

Big Data Science and Artificial Intelligence: A Paper by the National Council of Churches of Singapore

In May 2023, the Bioethics Advisory Committee (BAC) published a consultation paper “Ethical, Legal and Social Issues Arising from Big Data and Artificial Intelligence Use in Human Biomedical Research”.¹ The National Council of Churches of Singapore (NCCS) has accepted an invitation from the BAC to comment on the paper.

The NCCS commends the BAC for a substantive and well-thought contribution to the discourse and guidance around the use of big data and artificial intelligence in human research. The considerable expertise of the review group, wide-ranging breadth of issues covered, and the thorough discussion therein attest to the seriousness with which the BAC treats the subject.

The BAC paper covers ethical, legal and social issues. We are grateful for the invitation from the BAC to comment on their consultation paper, not least because it is a salutary reminder that ethics, law and society are topics which the Christian faith has had a well-documented tradition of sustained reflection on and a profound concern for. We see this invitation as a sound occasion for Christians to bring our well-documented theological and moral tradition to bear on an issue that is an inextricable feature of life in the modern world: big data science and artificial intelligence. The NCCS is delighted to offer this paper, which is not an expository critique of the BAC’s laudable consultation paper, but part of a complementary contribution to the Church and society as we reason together on human dignity and the common good.

THE AGE OF BIG DATA

The era of big data is underway. An increasingly digitised world is characterised by the sheer density of information, ubiquitous presence, a massive proliferation of ways to connect electronically, a decrease in cost, and an increase in technological advances in data processing, storage, and collection. This multifaceted phenomenon brings developments in different fields together, seen in the emergence of technologies closely associated with big data: algorithms, nanotechnology,

¹ Bioethics Advisory Committee, *Ethical, Legal and Social Issues Arising from Big Data and Artificial Intelligence Use in Human Biomedical Research* (Singapore: 2023)

biotechnology, information technology, blockchain, cognitive science, artificial intelligence, virtual reality, and even quantum computing. All of these developments are becoming increasingly and systematically embedded in our lives.²

In 2001, big data was often considered to be characterised by “three Vs:” volume, variety, and velocity.³ Today, the ever-growing field of big data science can be defined according to seven Vs: volume, variety, velocity, veracity, visualisation, variability and value.⁴ As Viktor Mayer-Schönberger and Kenneth Cukier point out, scale is not the only development in big data: “Not only is the world awash with more information than ever before, but that information is growing faster. The change of scale has led to a change of state. The quantitative change has led to a qualitative one.”⁵ This rapidly sprawling phenomenon has already made impacts on economics, policing, security, science, education, policy, governance, health care, public health, and more. Significant organizational and intellectual changes have been effected by the advent of big data, and the expansive reach of big data means that its full ramifications are as-yet unfolding and more accurately, unforeseen.⁶

Technoreligion, Dataism and the Technological Future

“No social, human, or spiritual fact is so important as the fact of technique in the modern world. And yet no subject is so little understood.”⁷ For the theologian Jacques Ellul, the benefits that technology brought to human living was a double-edged sword, for “technical means gradually came to dominate the search for truth”.⁸ Technology had a reorienting effect on every aspect of human life, less of a neutral tool for good or ill, and more a “totalising force”.⁹

Jacques Ellul warned that with time, technology would become the sole mediator of all relations, transforming society into its own environment. It would supplant the old environment which humanity inhabited in order to create a new one where it would be supreme. He further warned that the natural and social world would get used as resources and plundered for technology’s aims.¹⁰ This, he posited, would

² Jerome Beranger, *Societal Responsibility of Artificial Intelligence: Towards an Ethical and Eco-Responsible AI* (London: ISTE Press, 2021), xi.

³ Doug Laney, “3D Data Management: Controlling Data Volume, Velocity, and Variety”, <http://blogs.gartner.com/doug-laney/files/2012/01/ad949-3D-Data-Management-Controlling-Data-Volume-Velocity-and-Variety.pdf> (accessed on 5 July 2023).

⁴ Beranger, *Towards an Ethical and Eco-Responsible AI*, xiii.

⁵ Viktor Mayer-Schönberger and Kenneth Cukier, *Big Data: A Revolution That Will Transform How We Live, Work and Think* (London: John Murray, 2013), 6.

⁶ Jacob Metcalf, Emily Keller, and danah boyd, *Perspectives on Big Data, Ethics and Society* (Council for Big Data, Ethics, and Society: 2023), 3.

⁷ Jacques Ellul, *The Technological Society* (New York: Alfred A. Knopf, 1964), xi.

⁸ Jacques Ellul, *Presence in the Modern World* (Eugene, OR: Cascade Books, 2016), 41.

⁹ Jason Thacker, *The Digital Public Square: Christian Ethics in a Technological Society* (Brentwood, TN: B&H Academic, 2023), 13.

¹⁰ Jacques Ellul, *The Technological System* (New York: Continuum, 1980), 36.

lead to an autonomous and deterministic process where the state and science depend on technology for their survival.¹¹ After all, technology is self-augmenting. By that Ellul meant that the invention of new technologies leaves open the possibilities for further invention and development of other related technologies. Innovation creates a space for more innovation, until humanity is entirely caught up by technological revolution: “all people in our time are so passionate about technology, so utterly shaped by it, so assured of its superiority, so engulfed in the technological environment, that they are all, without exception, oriented toward technological progress... no matter what their trade”.¹²

Ellul’s description of the effects of technology and the difficulty of understanding it seems bleak, and yet it is premonitory, especially in light of the advent of big data. One illuminating term that could be applied to big data science and artificial intelligence is that it is now a “hyperobject”: something that is massively distributed in time and space relative to humans.¹³ This not only makes it near-impossible to appreciate or understand, but, as Timothy Morton explains, creates a certain “weakness” that arises from “the gap between phenomenon and thing, which the hyperobject makes disturbingly visible.”¹⁴ As a hyperobject, big data science triggers both utopian and dystopian rhetoric. On the one hand, it offers the promise of addressing societal ills, offering the potential for epoch-making breakthroughs in cancer research, global terrorism, and climate change. On the other hand, precisely because it is increasingly pervasive, it can be seen as enabling a state of near-total surveillance, decreased freedom, and increased control (both overtly, as in coercive power, and subtly, as in algorithms providing subliminal messaging or worldview-shaping).¹⁵

Is it any wonder, given this sense in which big data is perceived as a totalising force, a hyperobject that is seemingly omniscient, omnipresent, and omnipotent, that Yuval Harari names this emerging techno-religion as “Dataism, which venerates neither gods nor man – it worships data”?¹⁶ Despite a profound misunderstanding of Christianity, Jerome Beranger’s words are descriptive of this new techno-religion: “[Biblical] texts say that ‘God is everywhere, in each one of us... and guides our choices.’ Two thousand years later, this quote is still relevant, with *an aging God who has taken a digital form*: ‘Algorithm is everywhere in each one of us... and guides our choices!’”¹⁷

¹¹ Ellul, *The Technological System*, 130-153.

¹² Ellul, *The Technological System*, 209.

¹³ Timothy Morton, *The Ecological Thought* (Cambridge, MA: Harvard University Press, 2010), 130-135.

¹⁴ Timothy Morton, *Hyperobjects: Philosophy and Ecology After the End of the World* (Minneapolis, MN: University of Minnesota Press, 2013), 2.

¹⁵ danah boyd and Kate Crawford, “Critical Questions for Big Data”, *Information, Communication & Society*, vol. 15, no. 5 (2012): 664.

¹⁶ Yuval Noah Harari, *Homo Deus: A Brief History of Tomorrow* (Canada: Signal Books, 2016), 371.

¹⁷ Jerome Beranger, *The Algorithmic Code of Ethics: Ethics at the Bedside of the Digital Revolution* (London: ISTE Press, 2018), xii.

Christian Faith, Science, and Technology

To leave it there would be to adopt a counsel of despair. But neither Ellul, nor the broader Christian faith which animates his thought, are content to leave the discussion on this note. The Bible speaks glowingly of creative efforts that leverage technology for God's glory, such as in the description of the building of the Ark of the Covenant or Solomon's Temple. In Genesis, it is God's gift of higher technology at junctures of profound human sin that make life possible in a fallen world: the gift of tunics of flesh to Adam and Eve prior to their expulsion from Eden, for example, or the instructions to build the ark prior to the flood. In these cases, it is possible to see a Biblical implication that technology can serve as a gift from God. Indeed, this reflects the truth that our experience and utilisation of technology is inextricable from the context of humanity's fall into sin. At the same time it also highlights our dependency on technology for the remediation of sin's effects in the world.

Historically, the Church and her members have done important work towards advancing science and technology. Many aspects of the Christian worldview formed the basis for exploration and the scientific enterprise. Brian Patrick Green helpfully catalogues a number of these contributions: metalworking by Benedictine monks; the founding of schools, libraries and scriptoria that enabled the transmission of technical knowledge; the first known tidal-powered water wheel found in an Irish monastery; the first impact-drilled well, drilled by Carthusian monks in France, and more.¹⁸

That is not to say that the Church has uncritically adopted every technological advance. The Church has condemned some technologies, especially where they threaten human dignity and the common good. A paradigmatic example where Christianity refuses modern technological advances would be in the case of weapons of mass destruction such as nuclear weapons.

In these cases, it is not that technology is either an unmitigated blessing or an unmitigated evil. A helpful response to technology comes from Pope Francis's encyclical *Laudato Si*, which embraces technological progress but rejects what he calls the "technocratic paradigm".¹⁹ Simply put, the Pope is not against science and technology that works for the common good, but rather he opposes the belief that technology can solve every problem without reference to ethics and morality,

¹⁸ Brian Patrick Green, "*The Catholic Church and Technological Progress: Past, Present, and Future*", *Religion and the New Technologies*, (Basel: MDPI), 17-19. Green also lists prominent Christian scholars such as Gregor Mendel, the father of genetics; and Louis Pasteur, the father of microbiology.

