National Gambling Board
South Africa
a member of **the dti** group

RESEARCH TO DETERMINE THE
POTENTIAL IMPACT OF THE FOURTH
INDUSTRIAL REVOLUTION ON THE
CURRENT AND FUTURE REGULATION
OF GAMBLING IN SOUTH AFRICA

Dr Rachel Adams

Human Sciences Research Council

Tel: 021 4667947

Email: radams@hsrc.ac.za

Dr Michael Gastrow

Human Sciences Research Council

Tel: 021 4667836

Email: mgastrow@hsrc.ac.za

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Acronyms

4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
ASA	Advertising Standards Authority
ATM	Automated Teller Machine
B-BBEE	Broad Based Black Economic Empowerment
CEMS	Central Electronic Monitoring System
CSI	Corporate Social Investment
EBT	Electronic Bingo Terminal
EU	European Union
FIC	Financial Intelligence Centre
FICA	Financial Intelligence Centre Act, 2001
GDPR	General Data Protection Regulation, 2018
GGR	Gross Gambling Revenue
GRC	Gambling Review Commission
IoT	Internet of Things
IR	Information Regulator
KZN	Kwa Zulu Natal
LPM	Limited Pay-out Machine
MEC	Member of Executive Council
NCEMS	National Central Electronic Monitoring System
NGA	National Gambling Act, 2004
NGB	National Gambling Board
NHA	National Horseracing Authority
NRGP	National Responsible Gambling Programme
PFMA	Public Finance Management Act
POPIA	Protection of Personal Information Act, 4 of 2013
PLA	Provincial Licensing Authority
PwC	PricewaterhouseCoopers
RICA	Regulation of Interception of Communications and Provision of Communication-Related Information Act
SARB	South African Reserve Bank
SARGF	South African Responsible Gambling Foundation
SARS	South African Revenue Service
the dtic	Department of Trade, Industry and Competition

Glossary

Artificial Intelligence: Digital systems that display intelligent behaviour by responding, with some degree to autonomy, to inputs (whether data, sensory or otherwise), in working to achieve specific goals. AI systems can be embedded in both software (such as facial recognition technology) and hardware (such as self-driving cars and robotics). The term is most commonly applied to neural-network based learning systems that require big data for training.

Automation: The use of computer software, machines, robotics and other technologies that autonomously carry out tasks that would otherwise be done by human beings.

Biometrics: Technology that uses the unique patterns of physical traits of individuals for authentication or identification, including facial, gait and emotion recognition technologies. Biometrics are steadily replacing traditional methods of identification authentication such as passwords and PINs.

Biotechnology: Biotechnology, in its broad sense, refers to any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use (US Convention on Biological Diversity, http://www.cbd.int/). In its contemporary usage, biotechnology is often referred to as specifically related to applications of technologies for manipulating DNA.

Blockchain: Cryptographic information technology that acts as decentralised digital archive to record and verify online transactions and events while storing them in a secure global database that takes the form of a distributed ledger.

Cloud technologies: Internet-based platforms which permit global network access to a shared pool of configurable computing resources that can be quickly provisioned and released with minimal service provider interaction.

Crypto-assets: Digital assets which use cryptography, are built upon secure blockchain technologies and available on a public ledger.

Data modelling: The process of describing information structures and capturing business rules to specify information system requirements. Data models represent a balance between the specific needs of project implementation and the general needs of the business area that requires it.

Data processing: Occurs when data is collected and translated into machine-readable form and its subsequent processing such as storing, updating, rearranging, or printing out by a computer or data scientists so as to have a usable end product or data output.

Data subject: Under data protection law, including both the Protection of Personal Information Act (4 of 2013) and the European Union General Data Protection Regulation (2018), the data subject is the person from whom their own personal data is collected.

Deep Learning: A technique used in machine learning applications which enables machines to learn by being trained. In particular, deep learning uses layers of neural-network based algorithms to train AI systems. This technique is currently used in image applications, big data analyses, speech recognition and machine translation.

Destination Approach: A policy approach, adopted in South Africa, to limit gambling opportunities by locating casino gambling venues a distance away from society. This is to reduce accessibility to vulnerable communities by concentrating these venues in fewer dedicated locations that will require effort and deliberate intention to visit.

Facial Recognition Technology: Computer programmess that analyse the characteristics of a human face, such as the distance between the eyes and the shape of the jaw, and compare it to images of similar faces in a database for the purpose of identification.

Fourth Industrial Revolution: The Fourth Industrial Revolution (4IR), as defined by the World Economic Forum, is seen as the fourth major industrial era since the initial industrial revolution of the 18th century, in which new technologies are fusing the physical, digital and biological worlds, and impacting all disciplines, economies, and industries (Schwab, 2016). Key technology platforms include artificial intelligence (AI), robotics, the Internet of Things, autonomous vehicles, additive manufacturing (also known as 3D printing), quantum computing and nanotechnology, amongst others. The 4IR is seen to be building on the digital revolution, representing new ways in which technology becomes embedded within societies and the human body.

