STADIO

Technology and Society
TAS152

Table of contents

Topic 3
Towards a just Internet

3.1 INTRODUCTION

This topic relates to the following module outcome/s:

- Contribute to the maintenance of a just Internet and world of technology.

The term 'Net neutrality' refers to the concept of a free and just Internet. However, the generic nature of this concept makes it difficult to identify and interpret the specific ethical challenges and values associated with Net neutrality and translate them into normative guidelines (Rochel, 2018:297). Under this topic, Rochel (2018:298) discusses issues of traffic management, individual freedom, informational ecosystems, and the elimination of domination between or within groups.

In this topic, you will gain knowledge in the following areas:

1. The Net and its neutrality
2. Two sets of values underlying neutrality
3. Towards a republican net neutrality

3.2 THE NET AND ITS NEUTRALITY

3.2.1 The net neutrality debate

Prescribed reading

Read Section 17.2 on pages 298-304 of Rochel (2018) *Towards a just Internet: A republican net neutrality*.

The Open System Interconnection (OSI) (Braden, 1989) is a conceptual model that is used to describe the different layers of networked computer systems and the protocols that are used to communicate at each layer. The OSI model consists of seven layers. The TCP/IP model (ITU-T, 1994) is also frequently used to model

communications between networks, specifically the internet, and consists of four layers. There are similarities between the models as illustrated by Figure 1 below.

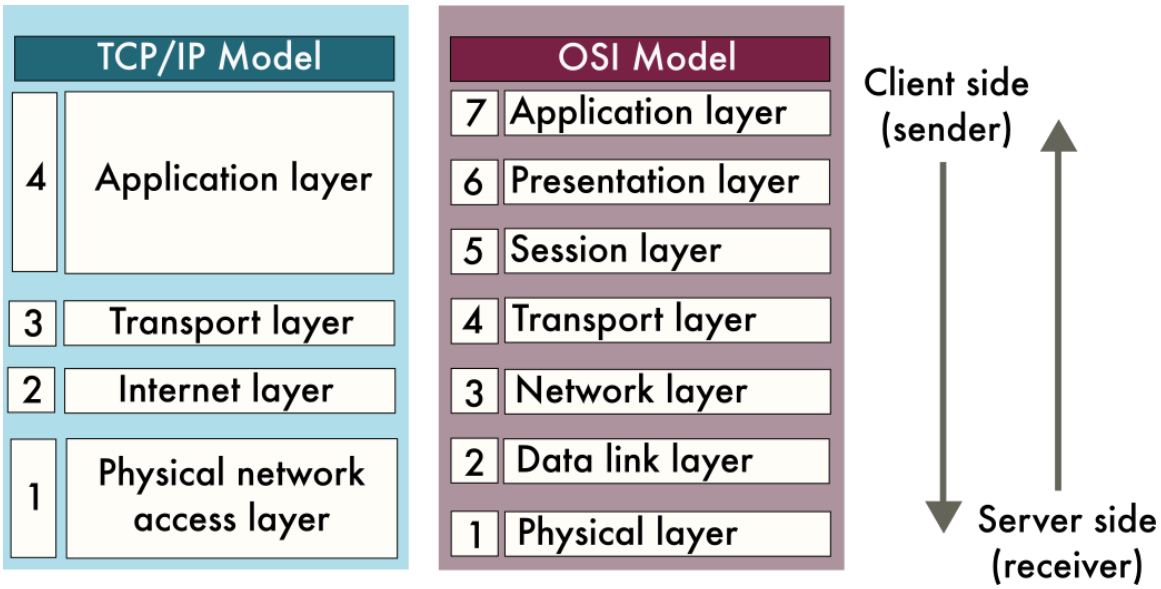

Figure 1. The TCP/IP model and OSI model

The OSI model starts with the physical layer at the bottom, this layer represents the physical infrastructure like switches, cables and other hardware that supports data transfer. The physical layer is followed by the data link layer and then the network layer. The data link layer facilitates data transfer between devices on the same network, while the network layer facilitates data transfer between different networks. The transport layer encompasses all aspects of communication between two devices, from start to finish. The session layer initiates and terminates communication between devices. The presentation layer will transform the data before it can be used by the application layer. The presentation layer performs actions such as encryption/decryption, encoding/decoding and compressing and decompressing data. The application layer does not refer to the software application like web browsers (e.g. Firefox, Google Chrome) or email clients (e.g. Outlook, Gmail) that a user will interact with, the application layer refers to the communication protocols used by the software application such as HTTP (Hyper Text Transfer Protocol) and SMTP (Simple Mail Transfer Protocol).

The physical network/access layer from the TCP/IP model encompasses layers 1 and 2 from the OSI model. The internet layer from the TCP/IP model corresponds with layer 3 from the OSI model. The transport layer from the TCP/IP model corresponds with layer 4 from the OSI model. Finally, the application layer in the TCP/IP model encompasses layers 5, 6 and 7 in the OSI model.

In both the TCP/IP and the OSI model, when data is sent from a device, the data travels from the highest level down through all the layers to level one. When data is received on a device, the data will travel from level one upwards.
With regards to net-neutrality, we will define the structure of the Internet as comprising four main layers (Rochel, 2018:299):

1. The first layer is the physical infrastructure of the network, which is generally maintained by large telecommunications corporations (corresponding to layer 1 in the TCP/IP model and layer 1, 2 and 3 in the OSI model).
2. The second layer is a service layer devoted to the delivery of usable services, which is generally the domain of software companies, developers and web architects (corresponding to layer 2, 3 and 4 in the TCP/IP model and layer 4, 5,6 and 7 in the OSI model).
3. The third layer is a logical layer focused on content providers, which are generally large organisations such as multimedia industries and news organisations.
4. A fourth layer that is occupied by end users who are recipients of the content that is stored and disseminated via the Internet.

The term 'Net neutrality' is related to a variety of political, economic and social issues, and is based on the right of Internet users to access online content, applications, services and devices without discrimination (Rochel, 2018:299).

Systems for managing Internet traffic must be flexible enough to accommodate a variety of conflicting interests while at the same time avoiding claims of unfair discrimination against particular user groups (Rochel, 2018:300-302). The five main challenges associated with the maintenance of net neutrality are related to traffic management as implemented by Internet access providers (IAPs).

- Challenge 1: Maintaining network security and integrity and preventing malicious attacks. To address this challenge, IAPs must share a common definition of the term 'network security' as well as a common understanding of what constitutes a threat to the network.
- Challenge 2: Alleviating traffic congestion by downgrading low-priority traffic. To address this challenge, IAPs need to agree on fundamental services that need to be prioritised in order to ensure the continued provision of lower priority services to end-users.
- Challenge 3: Blocking unauthorised access to legally restricted content. To address this challenge, IAPs need to distinguish between their legal

obligations and rules or demands that may be imposed by authoritarian regimes.