¹⁹ Pope Francis, *Laudato Si*, encyclical letter, Vatican website, 24 May 2015, 106-114, accessed 4 July 2023, https://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

because “a technology severed from ethics will not easily be able to limit its own power.”²⁰

From the perspective of the Christian faith, we seek neither to neuter technological advances like artificial intelligence and big data science, nor do we rush headlong to advance technical power. Christianity disavows any attempt to enthrone technology as salvific, in both the temporal and cosmic realms. The faith denies any claims of human mastery over creation, contingency and creatureliness. Most of all, the Church rejects any usurpation of true worship that must be offered to God. Technological prowess and progress are able to effect many marvels, but the way to salvation lies outside the grasp of any ingenuity, human or artificial. No amount of technology can bridge the gap between humanity and God. What we need are not better or more formidable technologies, but ethics: learning to love the right things, rightly. “‘You shall love the Lord your God with all your heart and with all your soul and with all your mind.’ This is the greatest and first commandment. And a second is like it: ‘You shall love your neighbour as yourself.’ On these two commandments hang all the Law and the Prophets.” (Matthew 22:37-40). Christians are a people who seek first to love God, out of which flows a love for neighbour; we learn to live based on the object of our love. We must love all things in relation to God. “For to enjoy a thing is to rest with satisfaction in it for its own sake. To use, on the other hand, is to employ whatever means are at one’s disposal to obtain what one desires”.²¹ Against the worship or fear of technologies like big data science and A.I., God is our goal. Christians and nonbelievers alike are able to use creational goods like science and technology. The difference is that the earthly city is ‘earthly’ because it does not relate these goods to God; the heavenly city is ‘heavenly’ because it relates earthly goods to God both in heaven and on earth.²²

The right Christian response to advances like big data and A.I. is to refer them to the order of love, and to seek to use them rightly. We are fully aware of the challenges that these developments have in forming our loves. As noted above, the temptation, when confronted by such a hyperobject, is to fear or worship. What matters for the Church, however, is not so much our possessing or lacking knowledge of a thing, but wisdom: the wisdom to know how to live in the world by loving God and neighbour rightly.

We have no certainty of what the future of big data science and artificial intelligence holds. But we do know that the future is not simply one constructed by human and machine interaction. The future is not simply the inevitable projection of our technological mastery. Rather, it belongs to the God who alone makes all things new. (Rev 21:5). The Christian account of the future is that it is God’s future. Our

²⁰ *Laudato Si*, 136.

²¹ Augustine, *On Christian Doctrine*, bk. I.4. Augustine continues in b. 1.5 to explain that the only true object of enjoyment – i.e. love for its own sake – is the Trinity.

²² Augustine, *The City of God Against the Pagans*, bk. XIV and XV.

actions today for the future are built upon the promises of an interpersonal God, for when Christians speak of the future we refer first to a God who will come again. Talk about the future in the Christian context is derived not from statistical projections or futurism, but from the relationship the Triune God has with His Creation.

Christian Ethics, Big Data and Artificial Intelligence

Since it is not technology but rightly-ordered love that is the concern of the Christian, it stands to reason then that ethics will be at the heart of our response to big data and artificial intelligence.

Projects are praiseworthy insofar as they utilize big data and A.I. to serve human dignity and the common good. We celebrate the fact that many of these technologies are already deployed in health care and medical research, which have proven beneficial for the common good of society.²³

On the other hand, as our response will show, we are also aware and concerned by common harms that big data and A.I. can foster. There are concerns over data colonialism, stewardship, justice, enforcement, control, and privacy, to name a few. The “Collinridge dilemma” well expresses the difficulty in attempting to control a technology: because we know too little about its implications during early development to warrant slowing down; but by the time we become aware of the consequences, the power to change it is diminished.²⁴

If big data science is to serve human dignity and the common good, then there will be a need to build up trust in those who regulate, develop, and use these technologies in human research. As Onora O’Neill has pointed out, we need trust, yet trusting often seems hard or risky. We live in “a risk society... among highly complex institutions and practices whose effects we cannot control or understand”, and we “see ourselves as subject to hidden and incomprehensible sources of risk.”²⁵

Trust has been eroded. If we go down a path where we cannot trust institutions, or the people in them, or the systems they put in place, then society cannot seek the common good together. The challenge for all of us is to build up our structures and institutions so that trust can be rebuilt. This will require demonstrable action which gives people confidence that they are being served rather than exploited. We are all

²³ Michael Miller Jr., “Catholic Health Care and AI Ethics: Algorithms for Human Flourishing”, *The Linacre Quarterly*, vol. 89, no. 2 (2022): 153. Miller Jr. shares how A.I. has been used to project re-admission rates, mortality, sepsis in hospitals to support allocation of resources; A.I. used in diagnostic imaging; and even A.I. designed for public health to combine geospatial and user-generated data e.g. GPS-location data to explore contributing factors to community health outcomes.

²⁴ Audley Genus and Andy Stirling, “Collinridge and the Dilemma of Control: Towards Responsible and Accountable Innovation”, *Research Policy*, vol 47, no 1 (2018):61-69.

²⁵ Onora O’Neill, *A Question of Trust* (Cambridge: Cambridge University Press, 2002), 15.

in some way complicit in the current predicament, and the restoration of trust perhaps requires us all to change.

What this means is that concerns over big data and A.I. cannot be simply concerns about breaking the rules. It calls for the consideration of genuine moral virtue, the development of principles within these technologies which reflect real respect for others and a desire to do good. It requires, in other words, ethics, not better technology.

For these reasons, in what follows, we have opted to guide our deliberations on big data and A.I. based on two principles that derive from our desire to love God and neighbour: 1) human dignity; and 2) the common good.

ON HUMAN DIGNITY

The use of ethical principles to guide reflections and the use of big data and A.I. in human biomedical research is a welcomed step.²⁶ At the most basic level, it articulates that big data and A.I. are not unbridled ends in themselves but are constrained by moral deliberations. The chosen ethical principles of respect for persons, solidarity, justice, proportionality, sustainability, etc., are fair principles that are commonly used ethical considerations.

It is to these that that the Christian worldview might add the principle of human dignity. Human dignity has been an important Christian contribution to the realm of ethics. For example, it is commonly acknowledged that the Christian tradition provides the foundation of human dignity on which the Universal Declaration of Human Rights is built upon, even if there was admittedly little direct influence by the Christian faith.²⁷ In fact, human dignity has often been the cornerstone of Christian social ethics, whether Protestant or Catholic.²⁸ It is our belief that this more fundamental principle could help to undergird the ethical considerations of the paper by making it more roused and rooted. The principle of human dignity could, for example, offer a deeper anchoring rationale for the ethical principle of

²⁶ Bioethics Advisory Committee, *Ethical, Legal and Social Issues Arising from Big Data and Artificial Intelligence Use in Human Biomedical Research* (Singapore: 2023), 20-24.

²⁷ Sigrid Müller, "Concepts and Dimensions of Human Dignity in the Christian Tradition," *Interdisciplinary Journal for Religion and Transformation in Contemporary Society* 6, no. 1 (2020): 22.

²⁸ Writing from a Protestant point of view, Matz argues that human dignity is rightfully the first social principle of Christian social ethics because from it flows every other principle. In the same vein, Himes notes that the human person and their inherent dignity is the fundamental concern of Catholic social teaching. Brian Matz, *Introducing Protestant Social Ethics: Foundations in Scripture, History, and Practice* (Grand Rapids, MI: Baker Academic, 2017), 157.; Kenneth R. Himes, *Responses to 101 Questions on Catholic Social Teaching* (New York: Paulist Press, 2001), 25. See also David Hollenbach, "Human Dignity in Catholic Thought," in *The Cambridge Handbook of Human Dignity* (Cambridge: Cambridge University Press, 2014.), 250–259.

respect for persons. In this way, the principle of respecting another human being is not merely a good subjective idea. Rather, it is based on the objective basis of an intrinsic, inalienable, and indelible human worth.

Scripture and Human Dignity

Human dignity is the belief that there is an intrinsic status and worth in all human beings that confers upon them respect, life, and freedom.²⁹ Within the Christian faith, this dignity is not simply arbitrary or subjective. Rather, it finds its origins in God who is the source and creator of all life. The creation account in Genesis tells us that God made humans in the image of God. This is the Christian doctrine of the *Imago Dei*. This is widely acknowledged to be the base and starting cornerstone of human dignity.³⁰ Humans bear something of the divine in us and that bestows on us a status, worth, and dignity that is not earned or merited, but inherently given by God. Human dignity, therefore, cannot be understood by reference to fellow human beings, but only in reference to God and His image.³¹

The main passages on this doctrine are found in Genesis 1:25a-27 and Genesis 9:6. The first passage reads: “Then God said, ‘Let us make man in our image, after our likeness. ... So God created man in his own image, in the image of God he created him; male and female he created them.’” The second passage states that “[w]hoever sheds the blood of man, by man shall his blood be shed, for God made man in his own image.” Theological interpretations and reflection on these passages are vast and varied.³² There are, however, some areas of consensus on the *Imago Deo* and human dignity.

Firstly, human worth and dignity is intrinsic, inalienable, and indelible. This is based on the fact that humans are created in the image of God. This makes humans qualitatively different from any other living or non-living thing.³³ We are distinct in

²⁹ Matz, *Introducing Protestant Social Ethics*, p.158.

³⁰ Alister E. McGrath, *Christian Theology: An Introduction, Fifth Edition* (Oxford: Blackwell, 2011), 349. Or, as the Catechism of the Catholic Church puts it, that the “human person is rooted in his/her creation in the image and likeness of God.” *Catechism of the Catholic Church*, Second Edition (Vatican City: Vatican Press, 1997), §1700.

³¹ Daniel F. Wright ed., *Essays in Evangelical Social Ethics* (Exeter, Devon: Paternoster Press, 1978), 135.

³² Erickson surmises that reflections could be grouped into three broad categories: (a) the substance view which links the image of God with a certain characteristic of the human person whether psychological or physical, (b) the relational view which regards the image of God not as something intrinsic but in the context of a relationship with God and/or other humans, and (c) the function view which locates the image of God in something that the human person does. Other discussions pertain as to whether there is a possible distinction between the “image” and the “likeness” of God. Millard J. Erickson, *Christian Theology, Second Edition* (Grand Rapids, MI: Baker Academic, 1998), 520-529. See also McGrath, *Christian Theology*, 348-349.; Müller, “Concepts and Dimensions of Human Dignity in the Christian Tradition,” 31-32.; Matz, *Introducing Protestant Social Ethics*, 160-164.