Interactive Gambling: A range of gambling activities that occurs through media connected to the Internet via smart wireless portable devices such as computers, laptops, tablets, mobile phones, interactive televisions, gaming consoles, and which allow interactive gambling activities such as blackjack, poker, lotteries, sports and race track events.

Internet of Things: The extension of the internet to sensors and wireless tags that make it possible to keep track of objects and processes, like parcels in transit or monitoring household items such as geysers and lights.

Loot Boxes: Specific visual representation of intermediary devices that reward players with random objects when a certain objective has been met. They are typically presented as containers of different sorts that contain randomized items that can also be purchased with real-world money.

Machine Learning: A branch of artificial intelligence that enables machines to perform their jobs intelligently by using neural-network based algorithms combined with big data sources.

Machine Translation: A method of converting the source sentence from one natural language to other natural language with the help of computerized systems whereby human assistance is not required.

Natural Language Processing: A branch of artificial intelligence that helps computers understand, interpret and manipulate human language in order to fill the gap between human communication and computer understanding.

Problem Gambling: A recognised mental disorder characterised by a pattern of continued and constant gambling, irrespective of the psychological, physical and social consequences for the individual, family and community.

Radio frequency identification chips: A form of wireless communication that incorporates the use of electromagnetic or electrostatic connection in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person. These chips are widely used in healthcare, manufacturing, inventory management, shipping, retail sales and home use.

Virtual Reality: Computer generated models of three dimensional images and environments that users interact with in a perceived reality by wearing special equipment such as headsets and hand-held sensors that help in stepping into immersive multi-screen physical environments.

EXECUTIVE SUMMARY

The Fourth Industrial Revolution is having, and will continue to have, a significant and multi-faceted impact on the gambling industry in South Africa, raising a wide scope of new challenges and demands for regulators. Our assessment of these impacts includes a scoping of the legal, policy, and regulatory environments, a scan of the technological dynamics of the 4IR and how these impact on the gambling sector, and in-depth interviews with a wide range of stakeholders. From a synthesis of these core knowledge resources, we have identified key issues for regulators.

The 4IR paradigm is dynamic, and at its conceptual core is the notion of change – the interplay between technological change, economic change, social changes, and political change. The exponential growth of computing power and internet connectivity continues to drive rapid global technological development, which in turn acts as a driver of social and economic change. The overarching implication for regulators, including policy makers and legislators, is that change is becoming more rapid, and regulation needs to become more adaptable. Our research demonstrates that the key implications of the 4IR on the regulation of gambling in South Africa for the NGB are: one, its impact on the destination model and the role of the NGB in protecting society from the stimulation of demand for gambling; two, preventing illegal online gambling; and three, controlling and responding to problem gambling as a result of the use of such technologies.

The recommendations emerging from our analysis fall into four broad areas, each of which address different modalities of adaptation to the changes brought about by the 4IR. Firstly, there are broad regulatory strategies that can be implemented in order to make regulation more responsive to technological change and to shorten the policy cycle. Secondly, there are strategies to adapt to broad global technological changes, such as digitalisation, automation and data-intensification. Thirdly, there is the need to respond to technological changes being brought about by specific technological platforms, such as AI, blockchain, and virtual reality. Finally, we reflect on the use of regulation that addresses the impact of technological change for meeting the core social mandates of the NGB, for example the prevention of problem gambling and the prevention of gambling by minors.

Thus, the key regulatory recommendations of this report are:

Ethical challenges
The increased use of 4IR related technologies in the gambling sector raise new ethical challenges which regulation must seek to address. These are: the blurring of the boundary between "gaming" and "gambling"; the effect on children and minors of increased and unregulated access to gambling services;

increased gambling addiction and the latent stimulation to gamble from immersive gambling services and products – whether online or at land casinos.

Policy and Regulatory Opportunities

The South African gambling industry has seen a recent wave in attempts to develop new regulatory instruments, from the amended National Gambling Act of 2008, to the National Gambling Policy of 2015 and the National Gambling Amendment Bill of 2018. To date, these regulatory instruments have not been implemented, while much of what is included in these instruments is pertinent to address the new regulatory challenges raised by the 4IR. This research report highlights the key provisions of these instruments in respect of the 4IR and recommends for their implementation. An additional policy opportunity includes the drafting of 4IR policy responses by the dtic, and we recommend that the NGB makes inputs to the dtic on policy responses for the gambling industry based on the findings of this research report.

