI, choosing the correct colour schemes can help certain aspects of an interface to stand out. Colour isn’t only used for highlighting more significant information, but it can also be used for people with colour blindness. Using particular colours can make it difficult for users with colour blindness to read information due to it being hard to differentiate between specific colours. Therefore, HCI designers have to ensure the design is accessible and aesthetically pleasing as well as attempting to keep the power consumption to a minimum. Brighter colours consume the most power whilst black consumes the least. Therefore, having a darker background on screens will minimise power consumption, and enhance battery life.

Using smaller devices/screens will also benefit the environment as there will be less e-Waste production if the devices are of smaller sizes. (Idress, 2014) Although small screens cannot be used all the time, devices such as mobile phones are used by individuals on a day to day basis and they are disposed of frequently due to the constant innovation of new products. Nevertheless, even if the device size cannot be small, using different materials which are more sustainable will be a big step in protecting the environment. Major industry leaders such as Apple are using ‘low- carbon materials and processes’ to reduce their carbon footprint. In addition to this, they are also aiming to make all products with clean energy (using renewable energy sources) by 2030. (Apple 2020).

Sustainable HCI has changed the way designers think for the better whilst also having a positive impact on the environment. By making minor changes to the design of an interface such as altering colour schemes, we can decrease the amount of power consumption of a device. These alterations will in turn aid in the alleviation of carbon/greenhouse emissions, decrease usage of non-renewable resources and make the world a healthier place for humans and the environment.