- Challenge 4: Providing a higher quality of service to particular end-users including application providers. Some IAPs may charge differential fees for the services they provide to end users, based on requirements such as e.g. rapid response times or the rapid processing of large data volumes.
- Challenge 5: Prioritising the Internet access provider's own business so as to ensure its ongoing sustainability. This occurs when an IAP deliberately favours its own applications and services, by providing preferential treatment for its own products and partners in order to undermine its competitors.

Examples of South African IAPs include: Cool Ideas, Afrihost, RSAWEB, Axxess, Vox, WebAfrica, Rain, MWeb, MTN and Telkom. South Africa, as of 2024, has no specific regulatory framework when it comes to net neutrality.

3.2.2 Balancing competing challenges

Balancing the competing demands outlined in section 3.2.1 above presents an ongoing challenge to IAPs. The fact that content has not been legally prohibited does not mean that it is ethically acceptable; and applications that are used for purposes such as video conferencing may legitimately require high levels of bandwidth. The concept of net neutrality therefore needs to be understood in relation to the broader concept of 'justice', encompassing issues of production of and access to scarce resources and the removal of discrimination.

Finally, Rochel (2018:304) makes the point that a neutral (equal) distribution of goods and services does not necessarily equate to a just distribution of those goods and services, using the example that it might be preferable to give more food to a starving child than to a well-fed one. This is an example of equity.

Equity fundamentally differs from equality. Equity is more closely related with fairness, whereas equality is a measure of sameness. An example of equality is ensuring that the government provides internet access to every single South African citizen. An example of equity is ensuring that the government focuses first on providing internet access to South African citizens who are unable to afford internet access, and only thereafter providing access to the rest of the citizens.

Activity

Given each of the following scenarios, discuss whether or not the way in which resources are being distributed is done with equity or equality in mind:

1. In order to provide students with internet access, every student in South Africa is given a 10GB mobile data bundle every month, regardless of their economic standing (i.e. if they are rich or poor). Is this distribution of the resources (mobile data) done with equity or equality in mind?

2. Buses are used as a popular form of public transport. Imagine that half of all the seats on the buses are reserved for elderly people and the other half are available to all other citizens. Is this distribution of the resources (seats on the bus) done with equity or equality in mind?

3. In order to help increase the pass rate for matric students, the government provides one-on-one maths and science tutoring. Students that currently have an average of 40% or below have access to the tutoring for free. Students with an average of between 40% and 60% pay half price for tutoring and students with an average higher than 60% must pay full price for tutoring. Is this distribution of the resources (tutoring services) done with equity or equality in mind?

3.3 TWO SETS OF VALUES UNDERLYING NEUTRALITY

3.3.1 Introduction

Prescribed reading

Read Section 17.2 on pages 304-309 of Rochel (2018) *Towards a just Internet: A republican net neutrality*.

In this section we first consider the values that underpin the freedom of individual Internet users, then we examine the broader values that apply to the Internet as an ecosystem. By understanding the relationship between these two sets of values, we are better equipped to develop technical, political, legal and social

strategies for constructing an 'improved' version of the Internet that meets the needs of all stakeholders (Rochel, 2018:304).

Two possible alternatives need to be considered when discussing the provision of equal access and use of Internet resources for individual Internet users (Rochel, 2018:305-307):

1. The argument in support of neutrality is based on the premise that two individuals who are in similar situations should receive equal treatment, and their individual rights to create or access information, engage in public debate, or conduct economic activities on the Internet should be protected. This view is based on a logical-rational approach which is typical of rule-based legal systems.
2. An argument can be made for adopting a normative approach in relation to the provision of Internet access, in which both the situation and the moral worth of an individual are considered before deciding how they should be treated. For example, individuals living in countries that are governed by authoritarian regimes may need additional protection to safeguard their rights as individuals, including the rights to freedom of expression, privacy and personal data; and in such cases, their ability to create and access information on the Internet without discrimination should be secured.

Activity

Point 2 above argues that the situation and moral worth of an individual should be considered before deciding how they should be treated. Do you think such an approach could be successfully implemented in practice? Outline the reasoning behind your answer.

A second broader set of values focuses on the role of the Internet within the 'informational ecosystem', based on four key principles (Floridi, 2008:32; in Rochel, 2018:308-309):

1. Principle 1: Entropy should not be caused
2. Principle 2: Entropy should be prevented
3. Principle 3: Entropy should be removed
4. Principle 4: Information ought to be promoted by extending, improving, enriching and opening the infosphere, that is by ensuring information

quantity, quality, variety, security, ownership, privacy, pluralism and access

The first three principles address the prevention of entropy caused by the impoverishment, vandalising or destruction of information. The fourth principle addresses the issue of information ethics. Here Floridi emphasises that net neutrality should only be specified if by doing so, no damage will be inflicted on an existing and diverse global information environment.

In a more recent document, Puddephatt (2016:15) reminds us that individuals rely on freedom of expression in order to communicate openly and transparently with others, and he points out that the Internet has provided a platform on which people can receive and impart information, collaboratively create and share content, generate economic opportunities, or campaign for political freedom.

3.4 TOWARDS A REPUBLICAN NET NEUTRALITY

3.4.1 Introduction

Prescribed reading

Read Section 17.3 on pages 304-309 of Rochel (2018) *Towards a just Internet: A republican net neutrality*.

A 'republic' is a form of government that is controlled by the elected representatives of that country's citizens (Wikipedia. n.d. *Republic*). To examine how the two sets of values defined in section 3.3 might be regarded from a republican perspective, we now consider the potential impact of attempted domination between actors in different power relations: for example, between democratic law-makers and authoritarian regimes. In this context, we regard freedom as the absence of domination, i.e. an individual can be protected against threats that would otherwise undermine their freedom of choice. (The alternative is a domination relationship such as that between a slave and their owner, in which the owner has the right to impose arbitrary rules or punishments on their slave.)

3.4.2 Domination among actors in different power relations

Rochel (2018:311-312) identifies three main elements that together define the republican approach.

1. Individual freedom exists within social relationships involving individuals, institutions and political communities and can accommodate power imbalances between the various actors.
2. Within these relationships, individuals may be affected by decisions that are made by others, but they still have the right to enjoy moral freedom at a personal level.
3. Agreed institutional measures need to be put in place to protect individuals against more powerful actors who might otherwise threaten their freedom of choice.