Legislative Alignment

Some of the concerns regarding the relevance of the current regulatory framework of the gambling industry for responding to the 4IR can be addressed through ensuring better alignment between gambling laws and other legislative frameworks that address 4IR related issues directly. In particular, gambling law must be aligned to the provisions of the Protection of Personal Information Act, 4 of 2013, particularly given the extent to which personal data is gathered and extracted in 4IR related gambling services. In addition, there must be alignment between gambling law and the Financial Intelligence Centre Act of 2001, in order to better protect again illicit money flows that can arise in gambling 4.0.

Institutional Operation

Given the ubiquitous nature in which the effects of the 4IR are being felt, the need for institutional cooperation in dealing with 4IR related regulatory challenges becomes more critical. To this end, it is recommended that the NGB maintains strong institutional relationships with other state institutions who have a mandate to deal with related 4IR concerns. This includes the Competitions Commission, which the NGB is mandated to cooperate with under Section 54 of the NGA 2004; the Information Regulator established under the Protection of Personal Information Act; the Financial Intelligence Centre; and the South African Bureau of Standards; and the Advertising Standards Authority.

Future and Incoming Regulatory Challenges

From the research undertaken for this report it is evident that the effect of the 4IR on the gambling industry will be more pronounced in future, as technologies like virtual reality and augmented reality become more widespread. In terms of key regulatory challenges in the foreseeable future, the research

for this report has ascertained that issues around intellectual property, particularly in terms of algorithmic propriety, will need to be addressed, as well as the regulation of crypto-assets and crypto-currency.

Through the implementation of these strategic and operational recommendations, the NGB will improve its effectiveness in carrying out its mandate. For the gambling industry, the NGB will be able to play a more effective role in updating regulation to govern new business models and practices. Perhaps most importantly, our recommendations may position the NGB to be more effective in carrying out its social mandate – the challenging task of regulating the gambling industry while continuing to protect the vulnerable, including children, from its negative impacts.

In summary, our key overall recommendations are summarised below:

Artificial intelligence

For regulators, AI has the potential to assist with data analytics and policy decision making. In the private sector, particularly amongst operators, including casinos, AI technologies should only be approved for security purposes, and should not be used for tracking or nudging player behaviour. Their use should only be permitted following regulatory approval. Any application of AI that uses consumer data in the gambling sector must be proceeded by the provision of evidence to regulators that data privacy is protected.

Augmented reality and virtual reality

Specific protocols should be developed to provide guidance to regulators considering VR and AR applications for regulatory approval – including clear boundaries regarding what kinds of applications of VR and AR are legal in the South African context, and which are not. Key questions to be considered include whether VR applications can be verified as live games, whether they can be verified as taking place in a South African jurisdiction or not, whether they protect the data privacy of consumers, and whether they have the potential to over-stimulate gambling demand through their appeal to younger consumers.

Blockchain and financial transactions

Develop a strategy to address the use of crypto-assets, including mechanisms to detect its use, and tools to enforce the controls and regulations that may emerge from the South African Reserve Bank. Cooperation with the FIC should be deepened in order to combat the illegal use of crypto-assets.

Data management

The data management capabilities of the NGB needs to be considerably strengthened in order to meet the challenges posed by an increasingly data-intensive gambling sector.

The collection of data from LPMs should be included in the NCEMS in a manner that does not produce insurmountable challenges – technological solutions for these challenges should be explored by regulators in partnership with sector stakeholders.

In order to enforce compliance with the POPI Act, the NGB needs to establish clear guidelines for the application of national data regulations to the gambling sector. This should include protocols for the protection of the privacy of players, for the collection and retention of personal information, and for the registration of players and the establishment of national databases to track player activity. AI systems have the potential to assist in this endeavour. This effort will require further research, as well as collaboration with the South African Information Regulator.

The potential for automated technological solutions for data management challenges should be explored.

Online gambling
Stronger mechanisms and processes should be developed for:
- Growing public awareness about the risks of online gambling
- Detecting online gambling and intervening where it is detected
- Blocking access to online gambling

The mechanisms by which South African consumers interact with online gambling operators outside of South Africa must be regulated and restricted. The financial constraints to online gambling should be further strengthened through dialogue with banks and internet service providers.

Promotion of gambling
The framework governing gambling advertisement, and the enforcement thereof, should be strengthened in order to more effectively align with the positions of the National Gambling Policy 2015. Online communication platforms and AI technologies have created an unprecedented escalation in the potential for both legal and illegal promotion of gambling, with the potential for significant social impacts. A dedicated regulatory body for monitoring gambling and casino advertising should be established – such monitoring requires a distinct set of capabilities and independent authority to detect the illegal promotion of gambling and respond accordingly.

Tighter monitoring and control over the use of geolocation technologies, micro-targeted messaging, and social media to advertise gambling are required.

Co-regulatory approaches between the Advertising Standards Authority and NGB could be considered.

The NGB should engage directly with social media providers regarding online advertising of illegal forms of gambling.