³³ Müller, “Concepts and Dimensions of Human Dignity in the Christian Tradition,” 24-25.

that no other created thing bears the image of God. Some Christian thinkers have tried to locate this image substantively in some psychological or physical aspect of the human person such as the human ability to reason.⁵⁴ Yet, locating it within one particular aspect runs the risk of de-humanisation. Are those whose sense of reasoning are impaired or incapacitated for whatever reason still human, such as comatose patients? Rather, there is some broad agreement that the image is intrinsic and inalienable. It is not found in *something* but in the very nature of being human. To be a human person *is* to be bestowed the image of God and thus human dignity.⁵⁵ This makes the Christian belief in human dignity a universal belief. Regardless of race, religious belief, or intellect, all humans bear the image of God and thus have an inherent dignity and worth.⁵⁶

Secondly, human dignity has a certain transcendence because it comes from God. The doctrine of *Imago Dei* implies that human dignity is not a gift or status accorded by fellow humans, or society, or the state. Neither is it based on individual accomplishment or merit. Human dignity comes directly from God because humans are made in the image of God. As such, it cannot be downplayed or disregarded by another human.⁵⁷ This is affirmed by the Roman Catholic Church as well in the papal encyclical *Gaudium et Spes*. It writes that the Church is “at once a sign and a safeguard of the transcendent character of the human person”.⁵⁸ There is something in every human that is divine, even if it is just an image of the divine. Every human being should be respected and accorded dignity.

This is a key reason why human life is deemed as sacred within the Christian worldview. Murder is prohibited because humans are created in God’s own image. This is articulated in Genesis 9:6 above. It is important to note that this text comes after the Fall of humankind with the introduction of sin. A corollary of this is the belief that the image of God is not lost because of the Fall. It remains inherent in humans. Furthermore, this also implies that the belief in human dignity has moral implications. The murder of a fellow human being is prohibited because he/she bears the image of God.⁵⁹ Put differently, the affirmation of human dignity is a

⁵⁴ For example, Augustine would locate it in the human memory, intellect, and will. Aquinas would see it in human reason and understanding. McGrath, *Christian Theology*, 348-349.; Matz, *Introducing Protestant Social Ethics*, 160-164.

⁵⁵ Erickson, *Christian Theology*, 532. Or again, the Catechism of the Catholic church states that “[b]eing in the image of God the human individual possesses the dignity of a person, who is not just something, but someone.” *Catechism of the Catholic Church*, Second Edition (Vatican City: Vatican Press, 1997), §357.

⁵⁶ Erickson, *Christian Theology*, 521, 535.; Müller, “Concepts and Dimensions of Human Dignity in the Christian Tradition,” 27.

⁵⁷ Wright ed., *Essays in Evangelical Social Ethics*, 167-168.; Sigrid Müller, “Concepts and Dimensions of Human Dignity in the Christian Tradition,” 46.

⁵⁸ Paul VI, *Gaudium et Spes* (Pastoral Constitution on the Church in the Modern World), Vatican Website, https://www.vatican.va/archive/hist_councils/ii_vatican_council/documents/vat-ii_const_19651207_gaudium-et-spes_en.html, §76. Accessed 28 June, 2023.

⁵⁹ Erickson, *Christian Theology*, 532 & 535.

countermeasure to the Fall and human sinfulness. To acknowledge that every person bears the image of God prohibits action that deny, downplay, or disregard it.

In other words, the doctrine of *Imago Dei* also is also the fundamental basis for moral rights and duty.⁴⁰ This is the third point that can be made regarding human dignity from a Christian perspective. An important aspect of being made in the image of God is that humans are God’s representatives on earth.⁴¹ Humans are qualitatively distinct from the rest of creation, but this privileged position also brings with it certain responsibilities. The text which describes humans being made in the image of God goes on to chronicle that humans were instructed to participate in God’s creative activity in the stewardship of creation and the act of procreation (Genesis 1:27-30). The distinct status as God’s image bearers immediately leads to responsibilities, duties, and care over others.

At the same time, the creation account in Genesis 2-3 also shows that God had given both Adam and Eve free will and choice. This is evidenced by the fact that (1) God placed the tree of knowledge of good and evil in the Garden of Eden, (2) gave them the command not to eat from it, (3) permitted the serpent to tempt them, and (4) allowed both Adam and Eve to eat the tree’s fruit and sin. Humans were clearly able to freely accept or reject God’s commands. This is to say that the freedom of choice is part of God’s gift to humans in creation. Human agency – the ability of the individual to make their own choices based on their own will and consideration – is part of that human dignity bestowed in creation.⁴² To respect human dignity is to respect human agency, or their freedom of choice. This is why the papal encyclical *Gaudium et Spes* writes that “[a]uthentic freedom is an exceptional sign of the divine image within the person”.⁴³ However, the encyclical is careful to note that this freedom is one that is directed to goodness. This brings us back full circle on this point. Human freedom, which is a part of the human dignity we observe in creation, is a freedom that is orientated towards morality (i.e., do not murder), goodness, and responsibility. The human person is free, and it is precisely the one who is free who can be morally responsible.⁴⁴

⁴⁰ Müller, “Concepts and Dimensions of Human Dignity in the Christian Tradition,” 24-25.

⁴¹ *Ibid.*, 25.

⁴² “The image refers to the elements in the makeup of man which enable the fulfilment of his destiny. The image is the powers of personality which make man, like God, a being capable of interacting with other persons, of thinking and reflecting, and of willing freely.” Erickson, *Christian Theology*, 532-533. See also Müller, “Concepts and Dimensions of Human Dignity in the Christian Tradition,” 26 & 45.

⁴³ Paul VI, *Gaudium et Spes*, §17.

⁴⁴ This point is made in the papal encyclical *Dignitatis Humanae*. In its open section, it writes that a “sense of the dignity of the human person has been impressing itself more and more deeply on the consciousness of contemporary man, and the demand is increasingly made that men should act on their own judgment, enjoying and making use of a responsible freedom, not driven by coercion but motivated by a sense of duty.” Paul VI, *Dignitatis Humanae* (Of the Dignity of the Human Person), Vatican Website, https://www.vatican.va/archive/hist_councils/ii_vatican_council/documents/vat-ii_decl_19651207_dignitatis-humanae_en.html, §1. Accessed 28 June, 2023.

The Christian view of human dignity is further shaped by the coming of Jesus Christ. Each of the points raised above is given greater significance by the incarnation of Christ. For one, the orthodox Christian belief is that the incarnate Jesus Christ is fully God and fully human. That means that of all the means possible, God chose to come as a human person for the redemption of the world. One implication of this is the fact that humankind or human nature is not inherently bad or evil. It can be used and imbued with good and the divine. Because of Christ's incarnation, the intrinsic, inalienable, and indelible human worth and dignity is at the very least affirmed, or perhaps, some might argue augmented. Moreover, the fact that Jesus came to die on the Cross so that humans might be redeemed and saved affirms that the humankind holds an inherent value and status that is worth saving.⁴⁵ Human dignity which was bestowed by God at creation is indeed further enriched by the significance of Jesus life, death, and the resurrection.

AI, Big Data, and Human Dignity

The Christian worldview holds firmly to the belief that there is an intrinsic, inalienable, and indelible human dignity in all persons. This dignity is bestowed transcendentally by being made in the image of God. Part of this dignity includes our human agency, that is, the freedom of choice. It also leads to responsibility, duty, and morality. This is a universal and normative claim of the Christian faith on human anthropology.

As such, it is our belief that it can and does hold relevance even to the field of big data and A.I. To put it simply, the human person should be front and centre in our considerations. The advancement of big data and A.I. – no matter what or how much benefits it may offer us – cannot displace the centrality of the human person in our considerations. Big data and A.I. should not replace or affront human dignity. Neither should it replace or diminish human agency. The human person is primary. Big data and A.I. should serve the good of humans and not vice versa.

This belief is not unique to Christians in Singapore. Take the Markkula Center for Applied Ethics in Santa Clara University as an example. They recently produced a well-researched handbook that helps its readers think through and operationalize ethics in technology.⁴⁶ It is interesting to note that the handbook was the fruit of academics from the university and experienced professionals from the technology and management sector, as well as the Vatican's Dicastery for Culture and Education. In short, it is possible for academia, industry and the Church to bring the best of their expertise to forge ethics that are both prudent and practical.

⁴⁵ Matz, *Introducing Protestant Social Ethics*, 157.

⁴⁶ Jose Roger Flahaux, Brian Patrick Green, and Ann Gregg Skeet, *Ethics in the Age of Disruptive Technologies* (Santa Clara, CA: Markkula Center for Applied Ethics and Santa Clara University, 2023).

The handbook is clear that the human person should be front-and-centre in any ethical considerations. Business governance, for example, is focused on the critical ethics factor of the human person. Ethics is not only about the prevention of wrongdoing, but also about human flourishing. As such, technology should be human centered and in the service of humanity. Conversely, government and companies should not work on projects would cause harm to human well-being.⁴⁷ The handbook proposes that the central ethical ideal should be “treating people and the planet morally correctly”.⁴⁸ This leads directly to the anchor principle: “Our Actions Are for the Common Good of Humanity and the Environment”.⁴⁹ This in turn gives rise to seven guiding principles:

1. Respect for Human Dignity and Rights
2. Promote Human Well-Being
3. Invest in Humanity
4. Promote Justice, Access, Diversity, Equity, and Inclusion
5. Recognize that Earth is for All Life
6. Maintain Accountability
7. Promote Transparency and Explainability.⁵⁰

The handbook then goes on to expand on these guiding principles and how they could yield specific principles. The first three are relevant to our discussion and well worth reproducing in full: Respect for Human Dignity and Rights – For the sake of the common good, all people deserve to be respected and treated as equals because of their fundamental nature as human beings.

- a. Autonomy and self-determination – We believe in human autonomy and self-determination. Individuals should be able to lead their own lives freely and seek to become the people they desire to be.
- b. Empowerment of individuals – Individuals should be empowered by technology rather than disempowered, overwhelmed, misled, or oppressed by it.
- c. Safety, security, & reliability – Technology should be safe, secure, and reliable. Technology should not intentionally or unintentionally harm people or facilitate the harming of others.
- d. Privacy and confidentiality – Technologies should protect personal data, honouring privacy and maintaining confidentiality.
- e. Participation in governance – Stakeholders should be consulted when subject to the decisions of others. Technologies are forms of power, and power can be oppressive. Technologies ought to be subject to governance that decreases the likelihood of their abuse.

⁴⁷ Ibid., 6-7.

⁴⁸ Ibid., 20.

⁴⁹ Ibid.

⁵⁰ Ibid., 21.

- f. Right to appeal to a human – In cases where automated decision-making is used, those subject to these decisions should be able to get an explanation of the automated decision from a person.
- g. Right to an explanation – Everyone subject to decisions by automated systems or bureaucracies deserves to access an explanation in response to their inquiries.

2. Promote Human Well-Being – Respecting human dignity means helping others pursue their well-being so they may achieve their potential. The products and services we offer also follow this principle.