Potential risks to individual freedom can be analysed in terms of the extent and the intensity of interference that may be imposed by powerful figures or organisations. The 'extent' of domination reflects the degree to which important interests are interfered with by those who are in positions of authority; while the 'intensity' of interference reflects the ease with which the dominator can arbitrarily interfere in the personal interests of others (Rochel, 2018:312-313).

We now consider the extent and intensity of interference in relation to the Internet. Individual freedom of access to information would be threatened if access to the Internet was controlled by governments and/or powerful organisations. At the same time, the activities of the IAPs who provide Internet services to their end users fall under national (rather than global) legislation.

This situation gives rise to two possible alternatives:

1. Freedom based on non-domination
   This approach would ensure that all individuals are entitled to access online information, to protect their personal privacy and to restrict access to their own data (Rochel, 2018:314).
2. Freedom based on global governance
   This approach would involve policy-making at an international level in order to prevent domination of the Internet by a few powerful entities. For this approach to succeed, a complex global information ecosystem would have to be created based on a set of universally accepted ethical principles (Rochel, 2018:315) – an ideal that would probably be difficult to implement and enforce in practice.

Activity

Point 2 in paragraph 3.4.2 above states that "individuals … have the right to enjoy moral freedom at a personal level". However, point 3 in the same paragraph points out that some individuals may need to be protected against more powerful actors.

The United States of America allows citizens to request documents held by the government as per legislation called the Freedom of Information Act (FoIA). The citizen will subsequently be provided with access to the document they requested (sometimes fully or partially redacted) after a certain amount of time. Conduct some research to determine if South Africa has similar legislation.

3.4.3 A blueprint for achieving net neutrality

Rochel (2018:315) suggests that it might be possible to achieve Net neutrality by implementing a global framework that will identify and address the risk of Internet domination by powerful governments, organisations or individuals. He outlines three different situations that could potentially contribute to power imbalances and discusses ways in which those imbalances might be addressed.

0. *Situation 1: Mitigation of congestion*

Here Rochel (2018:316) considers the need for a 'traffic management system' that will prevent powerful organisations from influencing the flow of Internet traffic for their own advantage. Instead, the main goal of the republican approach should be the effective functioning of the Internet as a whole. Where traffic congestion does occur, this should be addressed in a way that will meet the needs of the widest possible range of applications; and when congestion of network traffic is unavoidable, appropriate prioritisation rules should be applied.

Situation 2: Prohibition of access to specific content

The principle of 'Net neutrality' implies that individual freedom of access to information sources should be promoted at both national and international levels. It is not sufficient for only illegal content to be banned; instead, all content that is uploaded to the Internet should be scrutinised to determine whether or not it fosters non-domination, and (in the case of non-dominating content) whether all relevant stakeholders have been given an opportunity to express their views (Rochel, 2018:316).

Situation 3: Differentiation of services to end-users and the protection of IAPs' own services

This principle addresses two potential risks related to Internet service delivery: the risk that IAPs could prioritise the interests of powerful business conglomerates by limiting the Internet access of individual users; and the risk that IAPs might prioritise their own business needs above the needs of their customers, thus threatening the quality of the information ecosystem as a whole (Rochel, 2018:317). To mitigate both these risks, the interest of all users should be taken into account when determining the control mechanisms that should be implemented by IAPs.

3.4.4 Conclusion

Rochel (2018:318) argues that the net neutrality debate must take into account a number of competing challenges related to the management of Internet traffic, and emphasises that individual freedoms of Internet access and use must be balanced against the functioning of the informational ecosystem as a whole. He recommends the adoption of normative guidelines based on the concept of 'freedom as non-domination' which should serve to promote the interests of informational ecosystem as a whole while at the same time protecting the interests of individuals.

Activity

Watch the video entitled "What is net neutrality and how could it affect you?" (BBC News, 2017) which is available online at https://www.youtube.com/watch?v=zq-2Yk5OgKc. (Accessed 2022-03-13).

This video appears to be in favour of allowing ISPs to implement differential pricing of their services, based on traffic volumes and the prices that ISP subscribers are willing to pay. However, such an approach would undermine the concept of 'net neutrality' and would negatively impact the quality of service that is provided to individual users and organisations in developing countries.

Do you think it is acceptable for ISPs to implement differential pricing that disadvantages organisations and users based in developing countries? Write down a balanced argument either for or against the protection of net neutrality.

Summary

The Internet has four main layers: (1) the physical network infrastructure; (2) a service layer containing software applications and other usable services; (3) a logical layer where content is stored by large corporates such as news organisations; and (4) a layer that allows end users to upload or retrieve information to/from the Internet. Internet Access Providers (IAPs) manage the flow of traffic to and from the Internet, while at the same time maintaining the security of the network, prioritising essential services, and blocking unauthorised access to restricted content. Some IAPs may also charge differential fees for their services based on the end user's processing requirements. In addition, "… information quantity, quality, variety, security, ownership, privacy, pluralism and access" should be protected" (Floridi, 2008).

Individual freedom of access to information could be threatened if access to the Internet was controlled by governments and/or powerful organisations. This gives rise to two possible alternatives: either all individuals should be able to access online information, to protect their personal privacy and to restrict access to their own data; or else a global information ecosystem would have to be created based on a set of universally accepted ethical principles in order to prevent domination of the Internet by a few powerful entities (Rochel, 2018:314-315).

Three possible approaches could be implemented in order to address potential power imbalances: (1) a 'traffic management system' that supports the effective functioning of the Internet as a whole; (2) the prohibition of illegal or discriminatory content; and (3) balancing the IAP's own business needs and the needs of their customers. Rochel (2018:318) endorses the concept of 'freedom as non-domination', which would serve to promote the interests of the informational ecosystem as a whole while at the same time protecting the interests of individuals.

Self-Assessment Questions

Write an essay of approximately 350-450 words based on each of the topics outlined below:

1. Explain the meaning of the term 'net neutrality' and discuss the advantages and disadvantages of adopting a net neutral approach in relation to the provision of Internet services.
2. The logical-rational view of Internet neutrality is based on the expectation that individuals who find themselves in similar situations will be treated

similarly (Rochel, 2018: 305). However, some Internet service providers have claimed that strict net neutrality limits their ability to manage traffic adequately and keep their networks running smoothly. Discuss the implications of these statements for Internet service providers and their subscribers.