The National Responsible Gambling Programme should include reference to new technologies in its gambling education programmes. NGB should consider undertaking further research with the aim of developing programmes to promote responsible gambling, as well as providing online-based therapy for those in need.

Prevention of problem gambling
The NGB should support the adoption of emerging technologies focussed on the prevention and mitigation of problem gambling.

Robotics, automation and manufacturing
At present, due the functional structure of the gambling sector, automation is not having as large an impact as in other sectors. In the long term, possible uses of robotics to automate tasks in the casino environment may lead to unemployment, or other unanticipated consequences – such applications should be monitored by regulators on an ongoing basis.

Sports betting
Regulators should review the conditions under which international firms enter the South African sports betting market. Higher licencing fees and a requirement for investment in local physical betting sites may provide leverage to create local jobs, and also create more even market conditions for local firms to compete.

Virtual horse-racing is a form of online gambling that should not be permitted in South Africa under current law.

Underage gambling
More effective mechanisms for detecting the advertising of gambling to minors need to be developed. Closer collaboration between South African gambling regulators and international social media firms may assist in this regard.

The NGB should developing principles that distinguish between online games that are appropriate for minors, and online games that are sufficiently similar to gambling games that are therefore not appropriate for minors. The distinction between gaming and gambling must be more clearly differentiated, and more effectively regulated.

Further research

Ongoing research is required to understand the real and potential impacts of new advanced technologies on the South African gambling sector. This includes considering the impact of the 4IR on jobs in the gambling sector and relevant skills training. Strengthening the research function of the NGB should be considered. This is broadly in line with the recommendations of the Gambling Review Commission of 2010 to establish an independent research function for gambling at a national level (19).

Digitalisation also creates a need for further research. In order for appropriate standards to be developed for software products that comply with nationally set standards for public-use, and can be monitored and tracked by the NGB or similar national regulatory authority, further research is required. Server and database systems have become highly complex, and in some cases may not be physically based in South Africa (and therefore within the jurisdiction of South African law). Further research is needed to understand what kinds of national registries might be most relevant under such circumstances.

1. Introduction

Established under the National Gambling Act Act (NGA), 2004 (Act 7 of 2004), the National Gambling Board (NGB) is the national body mandated to oversee the regulation of gambling in South Africa. Its mandate includes the promotion of legal gambling activities and the protection of punters against the effects of over-stimulation. In addition, the NGB is required to brief the Minister of the Department of Trade Industry and Competition (the dtic) on matters pertaining to the development of the industry, and to make policy recommendations therein. The Fourth Industrial Revolution (4IR) constitutes a significant policy consideration for the NGB. To this end, the NGB commissioned the Human Sciences Research Council (HSRC) to conduct a study to understand the current and potential future penetration of 4IR technologies on gambling in South Africa, and the effect on the regulation of the sector therein.

The 4IR is having, and will continue to have, a significant impact on South African governance and society as a whole, and on the gambling sector in particular. The 4IR has been defined as a successor to the first three industrial revolutions, which were driven by steam power, electricity, and computing power respectively. The 4IR is distinct in that it is defined by accelerating technological change, the convergence of multiple technology platforms across the physical, digital, and biological realms, and a movement towards transhumanism, which refers to the expansion of personhood to encompass physical and digital extensions of the mind and body (Schwab, 2016). Technology platforms that are currently central to this revolution include artificial intelligence (AI), robotics, automation technologies, the industrial internet of things, blockchain, and biotechnology. Several of these technology platforms are salient to the question of gambling and related regulation, for example AI, (blockchain-based) crypto-assets, and services automation.

AI systems, in particular, are forecasted to have a significant impact on gambling. These impacts include the use of AI and swarm intelligence to track, predict and control human behaviour, the use of AI-based nudging techniques to influence punters' decision making in gambling and gaming, and the use of AI to profile individuals and provide personalised advertising for gambling services and products (Fong 2018). Moreover, given that some key gambling services, including betting, are based on statistical probability, the development of AI technologies for predicting outcomes and contingencies is likely to have a significant impact on this industry (Bunker and Thabtah 2017).

Indeed, the gambling industry, in South Africa and internationally, is rapidly evolving and often at the cutting edge of public use of new and emerging technologies related to the 4IR (Dzhingarov, 2017). The NGB's national gambling statistics estimate the size of gambling industry revenues in South Africa to be R30bn for the financial year 2018/19. Gross gambling revenue (GGR) for the industry is expected to rise from R26 billion in 2015 to R34.8 billion in 2020 (PwC 2017). However, the impact of 4IR related

technologies on the industry has yet to be fully assessed, particularly with regard to the impact it may have on illegal gambling, including online gambling.

