The Roles of New Technology and the Law in the Fight Against Covid-19

by Dawie de Villiers

The importance of South Africa adapting to the Fourth Industrial Revolution (4IR) has been high on the national agenda in recent years. However, the adoption of artificial intelligence (AI) and other forms of technology has been hampered to some extent by fears of job losses and privacy issues. The urgent need to address the challenges posed by the Covid-19 pandemic has forced a renewed interest and focus on the possible solutions that technology can provide in a time of enormous crisis. This article provides some preliminary observations on how new technology can assist in the fight against the pandemic, and some of the legal challenges that may arise.

Before discussing these issues further, it is worth acknowledging that the relationship between law and medicine has always been somewhat strained. Law is often seen as being in opposition to medicine, and hostility from doctors towards lawyers is not uncommon. Lawyers, for their part, are known to be sceptical about medical evidence when cross-examining medical experts in court. However, it is essential to point out that due to the distinct characteristics of medical practice, legal rules and regulations are created to protect both doctor and patient from potential harm. This is pertinent to the 4IR: when the need to regulate new technology arises, it is up to the law to determine if current legal instruments are sufficient or if there is a need to revisit them.

New Technology in the Fight Against Covid-19

The Covid-19 crisis has highlighted the centrality of internet access. However, the fact that more than half of the global population does not have internet access diminishes the potential of new and exciting technologies. If the solutions that new technologies present do not in themselves worsen this inequality gap, steps will need to be taken to expand stable and accessible internet services to remote areas, so that the most vulnerable in society

can also benefit from better healthcare supported by new technology (Guterres, 2020).

The lack of hospital capacity and resources has been a real concern since the beginning of the Covid-19 outbreak. Many hoped that new technology like AI would speed up patient screening, reducing the strain on medical personnel. A valid question that arose, however, was whether the results of tests conducted by IT experts in laboratories would be comparable to real situations. A study from Google Health revealed that this was not the case (Heaven, 2020). Other problems were noted, such as poor internet connections which caused delays. It was also pointed out that accuracy in labs is only the first step.

In response to these concerns, the speeding up of the rollout of 5G technology across Africa has inevitably been marked as a priority. While this priority may be justified, it should not overshadow the need to be mindful of the balance between the right to safety and security (including the right to health facilities) and the right to privacy.

Assistant Robots

Medical chatbots and other robots that can update algorithms in the initial screening of patients may be extremely valuable, particularly in assisting health personnel who are under tremendous pressure. An example of this is Quintin, a robot at Tygerberg Hospital in the Western Cape, who assists with virtual ward rounds – some of which are conducted in the absence of medical staff. Doctors can control Quintin remotely with a desktop, tablet or smartphone, and communication between the doctor and patient occurs through a microphone and Zoom. The obvious benefit of using robots in these circumstances is that medical personnel are not exposed to the virus unnecessarily.

Germ-Destroying Robots

It is crucial to control the spread of Covid-19 in hospitals and amongst health care workers. The latest technologies can play an essential role in this, as seen in the use of super germ-destroying robots. Netcare began acquiring these robots in late 2017, and currently uses two types. Dr Richard Friedland, Netcare Group's chief executive officer, explains: 'Both the Xenex pulsed ultraviolet (UV) robots and Yanex Pulsed-Xenon UV robots deployed in Netcare hospitals use high doses of UV light to destroy viruses, bacteria and fungal spores and disinfect hospital wards, theatres and other spaces within minutes' (Netcare, 2020). There are currently 28 of these robots in operation at 22 hospitals and, according to Friedland, another 13 will soon be deployed.

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The Russian-designed Yanex robot has proven to be effective against antibiotic-resistant bacteria and viruses such as Covid-19. It releases UV-C spectrum light, which destroys viruses and prevents replication. The robot can destroy a remarkable '99.90% of germs on high-touch surfaces and 99.99% of airborne germs', and is able to disinfect a room in just over a minute (Netcare, 2020). The robots are connected to a cloud, where all records are stored and are easily obtainable.

Screening Robots and Applications

The screening of large numbers of people, both for possible quarantine and for necessary treatment, is key to controlling the spread of Covid-19. However, our present pathogenic laboratory testing approach is time-consuming and carries the risk of a large number of false-negative results. AI may offer a solution to these issues, according to a recent study by eleven researchers from China (Wang et al, 2020). By using a deep learning technique, the researchers developed an AI screening application that reached a global 89.5% accuracy – far higher than the results obtained by two skilled radiologists. The researchers made use of a supercomputer system that obtained results in about 10 seconds per individual case. Testing can also be conducted remotely through a shared public platform. This is a work in progress, however, and the researchers admit that there are limitations to their study.