Rochel (2018:311) states that "… individual freedom is always to be conceived within a social relationship", which could include other individuals, organisations or political communities. Within this context, individuals who are directly affected by decisions that have been made by others (for example, by Internet service providers) remain vulnerable to domination. Discuss how ISPs might potentially discriminate against certain groups of Internet users, taking into account the impact of net neutrality on the development of innovative services, and the increased levels of bandwidth that may be needed to support complex technologically advanced online applications.

Glossary of terms

AI-based prosthetic: An artificial device that is used to replace a missing body part.

Algorithm: A set of instructions that are used to perform a specific computation.

Algorithmic AI bias: Errors in the definition of an algorithm that lead to unfair outcomes.

Autonomous car: A vehicle that uses information obtained from environmental sensors to navigate, with little or no human involvement.

Autonomous weapon: A lethal weapon that operates either partly or entirely without human supervision.

Autonomy: The ability of an individual human being to make a rational informed decision.

Artificial intelligence: The ability of a computer to 'think for itself' based on logical tools that include knowledge representation, reasoning and machine learning.

Bandwidth: The amount of data that can be transmitted between two points within a given time frame (usually measured as bits per second).

Blockchain: A system that distributes transaction information across a network of linked computers, making it almost impossible to edit or delete any single entry.

Bot: A software application that has been programmed to perform a specific automated task, often replacing a human user.

Cascading failure: A process in which the failure of one component triggers the failure of other related components.

Cognitive behavioural therapy: A method of addressing anxiety-related disorders by developing appropriate coping strategies.

Contextual ethics: Takes into account the particular context within which an action was performed, rather than judging the action based only on absolute moral standards.

Cultural relativism: The idea that a person's beliefs and behaviour should be based on their own particular cultural context.

Cyber bullying: Undesirable behaviour in which somebody bullies other people on the Internet, often on social media sites.

Cybercrime: Illegal computer-based activity that takes place in cyberspace.

Cyberspace: A global network of IT infrastructures, telecommunications systems and computers.

Data anonymisation: The removal of personally identifiable information from data records.

Data privacy: Data privacy legislation ensures that personal information cannot be disclosed to other parties without the owner's consent.

Data protection: Ensures that important data is protected from loss or corruption and can be restored to a functional state if it becomes unusable.

Deontological ethics: A theory in which human actions are judged as being morally right or morally wrong based on their adherence to a set of underlying rules.

Digital pirate: Somebody who downloads online material from the Internet without the permission of the copyright holder.

Disruptive technology: An innovative technology that changes the way in which particular industries or businesses operate.

Domain: A network of computers and other devices that are controlled by a specific organisation and are linked to a particular IP address.

Drone attack: An attack by one or more unmanned aerial vehicle (UAVs) which may be equipped with military weapons.

Entropy: Measures the level of disorganisation within a particular system.

Ethos: The set of beliefs and behaviours that are representative of a particular social group.

Fake news: Inaccurate or misleading content that is intended to influence or deceive the public.

Fintech: Technologies that are used to automate the provision and use of financial services.

Fiscal crisis: A situation where the expenditure of a state or country is greater than its tax revenues.

Forensic specialist: An investigator who collects and analyses evidence related to a crime.

Genetic algorithm: A search method that is frequently used in AI applications to identify optimised solutions to complex problems.

Hierarchy of Needs (Maslow): A set of human psychological requirements progressing from physiological needs (level 1) to self-actualisation needs (level 5).

Human agency: The ability of an individual to achieve their potential based on their choices and actions.

Informational ecosystem: A theoretical structure that uses communication networks to meet the information needs of a population or community.

Intellectual property: Intangible creations or inventions that are legally protected against unauthorised duplication or use.

Internet access provider (IAP): An organisation that provides users with access to the Internet, but does not usually offer additional ancillary services.

Knowledge society: A society in which invests in education and knowledge creation in order to build human capital and foster innovation.

Legal norms: Rules that govern social behaviour by regulating the rights and duties of citizens and imposing sanctions when citizens do not adhere to prescribed rules.

Livelihood: The sources of income that are available to individuals, families and communities, such as wages or the proceeds of entrepreneurial activities.

Machine intelligence: A combination of pre-programmed problem-solving techniques with deductive logical abilities that together allow a machine to demonstrate original behaviour.

Machine learning technologies: Technologies that use large data sets to develop predictive algorithms, which can then be applied to autonomously solve data-based business problems.

Machine tool: A power-operated machine used in manufacturing facilities to shape metal components.

Net neutrality: The idea that Internet service providers should deliver the same level of service to all their customers.

Normative guidelines: Generally accepted standards that are used to evaluate behaviours, actions and outcomes.

Post-labour economy: An economy in which automation or the relocation of facilities to third-world countries has reduced the demand for skills that were previously supplied by human workers.

Predictive modelling: A statistical technique in which mathematical models are used to predict the probability of future outcomes.

Product development partnership (PDP): Collaboration between a not-for-profit organisation and a government or manufacturing partner, in order to deliver drugs and diagnostic devices to inhabitants of low-income countries.

Relation-based decision: The decision that will lead to the most optimal outcome is identified by evaluating the outcomes of all likely alternative decisions.

Robotisation: The use of industrial robots to perform automated tasks, usually as part of a manufacturing process.

Socially responsible investment (SRI): An investment strategy that takes into account the environmental, ethical or social impact of that investment.

Societal AI bias: A problem that arises when algorithm designers are influenced by, and then unwittingly reinforce, pre-existing social, cultural or institutional norms.

Stakeholder: A person or group of people who will be affected by the outcome of a business activity or project.

Supply chain: A process that encompasses the sourcing of raw materials, the manufacturing of finished goods, and the transportation of the final product to the distributor.

Sustainable Development Goals: A set of common goals identified by the United Nations that are intended to protect the planet and improve the social wellbeing of its inhabitants.

Targeted marketing: A marketing approach in which personalised advertising is used to target potential purchasers based on e.g. their income group or hobbies.

Techno-social disruption: The disruption of traditional practices following the introduction of new technologies or production methods within a particular market or industry.

Teleological ethical standards: Ethical standards which are based on the principle that the rightness or wrongness of an action can only be determined by its consequences.

Tweet: An online message created and saved by a Twitter user.

Universalism: The belief that generalised norms, values or concepts can be applied to all people and cultures.

Virtual environment: A computer-generated environment that allows a user wearing virtual reality video goggles to manoeuvre within a simulated 3D space.

References

Agrawal, S. 2021. Autonomous weapon systems: Our new soldiers, or a disaster waiting to happen? *Viterbi School of Engineering, USC*. [Online] Available from https://vce.usc.edu/volume-5-issue-1/autonomous-weapon-systems-our-new-soldiers-or-a-disaster-waiting-to-happen/ [Accessed 2022-05-22].