- a. Do good & do no harm (beneficence & non-maleficence) – We believe in providing benefit for the common good and avoiding harm.
- b. Health & well-being – We act in ways that support human health and well-being, and create products which do the same.
- c. Safe and respectful working conditions – We have safe and respectful working conditions.
- d. Access to education – Everyone deserves access to education and we will work with society to encourage and enable this access.
- e. Conflict resolution – We will support efforts to resolve conflicts from the smallest to the largest scales.
- f. Care for the vulnerable – We will prioritize care for the vulnerable because their need is most urgent.
- g. Financial Security – We will support efforts for the common good by supporting access to financial security for all people.
- h. Emotional Well-being – We will consider the emotional well-being of those we directly and indirectly affect, whether through our direct actions or our products.
- i. Purpose and Meaning – We will enable, or at least not obstruct, people in their need to seek purpose and meaning in their lives.

3. Invest in Humanity – We act in ways that invest in humanity. Respecting dignity means investing in the sorts of institutions and processes that help human well-being and the common good.

- a. Good institutions – We will build sound, trustworthy, sustainable institutions that work to protect human dignity and the common good, and protect against efforts to undermine institutions and people’s trust in them.
- b. Long-term thinking – We will engage in and support long-term thinking for creating a better world rather than short-term thinking which may lead to long-term harms.
- c. Civility & community building – We will promote civility and civil dialogue with the goal of creating stronger communities.

- d. Building good character – We will support efforts towards cultivating good individual character along with community dispositions to facilitate good character.
- e. Creating healthy, inclusive cultures – We will work towards creating healthy cultures that are supportive and inclusive of all people.⁵¹

This is an excellent example of how human dignity can be applied as an ethical principle in technology. It starts as a broad guiding principle before cascading into specific actionable principles. In fact, many of the specific principles raised directly address common ethical issues in big data and A.I. such as data privacy and confidentiality.

Trust in Big Data and AI

We will also offer reflections in four areas: trust, privacy and security, accountability and responsibility, and biases. As Murphy et al. reveal, these were the most recurrent ethical issues in relation to A.I. and healthcare after reviewing more than 12,000 articles.⁵²

While the issue of trust was not cited in the BAC’s paper, Murphy et al. showed that recent literature concerning ethics in relation to A.I. have increasingly cited the need to maintain and build public trust.⁵³ Likewise, Richards and King have echoed the same point in the field of big data ethics. Recent controversies such as the Cambridge Analytica data scandal have caused a lot of mistrust in this area. This has led to big technology companies making that same clarion call for the restoration and rebuilding of trust. Brad Smith, Microsoft’s general counsel, wrote that “people won’t use technology they don’t trust”.⁵⁴ Again, the same point is made in Markkula’s handbook. A breach of trust will lead to reputational damage that would result in longer term harm. It is far better to build and protect public trust as much as possible.⁵⁵ Clearly, the issue of trust is paramount importance. We should note that this is a fraught and fragile task. O’Neill astutely points out that we currently live in a world where trust is in a great global deficit.⁵⁶

⁵¹ Flahaux, Green, and Skeet, *Ethics in the Age of Disruptive Technologies*, 108-109.

⁵² Kathleen Murphy, et al., “Artificial Intelligence for Good Health: A Scoping Review of the Ethics Literature.” *BMC Medical Ethics* 22, no. 1 (2021): 1-2, 19-26. This concurs with the concerns of the BAC paper and other literature too. See for example *The Ethics of Big Data: Balancing Economic Benefits and Ethical Questions of Big Data in the EU Policy Context* (Brussels: EESC, 2017), 57-63.; Neil M. Richards and Jonathan H King, “Big Data Ethics,” *Wake Forest Law Review* 49, no. 2 (2014): 393.; Natalia Díaz-Rodríguez, et al., “Connecting the Dots in Trustworthy Artificial Intelligence: From AI Principles, Ethics, and Key Requirements to Responsible AI Systems and Regulation” (2023).

⁵³ Kathleen Murphy, et al., “Artificial Intelligence for Good Health: A Scoping Review of the Ethics Literature,” 20-22.

⁵⁴ Richards King, “Big Data Ethics,” 415.

⁵⁵ Flahaux, Green, and Skeet, *Ethics in the Age of Disruptive Technologies*, 7 & 15.

⁵⁶ Onora O’Neill, *A Question of Trust: The BBC Reith Lectures 2002* (Cambridge: Cambridge University Press, 2002).

It could be the case that the BAC paper does not mention trust because it tends to be somewhat elusive as an ethical principle. What exactly does it mean for big data and A.I. to be trustworthy? Perhaps the Christian principle of human dignity could offer a paradigm of understanding trust. A person or organisation that respects, upholds, and builds human dignity is one that can be trusted. Governments, for example, show themselves to be trustworthy over time by serving the people. They recognise that the goal of the government should not be political longevity but human flourishing and the common good. In other words, that the human person and their good is primary. Such a government that respects and upholds human dignity is one that can be trusted. Likewise, big data and A.I. can build trust when those that develop and harness them show over time that they respect human dignity and are being used to serve people. Conversely, trust is broken when, for example, a person's data is used without prior consent. Those who used this persons' data have failed to respect their dignity as a human being. They have also failed to respect a fellow human's agency. This concern is particularly acute in the area of medical science. Patient data might contain sensitive information which could expose them to harm if leaked or shared without consent. In this way, respecting human dignity could provide the ethical foundation to build trust.

Data Privacy and Data Security

An area that the paper rightly cites flags as an ethical concern pertains to data. The related issues of data ownership, stewardship, security, and privacy are all important topics in A.I. and especially big data. Individuals must be able to trust that their data is used securely and appropriately, and that big data and A.I. will be deployed effectively and ethically.⁵⁷ Data privacy and data security could be viewed as one implication of respecting human dignity. A person's data is his/her personal and private information. It should not be used in ways that they did not consent to. This negates their freedom of choice or human agency because they did not agree to the use of their data in that way. A belief in human dignity which leads to a respect for persons must naturally affirm this point on data privacy and security.

Concerns in this area include the collection and use of patient data. This pertains to data privacy. Privacy has to do with information, specifically personal information which could be sensitive. It is one's right and prerogative to be able to decide on the use of one's own information. Patients must be adequately informed of the use of their data and be able to consent or reject to its use. Their consent should be sought if their data might possibly be used for purposes other than the said one originally consented to. This builds public trust in this area of data collection and privacy. Moreover, it is in line with the belief that freedom of choice should be respected as part of human dignity. Data security is another area of concern. Personal

⁵⁷ Kathleen Murphy, et al., "Artificial Intelligence for Good Health: A Scoping Review of the Ethics Literature," 19-20.

confidential data could be hacked or shared for profit. There is the danger of personal healthcare information being leaked to employers or insurance companies, which could lead to bias or prejudicial actions.

Murphy et al. cited an example in 2015 in the UK where data was shared between an A.I. research company, Google DeepMind, and the Royal Free London NHS Foundation Trust (NHS). 1.6 million patients' data which could potentially be identifiable was shared with DeepMind with the purpose of developing a clinical alert app to improve the management of acute kidney injury. However, questions were raised whether the content and quantity shared was commensurate with the aim of testing an app. Further questions were also asked why DeepMind was able to retain this data indefinitely. More importantly, this data was largely acquired in the absence of the patients' consent and the relevant regulatory bodies' approval. Both data privacy and data security were disregarded in this example. This resulted in a great decline in public trust in both in the NHS and the A.I.⁵⁸

Paterson and McDonagh make several good suggestions in this area of data privacy and data security. They recommend nine principles:

1. Purpose limitation principle.
 - a. Any collection of data should have a stated purpose instead of a blanket consent.
2. Data minimization principle.
 - a. Data collected should be kept to a minimal of what is relevant and adequate for its said purpose.
3. Requirements for Privacy by Design and Default.
 - a. Obligation to implement and maintain privacy should be made explicit in the design of the forms in data collection.
 - b. It should also be made the default that personal data should only be used for a specific and designed purpose.
4. Requirement to Conduct Data Protection Impact Assessment.
 - a. To consider the risk and impact of data lost.
5. Right to Erasure.
 - a. Data subjects have the right to seek the erasing of their personal data.
6. Make Re-identification of De-identified Data an offence.
 - a. In 2016, Australia made an amendment to their Privacy Act (1988) which makes an offence any re-identifying of de-identified government data.
7. Data Breach Notification.
 - a. Data subjects should be informed at the soonest when there has been a breach of data security.⁵⁹

⁵⁸ *Ibid.*, 21.

⁵⁹ Moria Paterson and Maeve McDonagh, "Data Protection in an Era of Big Data: The Challenges Posed by Big Personal Data," *Monash University Law Review* 44, no. 1 (2018): 19-29.

These principles could potentially be understood in relation to the Christian notion of human dignity, especially with the Fall in mind. It was mentioned in the preceding section that the affirmation of human dignity can be understood as a countermeasure to the Fall of humans and human sinfulness. The Christian understanding of the Fall means that all humans are tainted with what is known as original sin. There is an innate propensity to wrongdoing. This is why we need caution, checks, and balances. One potential check could be the litmus test of human dignity. The goal and/or criterion of data privacy and data security should be to protect human dignity.

Accountability and Responsibility

A third area of ethical concerns pertains to the question of accountability and responsibility. Who should be responsible for errors in the application of A.I. or findings in big data analysis? Is it those who have used or applied it? Or those who developed them? Some have argued that it is the healthcare practitioners who use the A.I. that should be held responsibility for any decisions regarding their patient. But what if the decision was heavily influenced by an error made by a faulty A.I. diagnostic? This has led others to argue that designers of A.I. systems should also bear responsibility for the quality, safety, and efficacy of their A.I. systems. Governments, on the other hand, should also be responsible too. It is the state that should provide regulatory oversight and develop policies and guidelines to address legal, social, and ethical issues. They are arguably best placed to gauge and guide public perception on big data and A.I.⁶⁰ Thinking through and answering some of these questions could, again, build public trust. Affirming human dignity in this area could look like what the Markkula handbook proposes, that each person must have a right to appeal to a person and a right to an explanation. Accountability and responsibility mean that an aggrieved party should get an explanation from a person instead of being passed around by automated systems or red tape.