With respect to the regulation of the gambling sector, the advancement of 4IR technologies raises multiple issues. These include, amongst others, the regulation of data processing and the protection of data privacy; the appropriate and ethical use of technology by players, gambling providers and regulators; the collection of revenue from gambling services and systems; and jurisdictional extra-territoriality for regulating and enforcing online interactive gambling. These issues have been explored in this report, both through desktop study and through stakeholder interviews – with a particular consideration given to appropriate regulatory responses, whether through the amendment of law and policy, or through self-regulatory industry-led measures.

One of the concerns regarding the penetration of 4IR-related technologies on gambling in South Africa is that online technologies are available through mobile and tablet devices, effectively promoting access to gambling services anywhere within South Africa. This has implications for regulation in at least three major ways: one, its impact on the destination model and the role of the NGB in protecting society from the stimulation of demand for gambling; two, preventing illegal online gambling; and three, controlling and responding to problem gambling as a result of the use of such technologies.

The effort to initiate a policy response to the issue of the 4IR in relation to gambling is aligned with broader departmental and national policy-making processes. The dtic is currently developing a 4IR policy response, led by its recently established Chief Directorate: Future Industrial Production Technologies (4IR). At a national level, the Presidential Advisory Commission on the Fourth Industrial Revolution has been established, and is tasked with leading a national multi-stakeholder engagement to chart South Africa's way forward in the current era of technological disruption.

In developing regulatory responses to the changes and challenges posed by the onset of the 4IR, regulators are faced with the question of the extent to which the law can keep up with the rapid pace of technological development. Within a constitutional democracy, such as South Africa, law- and policy-making is a consultative and measured process which seeks to take into account the needs and perspectives of as broad a range of stakeholders as possible. However, the pace at which new technologies are developed and diffused through the gambling economy means that the law can be left behind, and such technologies operate within an arguably non-regulated space. An example here is the lack of appropriate regulatory measures governing the activities of social media platforms, which, as platforms, are not regulated under traditional media, broadcasting and communications law. Within South Africa, there have been two responses to this conundrum to date, which have been relatively effective. The first is to draft tech-neutral law. The South African Protection of Personal Information Act

2013 (POPIA) – one of the key pieces of legislation for industry 4.0 – is an example of a law that speaks to technological processes (in terms of personal data processing and automated decision making) but is drafted with tech-neutral language in order to future-proof the relevance of the Act. The other response has been the review of outdated legislation through the courts. The recent declaration by the Gauteng High Court of the unconstitutionality of certain sections of the Regulation of Interception of Communication and Provision of Communication Related Information Act 70 of 2002 (RICA) with regard to excessive state surveillance powers, is an example here.

Against the background described above, this report seeks to determine the impact of the 4IR on the current and future regulation of gambling in South Africa. In doing so, we develop recommendations for legislative amendments where appropriate, in line with and in order to give effect to the principles of the NGA to regulate gambling in South Africa. In this we place an emphasis on new technologies that are being, or might be, adopted by the gambling sector in South Africa. We endeavour, too, to provide an assessment of the future technological trajectory of the gambling industry, globally and in South Africa.

In developing an appropriate regulatory response for the gambling industry to the emerging technologies of the 4IR, due regard has been given to the positions of key stakeholders, including the dtic, provincial licensing authorities, gambling service providers and operators, and regulators. In addition, regard has been given to the specific context of South Africa and the need to protect vulnerable sections of society, and particularly low income earners and children, from exploitation and the adverse effects of 4IR-related gambling services, including gambling addiction and over-stimulation. Lastly, appropriate regulatory responses to the impact of the 4IR on the gambling industry must take into account the transformation needs of the sector and of the South African economy as a whole.

2. Research methodology

The overall methodological approach to the study has been to undertake a desktop review of literature and regulation relevant to gambling and the 4IR, and to integrate the knowledge developed through this process with the findings of in-depth interviews with a broad range of relevant stakeholders. The resultant analysis places the South African sector in its global context, and focusses on key issues affecting the regulation of gambling in light of technological change.

2.1. Desktop review

The desktop component of this study entailed a systematic and comprehensive collation and review of relevant documents, including strategic documents, legislation, technical reports, academic literature,

policy documents, and documents related to key projects and programmes aimed at understanding the implications on the fourth industrial revolution in the South African context, and particularly with regard to the gambling sector and the regulation thereof. The desktop review was structured around the following key research questions:

1. What is the current regulatory framework of the gambling industry in South Africa, and how far does it address the changing technological environment of the sector?
2. From the literature, what understanding can be gleaned of the current penetration of 4IR related technologies in the South African gambling industry?
3. From the literature, what new technologies can we expect to see in the foreseeable future in the gambling sector, and what best practices in the regulatory responses to these technologies should be considered in South Africa?