American Library Association. 2018. Net neutrality: An intellectual freedom issue. *American Library Association*, February 2018. [Online] Available from https://www.ala.org/advocacy/intfreedom/netneutrality [Accessed 2022-04-30].

Ammanath, B. 2021. Thinking through the ethics of new tech… before there's a problem. *Harvard Business Review*, November 2021.[Online] Available from https://hbr.org/2021/11/thinking-through-the-ethics-of-new-techbefore-theres-a-problem [Accessed 2022-02-16].

Anneroth, M. 2021. AI bias and human rights: Why ethical AI matters. *Ericsson Blog*, November 2021. [Online] Available from https://www.ericsson.com/en/blog/2021/11/ai-bias-what-is-it [Accessed 2022-05-17].

Anon. Not dated. Check if your email or phone is in a data breach. [Online] Available from https://haveibeenpwned.com/ [Accessed: 2022-03-18].

Arthur, K. & Owen, R. 2019. A micro-ethnographic study of big data-based innovation in the financial services sector: Governance, ethics and organisational practices. *Journal of Business Ethics*, 160:363-375. [Online] Available from https://link.springer.com/article/10.1007/s10551-019-04203-x [Accessed 2022-03-28].

Aschendbrand, J., Proctor, J. & Trebilcock, B. 2018. The ethical supply chain. *Supply Chain Management Review*, Nov. 2018. [Online] Available from https://www.scmr.com/article/the_ethical_supply_chain [Accessed 2022-03-31].

Avelino, F. 2021. Theories of power and social change. Power contestations and their implications for research on social change and innovation. *Journal of Political Power*, 14:3, 425-448. [Online] Available from https://doi.org/10.1080/2158379X.2021.1875307 [Accessed 2022-05-02].

Ayim, C., Kassahun, A., Addison, C. & Tekinerdogan, B. 2022. Adoption of ICT innovations in the agriculture sector in Africa: A review of the literature. *Agriculture and Food Security*; 11, 22. [Online] Available from https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-022-00364-7 [Accessed 2022-04-19].

Ballard, B. 2020. New tech could halt the decline of rural communities. *The New Economy*, January 17 2020. [Online] Available from

https://www.theneweconomy.com/technology/silicon-villages-how-new-tech-could-halt-the-decline-of-rural-communities [Accessed 2022-03-24].

BBC News. 2017. *What is net neutrality and how could it affect you?* [Online video]. Available from https://www.youtube.com/watch?v=zq-2Yk5OgKc. [Accessed 2022-03-13].

Bossman, J. 2016. Top nine ethical issues in artificial intelligence (Chapter 5.1). In: Stückelberger, C. & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. Free PDF downloadable from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

Brown, S. 2020. A new study measures the actual impact of robots on jobs. It's significant. *MIT Management, Sloan School*. [Online] Available from https://mitsloan.mit.edu/ideas-made-to-matter/a-new-study-measures-actual-impact-robots-jobs-its-significant [Accessed 2022-04-20].

Bussel, J. 2013. Cyberspace. In: *Britannica Online Encyclopedia*. [Online] Available from https://www.britannica.com/topic/cyberspace [Accessed: 2022-02-18].

Çelik, C.B. 2016. Educational intervention for reducing Internet addiction tendencies. *Addicta: The Turkish Journal on Addictions*, Winter 2016, 3:375-386. [Online] Available from https://www.addicta.com.tr/en/educational-intervention-for-reducing-internet-addiction-tendencies-13108 [Accessed 2022-03-23].

Cemiloglu, D., Almourad, M.B., McAlaney, J. & Ali, R. 2022. Combatting digital addiction: Current approaches and future directions. *Technology in Society.* 68:1-11.[Online] Available from https://www.sciencedirect.com/science/article/pii/S0160791X21003079?via%3Dihub [Accessed 2022-03-23].

CEPEJ. 2018. European ethical charter on the use of artificial intelligence in judicial systems and their environment. *European Commission for the Efficiency of Justice, Strasbourg*. [Online] Available from https://rm.coe.int/ethical-charter-en-for-publication-4-december-2018/16808f699c [Accessed 2022-04-18].

Chetty, M., Sundaresan, S., Muckaden, S., Feamster, N. and Calandro, E. 2013. Investigating Broadband performance in South Africa. *Towards Evidence-based ICT Policy and Regulation*, Vol. 2. [Online] Available from https://www.researchictafrica.net/docs/RIA_policy_paper_measuring_broadband_performance_South_Africa.pdf [Accessed 2022-04-29].

Cloudian. Not dated. *Data protection and privacy: 12 ways to protect user data*. [Online] Available from https://cloudian.com/guides/data-protection/data-protection-and-privacy-12-ways-to-protect-user-data/ [Accessed: 2022-03-17].

Collins, R. 2014. The end of middle-class work: No more escapes. In: *Does Capitalism have a Future?* (pp. 39-51). New York: Oxford University Press.

COMEST. 2019. Preliminary study on the ethics of artificial intelligence. *Extended Working Group on the Ethics of Artificial Intelligence*. [Online] Available from https://unesdoc.unesco.org/ark:/48223/pf0000367823 [Accessed 2022-04-17].

Congressional Research Service. 2021. *Defense primer: Cyberspace operations*. [Online] Available from https://fas.org/sgp/crs/natsec/IF10537.pdf [Accessed: 2022-03-14].

Convention on the Rights of the Child. 1989. *General Assembly resolution 44/25 of 20 November 1989*. [Online] Available from https://www.ohchr.org/documents/professionalinterest/crc.pdf [Accessed: 2022-02-28].

Cussins, J. 2018. How to prepare fore the malicious use of AI. *Future of Life Institute*, February 2018. [Online] Available from https://futureoflife.org/2018/02/27/how-to-prepare-for-malicious-ai/ [Accessed 2022-04-02].

Deloitte Financial Advisory Services LLP. Not dated. *5 insights on cyberattacks and intellectual property*. [Online] Available from https://www2.deloitte.com/content/dam/Deloitte/us/Documents/finance/us-fas-five-insights-on-cyber-attacks-and-intellectual-property.pdf [Accessed 2022-03-30].

Desmond, P. 2021. Data privacy laws in South Africa. *De Rebus*, July 2021. [Online] Available from https://www.derebus.org.za/data-privacy-laws-in-south-africa/#:~:text=1.,the%20subject%20has%20given%20consent [Accessed 2022-03-21].

DifferenceBetween.com. 2019. *Difference between teleological and deontological ethics*. [Online] Available from https://www.differencebetween.com/difference-between-teleological-and-deontological/ [Accessed 2022-03-22].