The Centers for Disease Control and Prevention (CDC) recently released a Covid-19 assessment robot that can swiftly assess signs of infection and risk factors. After assessment, the robot

offers a report and proposes that either a doctor be contacted or that the illness be managed at home. Powered by Microsoft Azure, this healthcare robot will be an important tool in helping currently overwhelmed hospitals, as it will allow doctors and other healthcare workers to pay attention to more urgent matters. Apart from its assessment function, the Bot can be linked to a chatbot, Grace, who can answer patients' questions online (Bitran and Gabarra, 2020). Although this tool was only launched in March 2020, an average of more than 1 million messages per day are submitted by people who are concerned about Covid-19.

Closer to home, Nigeria has developed a free online Covid-19 triage application that allows users to pre-screen themselves and assess their risk category, based on symptoms and travel and recent exposure history. Their answers determine if remote medical advice should be sufficient, or whether they should contact a doctor (Harrisberg, 2020). Since March 2020, more than 400,000 Africans have made use of this service. Here it is important to note that any new technology developed for use in African countries should be mobile friendly, given the growing use of smartphones in Africa. Acutely aware of how Covid-19 could affect the continent's most vulnerable, Africans across the spectrum are increasingly using and implementing available mobile technology options to prevent the spread of the virus. To quote Wale Adeosun, CEO of Nigerian-based Wellvis: 'A majority of Africa's problems require mostly African solutions or solutions designed with Africans in mind'.

In South Africa, WhatsApp users have reacted favourably to an interactive chatbot launched by the Department of Health – a solution that is less data intensive and more affordable than other web-based health sites. This chatbot answers general questions about symptoms, possible treatment, and myths in five different languages. Since its launch just over a month ago, it is now available globally and has already reached more than 3.5 million users (Harrisberg, 2020).

Another pre-screening symptom checker that is being used locally is an application recently released by Epione.net, available as a free download (Daniel, 2020). At present the app is linked to two hospitals in Soweto, with several doctors and other staff partaking in its pilot programme. It has also just been extended to Zimbabwe. The app allows users to monitor the progress or deterioration of their symptoms, thereby limiting the numbers of visitors to hospitals and clinics.

A leading radiologist at a hospital run by the UK's National Health Service saw the potential of an existing AI chest X-ray application called qXR, which was developed by a Mumbai-based company, Qure.ai. In order to distinguish Covid-19 from other pneumonia viruses, the company re-adjusted qXR to execute initial readings, as opposed to the older version that was used to double-check human diagnosis. One of the challenges encountered in doing this was the collection of enough data for training algorithm purposes, due to privacy concerns. Qure.ai has now expanded this rollout from the UK to the US, Italy, France, Mexico and Portugal (Hao, 2020). The qXR application is extremely valuable as it can deal with enormous workloads, reducing the burden on radiologists. The importance of aggressive and proactive screening in containing the spread of the virus has been demonstrated in countries like South Korea, Taiwan and Singapore (Tarun et al, 2020).

The new online version of Radify, developed by Envisionit Deep AI, is another example of assessment technology being used in the response to Covid-19. Radify can label 20 different X-ray pathologies at a speed of 2,000 X-rays per minute, which greatly reduces the workload of radiologists (Bizcommunity, 2020). It also assists hospitals by grading possible cases in order of high, intermediate and low probability.

Track and Trace Technology

Apple and Google have joined forces to launch application programming interfaces (APIs) and operation system-level technology that will enable contact tracing. These APIs work interchangeably

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between iOS and Android devices when customers use apps made available by health authorities. Apple and Google will also enable a common Bluetooth-based contact-tracing platform (Apple Newsroom, 2020). The use of this platform will, however, depend on how aspects like transparency, consent and protection of privacy are addressed.

Tracking and tracing Covid-19 patients and their contacts has become a key strategy in many countries, including South Africa. In his address to the nation on 30 March 2020, Ramaphosa announced the launch of an 'extensive tracing system' that would be used to 'trace those who have been in contact with confirmed coronavirus cases and to monitor the geographical location of new cases in real-time'. Within days, new regulations – in terms of Section 27(2) of the Disaster Management Act, 2002 – were passed that permitted the government to implement this tracing system, without needing a court order (Mahlangu, 2020). This method, however, will not be practical without the assistance of big IT companies and mobile service providers.