These central questions structured the review within three areas:

1. Desktop research to ascertain the real and potential impact of 4IR technologies, with particular regard for the South African gambling sector

A broad research inquiry examined the real and potential use of emerging 4IR technologies within the South African gambling sector, including artificial intelligence, augmented reality and virtual reality, blockchain and crypto-assets, big data, cloud computing, online gambling, social media, robotics and automation. These in turn have been related to key challenges in the gambling sector, including those related to the promotion of gambling, the prevention of problem gambling, and underage gambling, amongst others. The research emanating out of this review includes a forecast of the most pressing technologies and changes impacting, and likely to impact in future, the South African gambling sector, in order to inform policy prioritisation in this regard.

2. Scoping of regulatory frameworks with a view to addressing regulatory gaps

The desktop study reviewed legislative frameworks that are relevant to, or which will have relevance for, the regulation of the gambling industry within the 4IR. These frameworks have been assessed to ensure alignment between the NGA and new legislative developments governing 4IR related technologies in South Africa.

3. A review of the use of 4IR technologies for the effective control and regulation of gambling activities

This research component included an assessment of the use of 4IR-related technologies to assist in the regulation and monitoring of the gambling industry, including the regulation of gambling transactions,

and the use of data for the profiling and surveillance of problem gamblers. This research includes an assessment of the ethical and legal implications of their use. In doing so, potential legal challenges to the use of such technologies for controlling and regulating gambling activities have been canvassed.

The desktop study included comparative analysis of the experiences and regulatory responses of other jurisdictions regarding the impact of the 4IR on gambling. Adding an international comparative perspective to this research project allows for a critical review of international standards, benchmarks and best practices against which South Africa can measure the potential effectiveness of any proposed regulatory amendments. This component also builds on the research of the Gambling Review Commission, specifically with regard to the regulation of online and interactive gambling by Australia and the UK. International comparison also contributes to the realisation of the NGB's mandate under the NGA to 'have regard to international developments in the field of casinos, racing, gambling and wagering' (Section 65(4)(b)) and to monitor and evaluate 'the gambling industry's international competitiveness and advising the Minister thereon' (Section 65(1)(e)).

2.2. Stakeholder interviews

In-depth interviews with stakeholders aimed to gain increased perspective of and understanding into the key challenges and opportunities within this rapidly changing industry. Beyond offering insights in greater detail, these interviews also sought to develop a context for the evolution of these spaces and further aids in corroborating observations from the desktop research.

Thirty-five interview sessions were held between November 2019 and January 2020. Table 1 presents an overview of the interview sample. Interview participants have been anonymised, in line with research ethics best practice. In order to provide anonymity, an anonymization code have been assigned to each interview, indicating the stakeholder group to which the participants belong. Many of the interviews included more than one participant – for anonymization purposes, the analysis does not distinguish between different individuals responding within the same interview session, and they are assigned the same analysis code. The broad spectrum of stakeholders included three civil society organisation (which includes industry associations), one expert consultant, one casino equipment and service provider, one financial institution, eight gambling boards, one government department, six firms (operators) active in sector, one product testing and assessment specialist, and two specialist university academics.

Table 1: interview summary

Anonymization Code	Interview Date

Civil society 1	27/11
Civil society 2	17/01
Civil society international 1	25/11
Consultant 1	29/11
Equipment and service provider 1	26/11
Financial institution 1	21/11
Gambling board 4	21/11
Gambling board 1	10/11
Gambling board 2	21/11
Gambling board 3	22/11
Gambling board 5	03/12
Gambling board 6	18/11
Gambling board 7	23/12
Gambling board 8	19/12
Government department 1	20/11
Operator 1	18/11
Operator 2	20/11
Operator 3	04/12
Operator 4	12/11
Operator 5	21/11
Operator 6	22/11
Testing and assessment 1	26/11
University academic 1	28/11
University academic 2	25/11

Interviews were largely conducted in person, or via Skype or teleconferencing methods. Semi-structured interview questionnaires were designed to answer the key research questions of the study, and were informed by the desktop research component. The full research methodology protocol for the study was approved by the HSRC's Research Ethics Committee. All interviews were undertaken after the signing of a confidentiality and consent form that was aligned with the research ethics protocols of the HSRC. Participants also signed consent for audio recording. All interviews were digitally recorded, transcribed, and loaded onto the Atlas.ti qualitative analysis software package.

2.3. Analysis

The analysis presents a set of key findings and recommendations based on a synthesis of the desktop study and interview data analysis, focussing on the primary aim of the report, i.e. *to understand the potential impact of the fourth industrial revolution on the gambling products and services offered in the gambling industry in South Africa, and whether this impacts on the current South African regulatory model, and if so, what that impact would be*.