Dizikes, P. 2020. How does using robots in manufacturing impact employment? *Massachusetts Institute of Technology*. [Online] Available from https://news.mit.edu/2020/how-many-jobs-robots-replace-0504 [Accessed 2022-04-20].

Dodd, A. 2019. What is the Internet. *InformIT*, April 2019. [Online] Available from https://www.informit.com/articles/article.aspx?p=2963467&seqNum=4 [Accessed 2022-04-29].

Ethical Systems. Not dated. *Contextual Influences*. [Online] Available from https://www.ethicalsystems.org/contextual-influences/ [Accessed 2022-03-29].

Floridi, L. 2008. Information ethics, its nature and scope. In: v. d. Hoven, J. and Weckert, J. (eds.) *Information technology and moral philosophy*. Cambridge: Cambridge University Press.

FRA Focus. Not dated. Data quality and artificial intelligence–mitigating bias and error to protect fundamental rights. *European Union Agency for Human Rights*. [Online] Available from

https://fra.europa.eu/sites/default/files/fra_uploads/fra-2019-data-quality-and-ai_en.pdf [Accessed 2022-04-01].

Gaiani, S. 2008. Information and communication technologies (ICTs) for rural development in developing countries. *New Medit*, 7(1):50-57. [Online] Available from https://newmedit.iamb.it/2008/03/22/information-and-communication-technologies-icts-for-rural-development-in-developing-countries/ [Accessed 2022-04-19].

Galaz, V., Centeno, M.A., Callahan, P.W., Causevic, A., Patterson, T., Brass, I., Baum, S., Farber, D., Fischer, J., Garcia, D., McPhearson, T., Jiminez, D., King, B., Larcey, P. & Levy, K. 2021. Artificial intelligence, systemic risks and sustainability. *Technology in Society*, 67:1-10. [Online] Available from https://www.sciencedirect.com/science/article/pii/S0160791X21002165?via%3Dihub [Accessed 2022-03-23].

Garvey, M.D. 2021. A philosophical examination on the definition of cyberspace (Chapter 1). In: Carnovale, S. & Yeniyurt, S. (eds.) *Cyber security and supply chain management: Risks, challenges and solutions*, World Scientific Publishing Company. Downloadable from https://www.worldscientific.com/doi/pdf/10.1142/9789811233128_0001 [Accessed: 2022-02-14].

Gautier, A. & Somogyi, R. 2020. Prioritization vs zero-rating: Discrimination on the internet. *International Journal of Industrial Organization*, 73 (2020) 102662. [Online] Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7495184/ Accessed 2022-05-01.

Gillen, M. & Reddy, S. 2018. Ethics should inform AI – but which ethics? (Chapter 5.3). In: Stückelberger, C. & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. Free PDF downloadable from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

Globethics.net. 2018. Ethics in the information society: The nine P's. In: Stückelberger, C. & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. Free PDF downloadable from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

Golden, J. 2019. AI has a bias problem: This is how we can solve it. *WorldQuant Predictive*. [Online] Available from https://www.weforum.org/agenda/2019/01/to-eliminate-human-bias-from-ai-we-need-to-rethink-our-approach [Accessed 2022-05-21].

Green, B. 2021. The contestation of tech ethics: A sociotechnical approach to technology ethics in practice. *Journal of Social Computing,* 2(3):209-225. [Online] Available from https://scholar.google.co.za/scholar_url?url=https://arxiv.org/pdf/2106.01784&hl=en&sa=X&ei=I6lCYsybCpLeyQSQoL7oCQ&scisig=AAGBfm3XxbQ_Bh4Lj3XYZU2gWzBvEN-wDQ&oi=scholarr [Accessed 2022-02-15].

Hermstrüwer, Y. & Werkmeister, C. 2016. Using the Internet's fast lane: Exemptions from Net neutrality. *Cambridge International Law Journal*, May

2016. [Online] Available from http://cilj.co.uk/2016/05/12/using-internets-fast-lane-exemptions-net-neutrality/ [Accessed 2022-04-29].

Holling, C.S. & Meffe, G.K. 1996. Command and control and the pathology of natural resource management. *Conservation Biology,* 10(2):328-337. https://doi.org/10.1046/j.1523-1739.1996.10020328.x

Hopper, E. 2020. Maslow's hierarchy of needs explained. ThoughtCo, February 2020. [Online] Available from https://www.thoughtco.com/maslows-hierarchy-of-needs-4582571 [Accessed 2022-04-01].

Hopster, J. 2021. What are socially disruptive technologies? *Technology in Society*, 67:1-8. [Online] Available from https://www.sciencedirect.com/science/article/pii/S0160791X21002256?via%3Dihub [Accessed 2022-03-24].

Horwitz, G. 2019. Understanding net neutrality. *ThirdWay.org*, April 2019. [Online] Available from https://www.thirdway.org/memo/understanding-net-neutrality [Accessed 2022-04-30].

International Committee of the Red Cross (ICRC). 2018. Ethics and autonomous weapon systems: An ethical basis for human control? (Chapter 18). In: Stückelberger, C. & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. Free PDF downloadable from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

iWMS. 2020. Building an ethical supply chain. *WMS Supply Chain Solutions*. [Online] Available from https://iwms.co.za/2020/01/31/building-an-ethical-supply-chain/ [Accessed 2022-04-27].

Kulkarni, A. 2021. Bias and AI in machine learning: Sources and solutions. *Lexalytics*. [Online] Available from https://www.lexalytics.com/lexablog/bias-in-ai-machine-learning [Accessed: 2022-03-17].

Lee, K-F. 2021. The third revolution in warfare. *The Atlantic*, September 2021. [Online] Available from https://www.theatlantic.com/technology/archive/2021/09/i-weapons-are-third-revolution-warfare/620013/ [Accessed 2022-03-22].

Lee, N., Resnick, P. & Barton, G. 2019. Algorithmic bias detection and mitigation: Best practices and policies to reduce consumer harms. *The Brookings Institution*, May 2019. [Online] Available from https://www.brookings.edu/research/algorithmic-bias-detection-and-mitigation-best-practices-and-policies-to-reduce-consumer-harms/#footnote-9 [Accessed 2022-04-01].

Legal Information Institute. Not dated. *Intellectual Property*. Cornell Law School. [Online] Available from https://www.law.cornell.edu/wex/intellectual_property [Accessed 2022-03-30].

Makaula Z. 2021. Information and communication technologies (ICT) towards agricultural development in rural areas: Case of smallholder farmers in Umzimvubu local municipality of the Eastern Cape Province in South Africa.