The Adverse Consequence of Bias

The last area has to do with the adverse consequence of bias. Biases could potentially be embedded within the algorithms that guide A.I. and the analysis of big data. Algorithms are developed by humans who are fallible and could implicitly or inadvertently apply their biases. Or, that available data sets could be biased in the first place because only certain portions of a given population are captured. For example, those for whom medical care is inaccessible because of costs could be excluded from current data sets. That data set is therefore incomplete and inaccurate. This example based on economic inequality could be extended to other common societal biases such as race, gender, or age. This could result in certain

⁶⁰ Kathleen Murphy, et al., "Artificial Intelligence for Good Health: A Scoping Review of the Ethics Literature," 22-25, 36-37.

population groups having an advantage over others. Biases could also limit the effectiveness of big data and A.I. Incomplete data sets weaken the overall accuracy of research conclusions.⁶¹ More discourse that is participatory and inclusive is needed to mitigate such biases. This entails actual engagement with those who are biased against.⁶²

We propose that the principle of human dignity could apply to this area as well. The belief in a universal human dignity means that all humans ought to be valued. One person or a particular group of people should not be privileged over another. We must therefore work to minimize biases in big data and AI, whether in its algorithms or data sets. We must also ensure that the application and benefits of big data and AI goes to serves all people and not a select few. The minds behind the BAC's paper have chosen to use the ethical principle of solidarity, which would interpret ethics in a more collectivist way. This could result in the interests of the public overriding the interest of the individual.⁶³ However, the Christian social principle of solidarity tends to be understood slightly differently. Flowing from the principle of human dignity, Christian solidarity is principle of standing with the last, the lost, and the least. It is these groups of people that are at risk of being marginalized and disenfranchised, and therefore in need of the rest of society standing with them.⁶⁴ This ties in with the issue of bias. Solidarity means that we need to stand against biases that marginalizes some.

The Epistemological Challenge of Big Data

We would also add another consideration that relates to big data – the epistemological challenge. Researchers are becoming more wary of the facile claim that big data is neutral and comprehensive. It is empirical and hence, most emphatically, not. There is always some theory or philosophy in the background. For one, algorithms that are developed to aid the analysis of big data are written by humans who naturally work with certain ideas, presumptions, or theories in mind. Furthermore, any kind of interpretation of the data or statistical results entails some theoretic framework, subjectivity, and bias.⁶⁵

⁶¹ Kathleen Murphy, et al., "Artificial Intelligence for Good Health: A Scoping Review of the Ethics Literature," 25-26.

⁶² *Ibid.*, 35-36.

⁶³ Bioethics Advisory Committee, *Ethical, Legal and Social Issues*, 25.

⁶⁴ Matz, *Introducing Protestant Social Ethics*, p.193-203.

⁶⁵ Rob Kitchin, "Big Data, New Epistemologies and Paradigm Shifts," *Big Data & Society* 1, no. 1 (2014): 4-5. See also Luciano Floridi, "Big Data and Their Epistemological Challenge," *Philosophy & Technology* 25, no. 4 (2012): 435-437.

Neither is it the case that big data is comprehensively exhaustive.⁶⁶ For example, it could be open to sampling bias.⁶⁷ Public medical data, for example, might exclude those who cannot afford medical care. To add to this, Rominik and Rodighiero have argued that a blind belief in big data might “undermine interdisciplinary cooperation and promote structural shortsightedness”.⁶⁸ We end up with research silos and fail to benefit from the cross-germination of ideas. More crucially, we must be aware that big data presumes a more inductive sense of reasoning, or purports to “let the data speak”. This is what Kitchin terms as the rebirth of empiricism.⁶⁹ But such an approach might confuse correlation with causation.⁷⁰ Just because two things are related does not explain which causes which.

In other words, big data could be biased in perpetuity. One way of preventing this biasness is to foreground the notion of human dignity. Humans and the human good must always be front and centre in big data analysis. Data is the product and means, but not the ends. The field of big data should not be consumed with producing better or more data, but about serving the human person and the human good.

ON THE COMMON GOOD

The Christian emphasis on human dignity leads naturally to consideration of the common good, for the human good cannot be fully instantiated by individual pursuit alone. The language of the common good is often invoked in deliberations on public policy, social ethics, political economy, and other topics. The Bioethics Advisory Committee’s consultation paper on big data and artificial intelligence (A.I.) refers to the common good, particularly to how the common good serves as a foundational ethical principle, especially in relation to complex questions about the proper collection and usage of data.⁷¹ Broadly speaking, Christianity agrees that the common good is a foundational principle of life together, and particularly for the purposes of this discussion, as an integral moral anchor for the ethics of big data and artificial intelligence.

The concept of the common good has a rich foundation in antiquity. Service to the common good was central to the normative vision of the good life through much of classical Greek thought. Aristotle was the first to make the common good foundational to this conception of political theory; other prominent contributors to Western political and moral philosophy have followed Aristotle in grounding the

⁶⁶ Dominik Balazka and Dario Rodighiero, “Big Data and the Little Big Bang: An Epistemological (R)evolution,” *Frontiers in Big Data* 3, Article 31 (2020): 1.

⁶⁷ Rob Kitchin, “Big Data, New Epistemologies and Paradigm Shifts,” 4.

⁶⁸ Dominik and Rodighiero, “Big Data and the Little Big Bang: An Epistemological (R)evolution,” 10.

⁶⁹ Rob Kitchin, “Big Data, New Epistemologies and Paradigm Shifts,” 3-5.

⁷⁰ Dominik and Rodighiero, “Big Data and the Little Big Bang: An Epistemological (R)evolution,” 3.

⁷¹ Bioethics Advisory Committee, *Ethical, Legal and Social Issues*, 25-26; 88-90.

good of political society in the pursuit of the common good.⁷² The ubiquity of the common good is not just a feature of Western thought. In other intellectual traditions, such as the Confucian tradition, where there are no synonymous phrases for the common good, notions analogous to the common good are discernible.⁷³

Scripture and the Common Good

While the Biblical corpus is considerably diverse, the notion of the common good and the claim that it makes on Christian communities is coherent in Scripture. For example, consider the Ten Commandments. The Commandments depend on an intimate connection between the community as a whole and its individual members, charting a space for a good that is genuinely shared by all its members – i.e., a *common* good. Patrick Miller makes the astute observation that the Commandments frame a structure and space for the moral life in terms of responsibilities and not rights. The different spheres of human good such as work, family, marriage, economics, and desire are protected by the assumption of responsibility for the good of God and neighbour.⁷⁴ That is to say, the claims of the individual on goods are always coded by way of a reciprocal responsibility shared by all members of the community. Intrinsic to the Decalogue is a way of thinking and acting that is oriented toward the common good.

One clear illustration of this is in the law governing the Sabbath rest in Deuteronomy 5. The Sabbath commandment broadens the scope of the rest to everyone in a given household: “But the seventh day is a sabbath to the LORD your God; you shall not do any work – you, or your son, or your daughter, or your male or female slave, or your ox or your donkey, or any of your livestock, or the resident alien in your towns, so that your male and female slave may rest as well as you.” [Deut 5:14] The Sabbath rest is oriented towards common good, set to protect and provide for regular rest even for those who are in one’s service or economic control. This common good extends even to non-human creation.

The prophetic books of the Old Testament also speak of the common good, expanding the concept beyond the covenant community of Israel. The story of the prophet Jonah is paradigmatic in this regard. Jonah stands within the long and rich Israelite prophetic tradition concerning God’s justice, and he also knows the

⁷²Donald Morrison, “The Common Good”, in *The Cambridge Companion to Aristotle's Politics*, eds., Marguerite Deslauriers and Pierre Destrée (Cambridge: Cambridge University Press, 2013), 176.

⁷³See, for example, Albert Chen, “The Concept of ‘Datong’ in Chinese Philosophy as an Expression of the Idea of the Common Good”, and other related essays in *The Common Good: Chinese and American Perspectives*, eds., David Solomon and P.C. Lo (Dordrecht: Springer, 2014). See also Armando Salvatore and Dale Eickelman, eds., *Public Islam and the Common Good* (Leiden: Koninklijke Brill NV, 2004) as an example of an exploration of the common good from a non-Western perspective.

⁷⁴Patrick D. Miller, “‘That It May Go Well with You’: The Commandments and the Common Good,” in *In Search of the Common Good*, ed. Dennis P. McCann and Patrick D. Miller (London; New York: T&T Clark, 2005), 19–20.

Ninevites' particular sins. By all measures, Jonah is theologically and morally orthodox, and yet the prophet is excoriated for his failure unable to step out of his own identity and context and reconcile his desire for justice to be done with God's mercy for Nineveh. Jacqueline Lapsley concludes that Jonah fails to reimagine the boundaries of "common" in the common good. For it is in the interplay within God (and those who seek to imitate God) of the two seemingly opposing qualities, justice and mercy, that we find our own horizons expanded to include even the most detested outsiders within the purview of God's care, and thus within the common good.⁷⁵ The book of Jonah does not simply invite us to imagine how the boundaries of the common good can be erased; it compels us to see that in God's inclusion of the most violent of enemies within the boundaries of his grace is the imperative to do likewise. The imperative to extend the pursuit of the common good beyond the borders of the covenant community is fittingly expressed in Jeremiah's axiom: "Seek the welfare of the city where I have sent you into exile, and pray to the Lord on its behalf, for in its welfare you will find your welfare" (Jer. 29:7).

The New Testament, and in particular the epistles of the Apostle Paul, also refer to a good held in common with society as a whole. At first glance, this claim might seem to militate against the apostle's apocalyptic theology. Paul drew a sharp distinction between "this age" and "new creation" and describes in Galatians 1:4 the present as an "evil age". He saw creation as subject to bondage to decay, to the extent that it groaned for its emancipation (Romans 8:19-22). One of the most oft-quoted Pauline statements is famously expressed in Romans 12:2: "Do not be conformed to this world". This clear contrast is also seen in the way Paul spoke of the ethics of Christians and non-Christians: "What partnership is there between righteousness and lawlessness? Or what fellowship is there between light and darkness? What agreement does Christ have with Beliar?" Partnership, fellowship, and agreement were all terms consistently referred to in ancient discussions about what is good for society.⁷⁶ The late second-century *Epistle to Diognetus* expresses well the paradox at the heart of Christian engagement with public life, the concerns of divided loyalties and the place of Christians within the world: "For the Christians... dwell in their own countries, but simply as sojourners. As citizens, they share in all things with others, and yet endure all things as if foreigners. Every foreign land is to them as their native country, and every land of their birth as a land of strangers."⁷⁷

Yet despite this apocalyptic framework, Paul reminds Christians of the cosmic scope of God's salvation: "Creation itself will be set free... and will obtain the freedom of

⁷⁵ Jacqueline Lapsley, "'When Mercy Seasons Justice': Jonah and the Common Good," in *In Search of the Common Good*, 42–43.