The analysis of interview transcripts used both manual (inductive) and automated (word search) coding methods to code content in accordance with a coding scheme that was developed to reflects the key objectives, themes, issues, and research questions of the study. The codes and code groups used for analysis are presented in Table 2 below:

Table 2: Analysis codes and code groups

Code	Code Group
AI	Technologies
Augmented reality	Technologies
Automation	Technologies
Blockchain	Technologies
Internet of Things	Technologies
Social media	Technologies
Virtual racing	Technologies
Virtual reality	Technologies
Bingo	Modalities
Horse racing	Modalities
Online gambling	Modalities
Sports betting	Modalities
Destination model	Modalities
Children and gambling	Challenges
Data privacy	Challenges
Gambling addiction	Challenges
Illegal gambling	Challenges
Money laundering	Challenges
Social impact	Challenges
Legislation	Regulation
Policy	Regulation

International context	Findings and recommendations
Opportunities	Findings and recommendations
Recommendations	Findings and recommendations
Risks	Findings and recommendations

The coding process rendered 1731 quotations, each coded with a distinct theme. The number of quotations related to each code and code group is presented in Table 3 below:

Table 3: Analysis codes and quotations

Code	Totals
AI	20
Augmented reality	8
Automation	4
Bingo	24
Blockchain	51
Children and gambling	10
Data privacy	15
Destination model	25
Gambling addiction	16
Horse racing	83
Illegal gambling	109
International context	96
Internet of Things	2
Legislation	142
Money laundering	5
Online gambling	333
Opportunities	33
Policy	97
Recommendations	31
Regulation	185
Risks	45
Social impact	1
Social media	18
Sports betting	356
Virtual racing	6
Virtual reality	16

TOTAL	1731

The analysis concludes with recommendations that provide insights to enable the Minister of the dtic to make informed decisions with regard to legislation and regulation, particularly with regard to the possible amendment of legislation in future, while addressing the policy responses to the short and medium term challenges that may arise in regulating or not regulating, and new gambling modes in future.

3. The regulation of gambling in the Fourth Industrial Revolution

The Fourth Industrial Revolution has its conceptual roots in the deliberations of the World Economic Forum, which defines the 4IR as the fourth major industrial era since the initial industrial revolution of the 18th century, in which new technologies are fusing the physical, digital and biological worlds, and impacting all disciplines, economies, and industries (Schwab, 2016). Key technology platforms include artificial intelligence (AI), robotics, the Internet of Things, autonomous vehicles, additive manufacturing (also known as 3D printing), quantum computing and nanotechnology, amongst others. The 4IR is seen to be building on the digital revolution, representing new ways in which technology becomes embedded within societies and the human body. Moreover, the 4IR is seen as significant, imminent, and global. Being prepared for the 4IR therefore means to position institutions in a way that the 4IR is harnessed for the benefit of human wellbeing, and in support of national and international social and economic objectives.

It is broadly recognised that the 4IR is set to have a major impact on every sector of the economy and of society. In South Africa, industries across the country are considering the ways in which new technological developments may both improve business practice and require new regulatory responses to ensure the use of technology is fair, responsible and takes into account South Africa's broader socio-economic objectives. The gambling industry, both in South Africa and globally, is no stranger to technological innovation. Indeed, the development and use of new technologies to enhance player experience is a key driver of competition and growth in the sector. However, these new technologies also create new regulatory challenges. One of the major challenges in this regard is to mitigate the over-stimulation of the latent demand for gambling which is, in many respects, inherent in technologies that seek to create immersive player experiences, such with augmented reality and virtual reality technologies. In addition, high-end gambling products and activities tend to involve multiple technologies, designed and produced by various companies, which come together to create a single player experience. Within such contexts, differentiating the various hardware and software products and systems at play in any one gambling activity in order to monitor their use in national systems or to undertake standardisation and quality assessments, becomes much more complex. As with other sectors, an agile and future-proof regulatory response to the changes that the 4IR is having, and will continue to have, on the gambling sector will need to be developed.

Historically, the South African gambling sector has adopted a destination and sumptuary regulatory model which seeks to prevent overstimulation and mitigate the negative social impacts of gambling, for example by limiting the number of casino licenses that can be granted (GRC, 2010). With the

adoption of increasingly more sophisticated gaming technologies in South Africa, various regulatory measures have been considered, including licensing for certain interactive gambling activities (National Gambling Amendment Act 2008) and the roll out of a digital monitoring system to track such activities nationally (National Gambling Amendment Bill 2018). These efforts to modernise the regulatory framework of the gambling sector have been met with various pushbacks, resulting in a piecemeal approach to regulation. The 2008 National Gambling Amendment Act which sought to regulate interactive gambling, for example, has not come into effect or been implemented. According to the National Gambling Policy of 2016 this is because the Amendment Act does not provide adequate provisions to protect minors from the over-stimulation of the latent demand for gambling (p. 6).