South African Journal of Agricultural Extension; 49(1):81-90. [Online]. Available from: https://sajae.co.za/article/view/10779 [Accessed 2022-04-19].

McCammon, C. 2018. Domination. *The Stanford Encyclopedia of Philosophy* (Winter 2018 Edition), Edward N. Zalta (ed.) [Online] Available from https://plato.stanford.edu/archives/win2018/entries/domination/. [Accessed 2022-05-02].

McKenna, M. 2019. Three notable examples of AI bias. *AI Business*, October 2019. [Online] Available from https://aibusiness.com/document.asp?doc_id=761095# [Accessed 2022-05-17].

Miller, S. 2020. Freedom of political communication, propaganda and the role of epistemic institutions in cyberspace. In: M. Christen et al. (eds.), *The Ethics of Cybersecurity*, The International Library of Ethics, Law and Technology 21, https://doi.org/10.1007/978-3-030-29053-5_11 [Accessed 2022-03-30].

Moyer, D.M. & Hedden, S. 2020. Are we on the right path to achieve the sustainable development goals? *World Development*, 127, March 2020. [Online] Downloadable from https://www.sciencedirect.com/science/article/pii/S0305750X19303985 [Accessed: 2022-03-15].

National Planning Commission of South Africa. 2012. Chapter 6. An integrated and inclusive rural economy. In: *National Development Plan 2030: Our future – make it work*. Pretoria: Government Printer. [Online] Available from https://www.gov.za/issues/national-development-plan-2030 [Accessed 2022-03-24].

Omowole, A. 2021. Research shows AI is often biased. *World Economic Forum*, July 2021. [Online] Available from https://www.weforum.org/agenda/2021/07/ai-machine-learning-bias-discrimination/

Parschau, C. & Hauge, J. 2020. Is automation stealing manufacturing jobs? Evidence from South Africa's apparel industry. *Geoforum*, Vol. 115:120-131. [Online] Available from https://www.sciencedirect.com/science/article/pii/S0016718520301871 [Accessed 2022-03-31].

Paturel, A. 2014. Game theory: The effects of video games on the brain. *Brain & Life*, June/July. [Online] Available from https://www.brainandlife.org/articles/how-do-video-games-affect-the-developing-brains-of-children [Accessed 2022-04-21].

Pazzanese, C. 2020. Trailblazing initiative marries ethics, tech. *The Harvard Gazette*, October 16, 2020. [Online] Available from https://news.harvard.edu/gazette/story/2020/10/experts-consider-the-ethical-implications-of-new-technology/ [Accessed: 2022-02-15].

Phoenix, J. 2020. *The pros and cons of artificial intelligence*. [Online] Available from https://understandingdata.com/artificial-intelligence-advantages-and-disadvantages/ [Accessed 2022-03-24].

Pozzana, I. & Ferrara, E. 2020. Measuring bot and human behaviour dynamics. *Frontiers in Physics*, April 2020. [Online] Available from https://www.frontiersin.org/articles/10.3389/fphy.2020.00125/full [Accessed 2022-03-31].

Puddephat, A. 2016. Freedom of expression and the internet. *UNESCO*. [Online] Available from https://unesdoc.unesco.org/ark:/48223/pf0000246670 [Accessed 2022-04-16].

Rochel, J. 2018. Towards a just Internet: A republican Net neutrality. In: Stückelberger, C, & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. [Online] Available from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

Saruta, F. 2021. Effects of vertical integration on Internet service providers' zero-rating choice. *MPRA Paper No. 110288*, November 2021. [Online] Available from https://mpra.ub.uni-muenchen.de/110288/. [Accessed 2022-04-29].

Sax, M. 2016. Big data: Finders keepers, losers weepers? *Ethics and Information Technology,* 18:25-31. [Online] Available from https://link.springer.com/article/10.1007/s10676-016-9394-0 [Accessed: 2022-03-28].

Schuelke-Leech, B. 2018. A model for understanding the orders of magnitude of disruptive technologies. *Technological Forecasting and Social Change*, 129:261-274. [Online] Available from https://www.sciencedirect.com/science/article/abs/pii/S0040162517314610 [Accessed 2022-03-28].

Scott, B. Heumann, S. & Kleinhans, J. 2015. Landmark EU and US net neutrality decisions: How might pending decisions impact internet fragmentation. *Global Commission on Internet Governance*, July, 2015. [Online] Available from https://www.cigionline.org/documents/949/no18.pdf [Accessed 2022-04-30].

Security.org. Not dated. *How secure is my password?* [Online] Available from https://www.security.org/how-secure-is-my-password/ [Accessed: 2022-03-18].

Shapiro, A. 2019. Autonomous weapon systems: Selected implications for International security and for Canada. *Library of Parliament*, Publication No. 2019-55-E. [Online] Available from https://lop.parl.ca/sites/PublicWebsite/default/en_CA/ResearchPublications/201955E [Accessed 2022-05-22].

Siwiki, B. 2021. How AI bias happens–and how to eliminate it. *Healthcare IT News*, November 2021. [Online] Available from https://www.healthcareitnews.com/news/how-ai-bias-happens-and-how-eliminate-it [Accessed 2022-04-01].

Smith, A. 2021. Creating a sustainable and ethical supply chain. *PlugandPlay*. [Online] Available from

https://www.plugandplaytechcenter.com/resources/creating-sustainable-and-ethical-supply-chain/ [Accessed 2022-04-27].

Smith, R. 2018. Five core principles to keep AI ethical (Chapter 5.2). In: Stückelberger, C. & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. [Online] Available from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

Stahl, B., Timmermans, J. & Flick, C. 2017. Ethics of emerging information and communication technologies. *Science and Public Policy*, 44(3), 369-381. [Online] Available from doi: 10.1093/scipol/scw069 [Accessed 2022-02-16].

Stevens, H. & Huys, I. Innovative approaches to increase access to medicines in developing countries. *Frontiers in Medicine*, 4:218. [Online] Available from https://www.frontiersin.org/articles/10.3389/fmed.2017.00218/full [Accessed 2022-03-30].

Stückelberger, C. 2018. Cyber society: Core values and virtues. In: Stückelberger, C, & Duggal, P. (eds.) *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. [Online] Available from http://hdl.handle.net/20.500.12424/169317 [Accessed: 2022-02-14].

Stückelberger, C. & Duggal, P. (eds.) 2018. *Cyber ethics 4.0: Serving humanity with values*. Geneva: Globethics. [Online] Available from http://hdl.handle.net/20.500.12424/169317 [Accessed 2022-02-14].