⁷⁶ Victor Paul Furnish cites a number of examples from Aristotle's *Politics* in "Uncommon Love and the Common Good: Christians as Citizens in the Letters of Paul," in *In Search of the Common Good*, 63.

⁷⁷ Alexander Roberts, James Donaldson, and A. Cleveland Coxe, eds., "The Epistle of Mathetes to Diognetus," in *The Apostolic Fathers with Justin Martyr and Irenaeus*, vol. 1, The Ante-Nicene Fathers (Buffalo, NY: Christian Literature Company, 1885), 26.

the glory of the children of God” (Romans 8:21). He never summons Christians to withdraw from society, but to live within it. Furthermore, he specifically calls on Christians to include all people in their consideration: “See that none of you repays evil for evil, but always seek to do good to one another and to all” (1 Thessalonians 5:15). Galatians 6:10 also supports this: “So then, whenever we have an opportunity, let us work for the good of all, and especially for those of the family of faith.”

A concern for the common good is clearly stated in Philippians 1:27-28: “Live your life in a manner worthy of the gospel of Christ”, where the key verb translated as “live” is *politeuesthai*. According to Gerald Hawthorne, this verb is uncommon to the New Testament. It originally meant “to live as a citizen of a free state” or, “to take an active part in the affairs of the state”. To the ancient Greeks, the state was not merely a place to live. It was instead a kind of partnership formed with a view to having people attain the highest of all human goods. It was within this community that the individual citizen developed his gifts and realized his potential, not in isolation but in cooperation. Within this political society the individual could maximize his abilities, not by himself or for himself but in the community and for the good of the community. “To live as a citizen,” therefore, meant for the Greek (and later the Roman) rights and privileges but also obligations and responsibilities.⁷⁸ Paul encouraged the Philippian Christians to live as responsible citizens, which meant pursuing the common good together with their fellow citizens. This, he asserted, would be part of what it means to live in a manner worthy of Christ.

The foregoing discussion of Paul’s writings is not meant to assert that the common good was a particular characteristic of the apostle’s writings, or that Paul was engaging in theological discussions of the concept of the common good with philosophers of his day. Instead, it draws attention to the apostle’s mindfulness in maintaining cordial relations with the neighbours of the Christian communities across Rome. In many places, he encouraged believers to work for the good not just of one another, but for all people. Victor Furnish is surely right to conclude that Paul meant to teach the early Christians that what they could determine to be the will of God, seen in light of the Cross, ought to govern their conduct in relation to society at large no less than their conduct within the believing community.⁷⁹

This necessarily brisk survey, drawn from both the Old and New Testament, testifies to the diversity and integrity of the biblical witness in affirming the common good. Christians should be confident that the Biblical canon, and the intellectual traditions of Christian political and social ethics that arose from it, speak of advancing a good that redounds to the lives (and life) of all.

⁷⁸ Gerald F. Hawthorne, *Philippians*, vol. 43, Word Biblical Commentary (Dallas: Word, Incorporated, 2004), 68–69.

⁷⁹ Victor Paul Furnish, “Uncommon Love”, 87.

Christian Ethics and the Primacy of the Common Good

What, then, do Christians mean by the common good? The concept of the common good and the reality it hopes to instantiate have been characterised on the one hand as a deep desire, and on the other hand, an impossible difficulty.

A large proportion of this difficulty arises from a certain slipperiness about the notion of the common good. Christian theologians often seek to shed light on what the common good means by examining several terms whose meaning approximates the common good. For example, the notion of “general welfare” sums up the economic welfare of individual members of society into one aggregate sum. Closely related to this are references to the “greater good”. The issue with these concepts is that, unlike the common good, these can sometimes offer little to no attention to how this greater good or general welfare is distributed amongst members of society. The gross national product of a country could be increasing rapidly while members of society become destitute. This greater good thus is not common to all the members of society. The aggregative good can increase while the welfare of significant portions of a country’s residents decline.⁸⁰ This, and other kinds of utilitarian paradigms, constitutes most approaches to the common good. John Finnis rightly notes: “Confronted by the term ‘the common good’, one is first inclined to think of the utilitarian ‘greatest good for the greatest number’, which he concedes is a vastly mistaken and gives a bad name to common good theories.”⁸¹

The concept of public interest, too, seems to bear a family resemblance to the notion of the common good. Here, the commitment appears to be weighted almost exclusively on individual dignity and rights. Protection of rights is the public interest, and public institutions and policies that secure these individual rights for all persons are viewed as helping realise the public interest. The public interest, therefore, functions as a distributive concept, breaking down the public good into the effects it has on the rights of individual members of any given community.⁸² No less a philosopher than Alexis de Tocqueville praised “the idea of rights”, saying, “the idea of rights is nothing other than the idea of virtue introduced into the political world... There are no great men without virtue; without respect for rights, there is no great people: one can almost say that there is no society.”⁸³

If neither the greater good nor public interest adequately capture the thrust of the idea of the common good is, then what does? The common good, as mentioned in our discussion of Scripture, confirms a profound appreciation of community life. It is uncompromising on individual human dignity but enfolds respect for human

⁸⁰ David Hollenbach, S.J., *The Common Good and Christian Ethics* (Cambridge: Cambridge University Press, 2004), 7. See also Patrick Riordan, *A Politics of the Common Good* (Dublin: Institute of Public Administration, 1996), chapter 10.

⁸¹ John Finnis, *Natural Law and Natural Rights* (Oxford: Clarendon Press, 1980), 154.

⁸² Hollenbach, *The Common Good and Christian Ethics*, 8.

⁸³ Alexis de Tocqueville, *Democracy in America* (Chicago, IL: University of Chicago Press, 2000), 227.

dignity with ideas of stewardship, partnership, neighbourly love, and the good of being a community at all. As the most formidable Christian theologian on the common good, Thomas Aquinas, states: “It certainly belongs to the love that obtains among men that a man should strive for and preserve the good even of a single individual, but it remains better and more divine that this love should be shown to the whole nation and to cities.”⁸⁴ The common good is what belongs to everyone by virtue of our common humanity and our shared communal life. It is a good that can only be achieved by living well together, and if anyone is left out or deprived of it, then the common good is betrayed.⁸⁵

This is a profoundly Christian message. Life, individually and together, is a summons to live before the face of God. The ultimate end of every human person, and therefore humankind itself, is life with all Creation in God, which is the highest common good. However, every human society also has its penultimate end the common good of that society. This is the composition of cultural, economic, environmental, political and social systems working together in concert to benefit all people, so that all might flourish. The common good thus functions both as the end and the means of our life together. Though the common good of earthly society is neither the highest nor the perfect fulfilment of humans, it is dignified by being a good in its own regard, and more importantly, it provides the means by which we are drawn towards our ultimate common good in God. By acquiring the virtues found in the earthly common good, we acquire the freedom to choose God’s offer of salvation in Himself, the cosmic common good.⁸⁶

Therefore, while terms like ‘general welfare’ and ‘public interest’ are insightful⁸⁷, and, despite the slipperiness at the heart of the concept, Christianity has insisted on the primacy of the common good for good reason. As Augustine rightly observed: “A people, we may say, is a gathered multitude of rational beings united by agreeing to share the things they love... There can be as many different kinds of people as there are different things for them to love... The better the things, the better the people;

⁸⁴ Thomas Aquinas, *Sententia libri Ethicorum*, Lect. 2, In. 178-182.

⁸⁵ The BAC consultation paper refers to “rights” 11 times more than it does “the common good”. Yet when it deploys the language of the “common good” and “solidarity”, the authors seem to mean something like “general welfare” or “the greater good” in that the needs of the many justify concessions of rights by individuals. So, for example, BAC, “Big Data”, 25: “[The] BAC acknowledges that public interest may override individual rights and interests in certain circumstances, such as in public health and epidemiological research”. One way in which the ethics of the common good might inform this discussion is to see the collaboration needed amongst members of society to secure the common good, rather than to see the common good as a perennial potential justification for running roughshod over individual rights.

⁸⁶ Thomas Aquinas, *Summa Theologiae*, Ia IIae, q. 5, a. 5. ad. 1; a.7.

⁸⁷ Mary Ann Glendon finds that the near hegemony of rights language in law and politics, while rightfully protecting the rights of individuals, has resulted in a civic discourse dangerously short on the language of responsibility and the dimension of sociality. See *Rights Talk: The Impoverishment of Political Discourse* (New York: Free Press, 1991).

the worse the things, the worse their agreement to share them.”⁸⁸ Christianity asserts that a people who are united by agreeing to love the common good will form the best kind of human society. The common good as a concept best expresses the manifold nature of shared, social human existence, more than the paradigms of ‘general welfare’ and ‘public interest’ are able to capture. The question at stake is not simply what practices of AI and big data can be tacitly approved of or supported by Christians, but more fundamentally what kind of society we want to share in common with all our neighbours.

With that being said, how might the common good anchor a Christian response to big data and artificial intelligence being used in human research?

AI, Big Data, Society and the Common Good

As any technology develops, it might be expected that its increasing capabilities give rise to a commensurate number of ethical issues. In his Gifford Lectures in 1990 and 1991, the theologian Ian Barbour raised issues such as the deskilling of the workforce, increased unemployment, health concerns, stress, isolation of workers, and the storage of personal data in databases.⁸⁹ These are still live issues today. An article in *Wired*, published in April 2000, called for a moratorium on research in artificial intelligence, amongst other technological fields like nanotechnology. The author, William Joy, noted that the rapid technological advances we would make in these areas were faster than our understanding of the ethical questions raised by these technologies.⁹⁰

In addition to the moral quandaries raised by technologies such as big data and A.I, technology increasingly shapes how human beings seek the good life. Well-designed and well-used technologies aid humans in their desire to live well. The converse can be true as well: poorly designed or misused technologies can be inimical to our human pursuit of the good. As such, technologies are not ethically neutral, for they reflect the ethics and moral principles that formulate our design choices. Technologies “both reveal and shape what humans value”.⁹¹ The unprecedented speed, scale, and pervasiveness with which advances in these technologies are transforming our lives are worthy of consideration.

⁸⁸ Augustine, *City of God Against the Pagans*, Book 19.24. The translation comes from Oliver O’Donovan and Joan Lockwood O’Donovan, eds., *From Irenaeus to Grotius: A Sourcebook in Christian Political Thought* (Grand Rapids, MI: William B. Eerdmans, 1999), 162.