Revised regulations with more detailed location tracking procedures were published on 2 April 2020 in Government Gazette No 43199. In terms of these regulations, the Department of Health will keep a database of all those who are infected or reasonably suspected of being infected. This database can be shared with mobile service providers, who can then specify information about the location of those who have been infected, as well as people being traced who were in their immediate vicinity. Only identification is permitted under these regulations – the interception of any communication is not allowed.

It is worth noting that just months before these track-and-trace provisions were passed, surveillance laws (under the Regulation of Interception of Communications and Provision of Communication Related Information Act, 2002 (RICA)) were declared unconstitutional by the Gauteng (Pretoria) High Court. Sutherland J found no balance in the act between 'lawful surveillance' and respecting the individual's right to privacy.

With this case as background, it is understandable that much effort went into ensuring that many essential safeguards were put in place to protect the critical right to privacy, as guaranteed by our Constitution. These safeguards strike a fair balance between the need to limit Covid-19 infections and the right to privacy. Some of the safeguards are as follows:

- No content of any communication may be intercepted
- Location information or movements obtained from mobile service providers may only be from 5 March 2020 until the end of the national state of disaster
- The information may only be used to prevent or combat the Covid-19 virus
- The information may only be retained by the Director-General of Health for six weeks, after which it must be destroyed
- A designated judge must be appointed to oversee the protection of the right to privacy of citizens (Justice Kate O'Regan has since been appointed)
- An individual whose location information has been obtained must be notified of this, within six weeks of the state of disaster lapsing
- No person, unless authorised to do so, may disclose any information obtained in terms of the Regulations (Milo and Pillay, 2020).

The threat that exists of 'de-anonymising' individuals, as a concern mentioned by those who advocate for our privacy rights, is now possibly resolved. In this regard, a technique called differential privacy is used, where inaccuracies or 'noise' are inserted into the data. This can change characteristics such as age, race and gender. The more 'noise' that is inserted, the more difficult it is to de-anonymise the data. This is the same method that Facebook and Apple use to collect data without identifying a specific user.

Telemedicine

Telemedicine and mobile healthcare can play a significant role in combatting Covid-19. The potential uses of these technologies range from virtual consultations, to awareness raising, to clearing up misinformation. Useful telemedicine will only be possible if we can overcome legal and other challenges, such as exposure to delictual liability, privacy concerns, increased malpractice, insurance rates and scepticism concerning reliability. It is worth noting that the delictual liability risk of medical practitioners participating in telemedicine may be even higher than in

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traditional health care scenarios.

Telemedicine has significant advantages, including the prevention of the overcrowding of hospitals and clinics, and the facilitation of remote interaction – a patient can interact with their doctor via smartphone, for instance, and hospitals without certain specialists are able to contact specialists from other places. There are also the already popular ‘telemedicine robots’, used by more than a thousand hospitals in the United States in areas of cardiology, paediatrics, neurology, and mental health (Achenbach, 2020).

Notwithstanding these benefits, there exist several regulatory drawbacks and conflicting guidelines related to telemedicine, some of which have already been solved. The first barrier for telemedicine was the requirement that a face-to-face consultation had to occur before telemedicine could be practiced, according to the Health Professions Council of South Africa (HPCSA). The second was the requirement that telemedicine could only be practiced where there was an existing doctor-patient relationship. Understanding that these two obstacles stood in the way of the increased use of telemedicine, the HPCSA first did away with the face-to-face requirement, and then watered down the doctor-patient relationship requirement. A solution was also found to a previous written consent requirement by applying the Electronic Communications and Transactions Act 25 of 2002 (ECTA). The required consent can now be given electronically via a legally binding electronic signature on platforms such as WhatsApp and Zoom (Bizcommunity, 2020).

The infringement of a patient’s privacy and how personal and sometimes sensitive information is regulated are considerable concerns with this technology. The security of electronic medical records is difficult to guarantee: statistics show that in 2015 alone, more than 113 million healthcare records were stolen (Andriola, 2019). It is also alarming that no other industry has suffered more breaches of data than the health industry.