Suri, A. 2017. Artificial intelligence and the rise of economic inequality. *Towards Data Science*, August 2017. [Online] Available from https://towardsdatascience.com/artificial-intelligence-and-the-rise-of-economic-inequality-b9d81be58bec [Accessed 2022-04-01].

Triberti, S., Milani, L. Villani, D., Grumi, S. Peracchia, S., Curcio, G. & Riva, G. 2018. What matters is when you play. *Addictive Behaviors Reports* 8 (2018) 185-188. [Online] Available from https://doi.org/10.1016/j.abrep.2018.06.003https://reader.elsevier.com/reader/sd/pii/S235285321830035X?token=7653AF56CBA36446822DC7FE09D078B23E07F4649C1931F5C7127AF523E7C9D6C8E8A97755EB8B858A4DA5024596FDE1&originRegion=eu-west-1&originCreation=20220425153048 [Accessed 2022-04-25].

Turja, T., Särkikoski, T., Koistinen, P. & Mellin, H. 2022. Basic human needs and robotization: How to make deployment of robots worthwhile for everyone. *Technology in Society*, 68:1-10. [Online] Available from https://www.sciencedirect.com/science/article/pii/S0160791X22000586 [Accessed 2022-03-23].

Turner Lee, N., Resnick, P. & Barton, G. 2019. Algorithmic bias detection and mitigation. *Governance Studies, Brookings* (May 2019). [Online] Available from https://www.brookings.edu/research/algorithmic-bias-detection-and-mitigation-best-practices-and-policies-to-reduce-consumer-harms/ [Accessed 2022-05-17].

UK Government. 2018. *AI in the UK: ready, willing and able?* Paper 100 published by the authority of the House of Lords. [Online] Available from https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf. [Accessed: 2022-03-10].

UK Rehab. Not dated. Gaming addiction explained. *UK Rehab*. [Online] Available from https://www.uk-rehab.com/behavioural-addictions/gaming/ [Accessed 2022-04-22].

UNESCO. Not dated. *Artificial intelligence: Examples of ethical dilemmas*. [Online] Available from https://en.unesco.org/artificial-intelligence/ethics/cases [Accessed: 2022-03-15].

UNESCO. 2012. *Inclusive Knowledge Societies for Sustainable Development*. [Online] Available from https://www.un.org/en/development/desa/policy/untaskteam_undf/groupb_unesco_knowledge_societies.pdf [Accessed 2022-03-29].

UNESCO. 2016. How we could triple the availability of textbooks. *Global Education Monitoring Report*. [Online] Available from https://world-education-blog.org/2016/01/19/how-we-could-triple-the-availability-of-textbooks/ [Accessed 2022-03-30].

UNESCO. 2021. Promoting open access to information for all and supporting multilingualism. [Online] Available from https://en.unesco.org/ci-programme/open-access [Accessed 2022-03-31].

UNICEF Office of Research. 2018. *Policy guide on children and digital connectivity*. United Nations Children's Fund, New York. [Online] Available from https://www.unicef.org/esa/media/3141/file/PolicyLab-Guide-DigitalConnectivity-Nov.6.18-lowres.pdf [Accessed: 2022-02-28].

Valentiner, T. 2018. 8 guiding principles for building ethical global supply chains. GreenBiz. [Online] Available from https://www.greenbiz.com/article/8-guiding-principles-building-ethical-global-supply-chains [Accessed 2022-04-27].

Vallor, S., Raicu, I. & Green, B. 2020. Technology and engineering practice: Ethical lenses to look through. *The Markula Center for Applied Ethics at Santa Clara University*. [Online] Available from http://www.scu.edu/ethics/. [Accessed 2022-02-15].

VCEWeb. 2022. Maslow's hierarchy of needs. [Online video] Available from https://www.youtube.com/watch?v=ei26_TjBlhI [Accessed 2022-04-15].

Von der Heiden, J., Braun, B., Muller, K. & Egloff, B. 2019. The association between video gaming and psychological functioning. *Frontiers in Psychology*, July 2019. [Online]. Available from https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01731/full [Accessed 2022-04-25].

Wang, J-L., Sheng, J-R. & Wang, H-Z. 2019. The association between mobile game addiction and depression, social anxiety, and loneliness. *Frontiers in*

Public Health, Vol. 7:Article 247. [Online] Available from doi: 10.3389/fpubh.2019.00247 [Accessed 2022-04-25].

Westland, J. 2022. An introduction to supply chain management (SCM). *Project Manager*, February 2022. [Online] Available from https://www.projectmanager.com/blog/supply-chain-management [Accessed 2022-04-28].

Wihbey, J. 2019. Net neutrality. *Blackwell Encyclopedia of Sociology*. [Online] Available from https://camd.northeastern.edu/wp-content/uploads/2018/02/Net-Neutrality-entry_Blackwell-Encyclopedia-of-Sociology-1.pdf [Accessed 2022-04-30].

Wikipedia. Not dated. *Industrial revolution*. [Online] Available from https://en.wikipedia.org/wiki/Industrial_Revolution [Accessed: 2022-02-21].

Wikipedia. Not dated. *Digital revolution*. [Online] Available from https://en.wikipedia.org/wiki/Digital_Revolution [Accessed: 2022-02-21].

Wikipedia. Not dated. *Fourth industrial revolution*. [Online] Available from https://en.wikipedia.org/wiki/Fourth_Industrial_Revolution [Accessed: 2022-02-21].

Wikipedia. Not dated. *Net neutrality*. [Online] Available from https://en.wikipedia.org/wiki/Net_neutrality [Accessed 2022-04-29].

Wikipedia. Not dated. *Republic*. [Online] Available from https://en.wikipedia.org/wiki/Republic [Accessed: 2022-04-01].

Wikipedia. Not dated. *Sustainable development goals*. [Online] Available from https://en.wikipedia.org/wiki/Sustainable_Development_Goals [Accessed: 2022-02-22].

ITU-T 1994. Recommendation X.200 (07/94) Information technology—open systems interconnection—basic reference model: the basic model

Braden, R. Ed. 1989. RFC 1122

Equality vs. equity: What is the difference? (no date) Merriam-Webster. Available at: https://www.merriam-webster.com/grammar/equality-vs-equity-difference [Accessed: 2024-04-01].

What is the OSI model? | cloudflare. Available at: https://www.cloudflare.com/learning/ddos/glossary/open-systems-interconnection-model-osi/ [Accessed: 2024-04-05].

(FOIA), F. of I.A. (no date) Foia.gov (Freedom of Information Act) Home Page, Freedom of Information Act. Available at: https://www.foia.gov/ [Accessed: 2024-04-05].