⁸⁹ Ian Barbour, *Ethics in an Age of Technology: The Gifford Lectures Volume 2* (New York: HarperCollins Publishers, 1993), 146-156.

⁹⁰ William Joy, “Why the Future Doesn’t Need Us”, *Wired*, April 1 2000, accessed July 1, 2023, <https://www.wired.com/2000/04/joy-2/>

⁹¹ Shannon Vallor, “An Introduction to Data Ethics” (syllabus, Santa Clara, CA: Santa Clara University), 3.

For this reason, the Christian response to developments in big data, artificial intelligence and human research deliberately foregrounds the common good. The advancement of technologies such as those mentioned above far outpace the capability of the public, scholars, civil society, government, and policy-makers to understand the moral impact of these fields of knowledge. There is an increasing awareness and concern about “data processing technologies and algorithms that businesses are developing in a relatively lightly and inconsistently regulated environment.” Keeping the common good foregrounded in conversations about A.I. reminds us that technology should be “ethical by design”.⁹² Lawmakers, lacking the technical expertise needed to guide effective technology policy, are increasingly reliant on technical experts to anticipate social impacts and to think proactively about the technological reverberations on human life. Ethical design and implementation choices are being made in complex environments where few legal safeguards exist; those that do are woefully outdated and inadequate for the common good.⁹³

The common good is the highest of penultimate human concerns, and because it is a higher good that is not antagonistic to individual human dignity, it should be placed at the centre of discussions about the ethics of our technological advancements. How does this advancement enhance our life together as a community? Does it threaten it?

This does not necessarily mean that the Christian commitment to the common good is always negative about technological advances. It is worth reiterating that the common good is, as the term explicates, a good. There is a positive vision at the heart of the Christian theology of public life. The Church welcomes the positive developments that science and technology, such as big data and A.I., deliver for the betterment of the world. But our praise or our reticence is guided by our Christian commitment to the common good, which compels us to ask questions beyond present-day utility. Big data and A.I. would only deserve our praise for making our world better if that world is shared by us all. The Bible engages with the idea of technological advancement in several places. One important and fruitful paradigm is the idea of God as an artificer who forms man from dust (Genesis 2:7); creates and orders the cosmos with wisdom (Proverbs 3:19-20); and the designer and builder of the promised city (Hebrews 11:10). Aquinas himself found the analogy of God as an artificer to be theologically advantageous: “God, who is the first principle of all things, is compared to creatures as artificer to artifacts.”⁹⁴ But it is precisely because God is the ultimate common good of all men - the Unity in whom all goodness is diffused to all humanity equally without diminishing – that the Christians think of

⁹² Flahaux et al., *Ethics in the Age of Disruptive Technologies*, 15.

⁹³ Vallor, “Data Ethics”, 3.

⁹⁴ Aquinas, *Summa Theologiae*, Ia, q. 27, a. 1, ad. 3. See also Ia, q. 14., a. 8: “The knowledge of God is to all creatures what the knowledge of the artificer is to his artifacts”; and Ia, q. 45, a.6: “God is the cause of things through his intellect and will, just as is an artificer of his artifacts.”

the penultimate common good in analogous ways. That is to say, the highest of penultimate goods is the common good of society, an indivisible good whose goodness is at once communicated to and shared by every member of that society.

Foregrounding the common good in all discussions about big data and A.I. functions similarly, as a fruitful generative paradigm. The common good is a dynamic entity that must be “built up ceaselessly” with the changing of the times.⁹⁵ It is an ongoing work that sometimes involves sacrifice, a reformulation of goals, or a more modest pursuit of individual outcomes for the sake of another person or group's participation in the common good. Articulating what comprises the common good, maintaining that composition, and promoting adherence to it, demands collaborative efforts at all levels of society and the cooperative help of the citizenry. Seeking and establishing the common good involves “everyone working towards the construction of a society where people’s authentic and full human development is not thwarted but rather enabled.”⁹⁶

Governance

One key aspect of prioritising the common good is acknowledging the role that civil authority plays in directing members of society to secure the common good. “Today the universal common good poses problems... which cannot be adequately tackled or solved except by the efforts of public authority endowed with a wideness of powers, structure and means of the same proportions”.⁹⁷ James Skillen correctly surmises that “in a world of conflicting human aims and ideals... there can be no attempt to seek the common good that is not backed by authority to enforce common law.”⁹⁸ The role of public authority is to help facilitate robust public discussion about the common good, and to enforce the good and just order that arises out of that discussion.

One way in which the common good can aid public authority is in the reminder that the common good cannot be achieved by any single person or part of society alone. The BAC paper raises the important question of human agency and oversight in big data and A.I., and helpfully attributes human responsibility in the event that A.I. makes wrong decisions. These are A.I. algorithm researchers, biomedical

⁹⁵ Vatican II, *Pastoral Constitution on the Church in the Modern World (Gaudium et Spes)*, encyclical letter, Vatican website, 7 December 1965, no. 78, accessed 3 July 2023, https://www.vatican.va/archive/hist_councils/ii_vatican_council/documents/vat-ii_const_19651207_gaudium-et-spes_en.html

⁹⁶ Patrick Flanagan, “Much Ado About Something: An Ethic of the Common Good for Information Technology”, *Journal of Religious & Theological Information*, 10 (2011): 41-42, <https://doi.org/10.1080/10477845.2010.536100>

⁹⁷ Pope John XXIII, *Pacem In Terris*, encyclical letter, Vatican website, 11 April 1963, 137, accessed 3 July 2023, https://www.vatican.va/content/john-xxiii/en/encyclicals/documents/hf_j-xxiii_enc_11041963_pacem.html

⁹⁸ James W. Skillen, “The Common Good as Political Norm,” in *In Search of the Common Good*, 275.

researchers, developers, and clinicians, with varying clauses specifying how and why they would take responsibility for A.I. mistakes.⁹⁹

Big data and A.I. have reversed the scientific process from asking questions to the generation of data. In the new research model made possible by big data and A.I., we begin with the accumulated data and interrogate it, and our discovery in this sense is critically dependent on the way that interrogation is conducted.¹⁰⁰ The danger with this, of course, is that this risks what danah boyd and Kate Crawford call *apophenia*: “seeing patterns where none actually exist, simply because enormous quantities of data can offer connections that radiate in all directions.”¹⁰¹ Michael Fuller concludes that this has led to the development of “data scientists” to deal with big data.¹⁰² Mayer-Schonberger and Cukier describe the “data scientist” as someone with the “skills of the statistician, software programmer, infographics designer, and storyteller.”¹⁰³

Data sets contain information of many kinds, which must be expressed in language. What Fuller, Mayer-Schonberger and Cukier recognise is that interpretation of data is a skill that requires the ability to interpret, understand, and handle data, or what theologians and philosophers would call “hermeneutics”. “Interpretation is at the centre of data analysis.”¹⁰⁴

There are hermeneutical skills that data scientists, biomedical researchers, A.I. developers and clinicians alone cannot account for. Governing bodies and policymakers that regulate human responsibility for A.I. should consider how including others, such as theologians or philosophers (who are heirs to long traditions of hermeneutical reflection and practice), might help to ensure that human agency in big data and A.I. in human research continues to be directed toward the common good. Christianity has historically paid close attention to hermeneutics, and a number of key features of hermeneutical practice are worth mentioning.¹⁰⁵ Within Christianity, hermeneutics has been understood as an interdisciplinary, creative exercise which involves combining insights from a number of fields of study, generating meaning through close readings of texts and contexts, including socio-historical contexts. Germane to our discussion is also the foundational insight that hermeneutics is a communal practice that stresses the role

⁹⁹ BAC, “Issues Arising”, 99.

¹⁰⁰ Viktor Mayer-Schonberger and Kenneth Cukier, *Big Data: A Revolution that Will Transform how We Live, Work and Think* (London: John Murray, 2013), 72.

¹⁰¹ danah boyd and Kate Crawford, “Critical Questions for Big Data”, *Information, Communication and Society*, 15 no. 5 (June 2012): 668, <http://dx.doi.org/10.1080/1369118X.2012.678878>

¹⁰² Michael Fuller, “Big Data: New Science, New Challenges, New Dialogical Opportunities”, *Zygon*, vol. 50, no. 3 (September 2015): 577.

¹⁰³ Mayer-Schonberger and Cukier, *Big Data*, 125.

¹⁰⁴ boyd and Crawford, “Critical Questions”, 668.

¹⁰⁵ Anthony C. Thiselton, *Hermeneutics: An Introduction* (Grand Rapids, MI: William B. Eerdmans, 2009).

of community in providing a common framework of interpretation. The common good of the interpretive community is always on the hermeneutical horizon. The practice of big data analytics in medical research, for example, would benefit from broader hermeneutical considerations than a purely clinical approach might allow. A dialogical approach between the humanities, religious traditions and scientists foregrounds the ethics of the common good in big data and A.I. development.

Others have pointed out that tools used by data scientists tend not to prioritise ethical considerations. Since so much of data work is profit-driven, “we have to explicitly embed better values into our algorithms, creating Big Data models that follow our ethical lead. Sometimes that will mean putting fairness ahead of profit.”¹⁰⁶ Governing authorities will have to find means to ensure that discussions pertaining to policies on big data and A.I. include people whose responsibility it is to foreground the ethics of the common good in their deliberations.

There are other considerations for public authorities in the area of enforcement. An ethics of the common good requires a robust understanding of healthy limits. The rapidity with which big data, analysis, and its commodification are developing means that action is required if legislation is not always going to be lagging behind current practices. Besides facilitating a diversity of voices working for the common good, the adaptation and enforcement of current laws need to be made a priority.¹⁰⁷

Public authorities also need to consider how the laws of different nation-states vary in terms of how regulation of data and A.I. is enforced.¹⁰⁸ This is particularly challenging given the current fraught nature of international politics. It is, therefore, likely that there will be a continuing need for coordination and cooperation in cross-border policing of these issues. Despite its potential for being time-consuming and expensive undertakings, they are critical if the ethics of the common good is taken seriously.

Data Issues

We live in a world where datasets keep multiplying. In a world of big data analytics, algorithms and artificial intelligence, these significant volumes of data contribute to create new knowledge, new perceptions, new opportunities. Jerome Beranger announces that “we are now in an age of convergence between data that can all become homogenous, digitisable and integrable”.¹⁰⁹ The emergence of global digitalisation has resulted in massive datasets, supercomputing for large-scale data

¹⁰⁶ Cathy O’Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy* (London: Allen Lane, 2016), 204.