Other Technological Successes

AI has been recognised by the media as a formidable new weapon against infectious diseases. As some commentators have rightly pointed out, however, ‘too much confidence in AI’s capabilities could lead to ill-informed decisions that funnel public money to unproven AI companies at the expense of proven interventions such as drug programs’ (Bitran and Gabarra, 2020). Monitoring companies like Metabiota and Bluedot are making use of several natural-language-processing (NLP) algorithms to scan news and official healthcare reports. These are available in many different languages, making it easier to get a global picture for prediction purposes. AI has an established record of picking up on early signs of diseases that human doctors may have missed, including cancer, heart conditions and eye diseases. (Bitran and Gabarra, 2020). In order to make successful diagnoses, however, AI requires significant amounts of training data that may not be available during the early stages of a new disease.

There are also the challenges of AI relying on powerful algorithms, computing power and centralised cloud services – all of which place constraints on the speed and privacy of new applications. There is, however, some good news. It is now possible to run compelling algorithms on smartphones. Developers and researchers have found a way to shrink deep-learning prototypes without sacrificing their capabilities. New specialised AI chips are also able to store added computational power into less space, which also uses far less energy. Labelled ‘tiny AI’, this technology is already being implemented by the likes of Google, Apple and Amazon (Hao, 2020). To be able to operate powerful applications on cell phones, without the need to send requests to remote servers, is enormous progress. Localised or ‘tiny AI’ is also much better for privacy protection, as data does not need to leave the person’s computer or phone to get better performance.

Law and Technology

It is important that technology be regulated in

terms of the framework of existing legal structures, rules and regulations – particularly those that are designed to give effect to the rights-based approach required by the Constitution. These should not be regarded as being redundant in any context and in a country like South Africa, where these rights are the result of struggle and sacrifice, they should not be waived easily. If compliance is not possible, it may call for a re-visiting of legal requirements.

New technology can enormously advance access to healthcare, but it is vital that several regulatory issues are handled correctly. These include the licensing of medical practitioners, the determination of delictual liability, and the role of human rights in monitoring relationships. The law should take notice of the role that robots play in the health services arena. As mentioned above, robots are not totally in charge of medical care, but rather work alongside humans. The specific relationship between machines and humans is therefore meaningful from a legal perspective when determining liabilities and responsibilities.

There is already the case to be made that specific diagnostics by machine learning may have better results than diagnostics made by human doctors. This may affect medical malpractice law, and leads us to question if there should be an obligation on a doctor to make use of machine learning systems as part of the standard of care principle. If that is the case, doctors who fail to use machine diagnosis without a proper excuse may be liable for malpractice if an incorrect diagnosis follows.

Covid-19 and the Limitations of Fundamental Human Rights

The second part of this article focuses on the effect that the limitations of certain human rights may have on combatting Covid-19. Within this limited space, only a few essential rights can be highlighted. A recently-published comprehensive UN report on international human rights is referred to as background to this discussion, and used as a benchmark for the present situation in South Africa (Guterres, 2020). One of the many negatives of addressing pandemics is that approaches can easily divide societies, especially when unpopular laws impact individuals, relationships, businesses, and other institutions. Respect for public health requirements should go hand in hand with a reliance on fundamental human rights law and the protection against any unnecessary abuses.

South Africa's democratic constitutional dispensation requires that a high value be placed on the importance of all human rights. This is particularly true if the Constitution is to be successfully used as an instrument for the transformation of our society. However, it seems

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that these relatively newly acquired human rights have never come under so much pressure as during the past few months, with the government's reaction to the outbreak of Covid-19.

Most rights are not absolute. In other words, international law as well as our Constitution allows restrictions and limitations to our human rights in certain circumstances, especially if these are for the public good. This applies to even the most fundamental guarantees, as found in the International Covenant on Civil and Political Rights (ICCPR), which in times of national crises permits states to suspend certain rights (Guterres, 2020).

In order to limit rights in circumstances such as the Covid-19 pandemic, there must first be a formal proclamation of the public emergency, and the law must prescribe all conditions for the limitations. Curbing rights must be essential and necessary to achieve one or more of the following: public order, public health, public safety and national security, amongst others. We are, according to international law and our own Constitution, not allowed to impose restrictions to a greater extent than what is allowed in our Constitution. In the context of the limitation of human rights where there exists a threat to our public health, it is the balance between individual rights and communal rights that is difficult to strike, as this does not fall within clearly defined areas. The issue is further complicated in circumstances of disaster and uncertainty.

In order to comply with the necessary requirement of protecting public health, situations may necessitate powers to be extended to force individuals to do what they may not prefer to do. There is precedent for this in cases involving tuberculosis, such as *Minister of Health, Western Cape v Goliath 2009 2 SA 248 (C)*, where the court found that involuntary detention was a justifiable limitation on an individual's freedom of movement in open and democratic countries in situations where it was in the interests of public health. The key point, however, is that instances such as involuntary detention can only be justified in specific circumstances if the individual or group poses a real threat to society. To explain by way of another example: public health authorities should not, even within the context of Covid-19, impose mandatory physical examination, treatment or isolation of a person who is not contagious or where there is no reasonable suspicion of contagion. According to one commentator: 'the methods used, moreover, must be designed to prevent or ameliorate that threat. In other words, there must be a reasonable relationship between the public health intervention and the achievement of a legitimate public health objective' (Gostin and Berkman, 2007).

A crucial measure of how the balance should be struck is therefore the principle of proportionality, including a direct relationship between the limitation and the purpose for which the right is limited. South Africa's Constitution includes a limitation clause in Section 36, which spells out that the 'rights in the Bill of Rights may be limited only in terms of law of general application to the extent that the limitation is reasonable and justifiable in an open and democratic society based on human dignity, equality and freedom, taking into account all relevant factors, including — (a) the nature of the right; (b) the importance of the purpose of the limitation; (c) the nature and extent of the limitation; (d) the relation between the limitation and its purpose; and (e) less restrictive means to achieve the purpose'. The Constitution also specifies that: 'Except as provided in subsection (1) or in any other provision of the Constitution, no law may limit any right entrenched in the Bill of Rights' (Constitution of the Republic of South Africa, 1996).

The authorities are responsible for keeping the requirements of Section 36 in mind and striking a reasonable balance between public health and fundamental rights. Section 36 does not provide carte blanche to authorities to disregard rights and requires a high degree of responsibility when exercising powers relying on the limitation provision. If the interference is unfair or biased, it may well be deemed unconstitutional and can be set aside by the courts. In our current situation, some are fearful that the government might be overreaching and unnecessarily and unreasonably restricting rights, and that these restrictions may even continue after the Covid-19 crisis has ended.

Given our history, it is crucial that we only allow our rights to be sacrificed when it is necessary to defend public health. Sufficient attention should be given to due process so that unnecessary infringements on individual rights can be kept to a minimum. As Gostin and Berkman (2007) wrote: 'The threat of an influenza pandemic is real and could affect millions of lives. If such a disaster

occurs, we must not allow the widespread erosion of individual rights to compound the tragedy'.

The Role of Human Rights in a Time of Disaster

Because of the extraordinary situation that the world finds itself in, countries have had to adopt unprecedented regulations. In order to slow down the transmission of the virus, governments around the world have implemented lockdowns. These restrict not only freedom of movement, but also many other rights, including access to medical treatment (not only Covid-19 related), as well as the right to food, water, education and relaxation. These drastic measures have severely impacted the most vulnerable and least protected in our society, underlining our enormous social and economic inequalities, and the inadequacy of our existing health systems, especially for the poor.

Regulations and directives from various bodies and institutions are issued almost daily, and are often vague and contradictory. It is in this context that the Bill of Rights, with its proportionality requirement, can provide us with answers. The government should pay more attention to this as guidance, and should not ignore any of these binding sections. To quote the United Nations on International Human rights: 'This is not a time to neglect human rights; it is a time when, more than ever, human rights are needed to navigate this crisis in a way that will allow us, as soon as possible, to focus again on achieving equitable, sustainable development and sustaining peace' (Guterres, (2020).

The current crisis we face also reminds us of the adage that with great power comes great responsibility. In securing compliance with the limitation of rights, there is an additional concern. Law enforcement agencies, including the armed forces, do have an essential role to play in combatting the pandemic and safeguarding people. However, in South Africa we have witnessed a situation where broad powers were speedily granted to individuals who might not have been sufficiently trained for the job at hand. This carries risks that cannot be ignored. Oppressive and brutal enforcement is not productive and may cause more damage than anyone could have imagined. The actions of law enforcement officials, who admittedly work under challenging and stressful circumstances, should be judged by how they respond to immediate threats, while protecting human rights and the rule of law. South Africa was heralded for its quick response to Covid-19. It should strive to also be heralded as a leader for its ability to adopt a rights-based approach under challenging circumstances. ■

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