¹⁰⁷ O’Neil, *Weapons of Math Destruction*, 212 ff.

¹⁰⁸ Michael Fuller, “Big Data, Ethics and Religion: New Questions from a New Science”, in *Religion and the New Technologies*, ed., Noreen Herzfeld (Basel: MDPI, 2017), 92.

¹⁰⁹ Jerome Beranger, *The Algorithmic Code of Ethics: Ethics at the Bedside of the Digital Revolution* (Great Britain: John Wiley and Sons, Inc, 2018), 3.

use, and improvements in storing data. We inhabit a world where data driven approaches “where we visualise more than we model, and where quantity is more important than quality... [This has] provided the means for governments and companies to map society in a quantifiable and analyzable manner”.¹¹⁰

The Church views these developments cautiously. On the one hand, the digital revolution has brought about genuinely remarkable advances that were once unthinkable. On the other hand, this explosion of new perspectives and opportunities has also created new challenges to the common good, especially with reference to the treatment of data.¹¹¹ The BAC paper has also outlined a comprehensive list of data ethics issues relating to big data, A.I. and medical research.¹¹² Many of these issues pose formidable questions about the relationship between the individual and the common good.

One of them is the question of privacy and consent. One of the foremost principles of biomedical ethics is respect for individual autonomy, from which we derive the standard practice of obtaining the informed consent of any party whose data is to be harvested or stored.¹¹³ However, John Wilbanks makes the shrewd observation that the reality is that this process appears geared more towards limiting the liability of those harvesting the data, rather than genuinely informing the data subjects.¹¹⁴ Daniel Solove’s summary of the issues faced in this area casts the significant ethical concern into relief: 1) people do not always read privacy policies; 2) if people read them, they typically do not understand them; 3) if people read and understand them, they often lack enough background knowledge to make an informed choice; and 4) if people read them, understand them, and can make an informed choice, their choice may nonetheless be skewed by various decision-making difficulties.¹¹⁵

¹¹⁰ Beranger, *Beside*, 3.

¹¹¹ Some of these issues have led to the feeling of a “digital divide” where persons or groups are well integrated into the digital society on one hand, whereas others feel – or are – excluded from this same society; for examples of the digital divide in terms of social sorting, see D. Lyon, *Surveillance as Social Sorting: Privacy, Risk, and Digital Discrimination* (London: Routledge, 2003); for the difficulty for persons and structures to access big data, see J. Beranger, *Big Data and Ethics* (London: ISTE Press, 2016); for the incapacity to understand the opaqueness of hidden algorithms, see O. Tene and J. Polonetsky, “Big Data for All: Privacy and User Control in the Age of Analytics”, *Northwestern Journal of Technology and Intellectual Property*, vol. 11, no. 5 (2013): 239-272; for the inability for individuals to be informed about the traceability of data throughout its life cycle, see S. Coll, “Power, Knowledge, and the Subjects of Privacy: Understanding Privacy as the Ally of Surveillance,” *Information Communication and Society*, vol. 17, no. 10 (2014): 1250-1263.

¹¹² BAC, “Issues Arising”, 6-7.

¹¹³ Tom Beauchamp and James Childress, *Principles of Biomedical Ethics* (Oxford: Oxford University Press, 2019), 101-140.

¹¹⁴ John Wilbanks, “Portable Approaches to Informed Consent and Open Data”, in *Privacy, Big Data and the Public Good: Frameworks for Engagement*, eds., Julia Lane, Victoria Stodden, Stefan Bender, and Helen Nissenbaum (New York: Cambridge University Press), 235.

¹¹⁵ Daniel Solove, “Privacy Management and the Consent Dilemma”, *Harvard Law Review* 126 (2013):1888.

This raises the question of data stewardship and utilisation. The long-term storage of data means that situations may arise in which the data can be used for purposes that may not even be connected to those for which it was gathered and for which consent was originally given.¹¹⁶ It seems impossible that, in the era of big data and data storage, a party can give consent that fully specifies the terms of usage between collector and subject. Not only that, but the practice of anonymising data also turns out to be problematic in a big data age. As more and more datasets are merged, there is a risk of de-anonymisation. Christine Porter points out that even as far back as 1997, researchers were able to de-anonymise medical records by joining them with another database.¹¹⁷ Algorithms may already exist that make it possible to re-identify confidential and anonymous patient information once third-party data miners de-identify auxiliary databases... It is difficult to resist the conclusion that “privacy and big data are simply incompatible”.¹¹⁸

One way in which the Church’s common good ethic can resource these quandaries is precisely by reminding the public that the common good is both a communal and fully human good. In order for it to be a human good, it must reckon with the features of human existence, such as the background fabric of communal and political life together. As Hubert Dreyfus puts it, human life is organised from the start in terms of human needs and propensities which give “facts meaning, make the facts what they are, so that there is never a question of storing and sorting through a list of meaningless, isolated data”. Unlike computers, humans do not deal only with universally defined, context-free objects.¹¹⁹ In other words, human decision-making is made in the context of a fully human life – between our living and dying, and the infinite networks of unchosen obligations that constitute our life in the world. Or, as Neil Manson and Onora O’Neill describe it, “obligations and expectations are presupposed by informed consent practices. When they are waived by giving consent, they are not discarded or marginalised: they are merely waived in limited ways, for a limited time, for a limited purpose.”¹²⁰ When we consent to a clinical trial, we do not consent to take any number of novel medicines, only the ones relevant to our condition. As a human good, the common good always has a broad horizon of human existence to consider and not simply a myopic focus on what we want to achieve in a specific situation.

¹¹⁶ Michael Fuller, “New Questions”, 88.

¹¹⁷ C. C. Porter, “De-identified Data and Third Party Data Mining: The Risk of Re-Identification of Personal Information”, *Washington Journal of Law, Technology & Arts*, vol. 5, no. 1 (2008): 14.

¹¹⁸ Solon Barocas and Helen Nissenbaum, “Big Data’s End Run Around Anonymity and Consent” in *Privacy, Big Data and the Public Good*, 63.

¹¹⁹ Hubert Dreyfus, *What Computers Still Can’t Do: A Critique of Artificial Reason* (Cambridge, MA: MIT Press, 1999), 262.

¹²⁰ Neil C. Manson and Onora O’Neill, *Rethinking Informed Consent in Bioethics* (Cambridge: Cambridge University Press, 2012), 73.

The Church and the Common Good

There are many more issues, both now and in the future, that will arise out of the use of big data and A.I. in medical research. We hope simply to have illustrated the importance and worthiness of foregrounding the ethics of the common good in discussions surrounding this technological advance. The contribution of the Church is not simply restrictive in nature. When advances in technology bring a genuine advance in the common good, as they have in the past, the ethics of the common good necessitates the Church's involvement in helping to promote access to this good for all in society. After all, as a good in common, all resources which enable it are to be welcomed. The common good elevates us. It raises our eyes above our particular goods, turns us away from naked self-interest, and thus prepares us to love even higher goods. By God's design, the common good of the earthly city points us ahead to the heavenly city; participating in the common good here prepares us for the everlasting good there. So, "as we have opportunity, let us do good to all". (Gal 6:10).

CONCLUSION

Human biomedical research is but one major area of modern life in which big data science and artificial intelligence has made monumental inroads into. Life in an increasingly digital society means that we can expect the reach of big data and A.I. to extend. Data once considered unrelated to human biomedical research might very well be drawn into algorithmic calculations, given the voluminous amount of data generated and collected today. Technological advances and the applications of these advances – like data collection and interpretation – are unpredictable and dynamic, not linear and stable.

As our technology advances and our powers grow, so does our mastery over vast areas of human life. Dataism and technoreligion promise us godlike power and intelligence and the promise of salvation from the fragility of our human condition. There is no wall separating the church of technology from the state we inhabit. Terms like 'digital society' or 'artificial intelligence' can occlude the fact that we are all inhabitants together in the earthly city of man.

For this reason, as our paper has suggested, it is of paramount importance to foreground ethics, and not primarily technology, at the centre of our discussions about big data and A.I. The Christian faith prizes not just decisions, but is concerned with how cooperative human practices – practices such as the deployment of A.I. in data analysis - are themselves morally formative on the human person. And precisely because they are morally formative for humanity, they raise questions about the nature of the human good. In particular, two theological and moral principles animate our response: human dignity and the common good.

The Christian view of human dignity affirms the intrinsic, inalienable and indelible dignity in all persons. This dignity is bestowed on us by virtue of our relation to God in the bearing of God's image. This means that the dignity of the human person should always be at the centre of all developments in big data science and A.I. This extends to areas such as trust, privacy, security, accountability and biases. In all of these areas, human dignity is the basis of formative practices that help not only to proscribe certain actions, but also to help orientate big data science and A.I. towards serving the human good. An example of this would be where human dignity leads us to consider a preferential option for the last, the least and the lost, especially with regard to the applications of big data.

Talk of the human good within the Christian faith must then naturally lead to consideration of those goods constitutive of our humanity, chief amongst them the common good. It is not enough to speak of 'the greater good', or 'general welfare', if these goals lead to outcomes that trample on human dignity. For something to serve the common good means that every person must have a share in it, not simply the majority. The common good also raises the questions about what kind of society we want to be, and why we should want to be a society at all. Questions like these help to ground discussions on big data science away from profit or technological prowess. Our paper applies this, for example, to issues of governance in big data science, for what ennobles public authority is precisely the care for the common good.

To sum: Scripture and tradition provide us with two helpful grounds of theological ethics: human dignity and the common good. Human dignity reminds us of the dignity and agency of every human person; the common good commutes the private and personal good of the individual into the common good of all.

The Scriptural account of the Tower of Babel reminds us that overconfidence in and overreach of human technology can lead to theological, moral, and societal disaster. Similarly, the apostle Paul warns that those whose desires and minds are so "set on earthly things" are destined for destruction (Phil 3:19). We risk great harm in our desire to achieve great breakthroughs if our minds (and actions) are not set on the right ends. In this paper, we have sought to show how Christianity offers a realigned perspective on big data and A.I., which is to always shape technology with the right and good ends of human dignity and the common good in mind. Humans are ever prone to using technology for self-interest, or for profit, or in destructive, self-defeating ways. If we fail to prioritise the ethical, moral, and objectively good ends of human dignity and the common good, all technological advance – implications for big data, A.I. or otherwise – will constitute a threat to the beautiful but fragile wonder that is humankind.

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