Other pushbacks to modernising the regulation of gambling in South Africa have come from the provinces and the lack of effective co-ordination between the various national and provincial regulatory authorities. Under Schedule 4 of the Constitution of the Republic of South Africa (Act 108 of 1996), gambling is listed as a functional area of both national and provincial competence, meaning that both national and provincial legislatures have powers to legislate and regulate gambling within their respective jurisdictions.

With the onset of the 4IR and the wave of new technologies that are likely to affect the gambling sector in numerous ways, broader regulatory responses will need to be developed which, in line with the current regulatory framework, the NGB will be mandated to oversee.

3.1. Key Concepts

3.1.1. Gambling

At its most basic, gambling can be defined as making a stake on an uncertain future event. This broad definition is echoed in South Africa's gambling law which, under the National Gambling Act (discussed in further detail under Section 3 below), provides that:

> An activity is a gambling game if –
>> (a) it meets the following criteria:
>>> (i) it is played upon payment of any consideration, with the chance that the person playing the game might become entitled to, or receive a pay-out; and
>>> (ii) the result might be determined by the skill of the player, the element of chance, or both (NGA, Section 5).

In the matter of *Casino Enterprises v The Gauteng Gambling Board* heard by the Supreme Court of Appeal in 2011, the Court reflected on the concept of gambling in light of concerns raised around the legality of online gambling. The Court determined that, in keeping with common law and the case of *Rademeyer v Evenwel* (1971), there are two key elements to gambling:

1. That there exists a payment of a consideration (whether that is a stake, bet or other kind of wager); and
2. That there exists a contingency, against which this wager is made, in which the person making the wager may receive a pay-out of some kind ([29]).

The Court went on to state that once these criteria were met, 'the player who places the stake is gambling and (since gambling is necessarily a reciprocal activity) the other party or parties who make the gambling game available or accept the wager (who may be different persons) is or are likewise engaged or involved in a gambling activity' ([29]). Notably, the Court then stated that 'these criteria do not vary according to whether one is considering a terrestrial encounter between player and casino or whether the meeting takes place in cyberspace' ([29]). This judgement constitutes the key jurisprudence for assessing the legality of new forms of gambling activities, including those that arise within the context of the new changing technological environment of the 4IR.

In addition, the concept of "gambling" readily falls alongside that of "gaming". While the key distinct here is that gaming can take place without stakes, the discourse around gambling and gaming has become – in many instances – convergent, particularly with respect to the notion of interactive gaming or gambling, introduced in the NGA 2004. Indeed, globally the practice of engaging in gambling games is generally referred to as "gaming" and, within the South African context and gambling sector, online slot machines are referred to as "games". Those who engage in gambling activities are further designated as "players". Within the rapidly changing context of the 4IR the distinction between gaming and gambling becomes both more obscure and more critical to distinguish. Differentiating between "gambling" and "gaming" is necessary in order to regulate legal gambling activities and to prevent against the negative social effects of the latent stimulation to gamble, including for children.

3.1.2. The Fourth Industrial Revolution

The core concept of the 4IR is one of iterative industrial revolutions, each driven by distinct technological dynamics. In World Economic Forum's analysis of economic history, technological progress occurs in waves or 'revolutions', which are successively been driven by 1) steam power, 2) electrical power, 3) computational power, and 4) a fusion of physical, digital, and biological technologies (Schwab, 2015). Against this conceptual backdrop, Schwab's argument is that the

characteristics of velocity, scope and systems impact distinguish our current era as a revolution rather than an evolution. As evidence of velocity, reference is made to the exponential increases in computational power and data production. As evidence of scope and systems impact, reference is made to the potential impact of technological change in all areas of the economy and society.

> *The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited. And these possibilities will be multiplied by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing.*
> (Schwab, 2015)

In this context, disruption is seen as a significant consequence of rapid technological change. Many of these modalities of disruption are impacting, and will continue to impact, the gambling sector:

> *Disruption is also flowing from agile, innovative competitors who, thanks to access to global digital platforms for research, development, marketing, sales, and distribution, can oust well-established incumbents faster than ever by improving the quality, speed, or price at which value is delivered…*
>
> *Major shifts on the demand side are also occurring, as growing transparency, consumer engagement, and new patterns of consumer behavior (increasingly built upon access to mobile networks and data) force companies to adapt the way they design, market, and deliver products and services…*
>
> *A key trend is the development of technology-enabled platforms that combine both demand and supply to disrupt existing industry structures, such as those we see within the "sharing" or "on demand" economy…*
>
> *On the whole, there are four main effects that the Fourth Industrial Revolution has on business—on customer expectations, on product enhancement, on collaborative innovation, and on organizational forms.*
> (Schwab, 2015)

As noted above, technology platforms that are currently central to this revolution include artificial intelligence, robotics, automation technologies, the industrial internet of things, blockchain, and

biotechnology. Several of these technology platforms are salient to the question of gambling and related regulation, most prominently artificial intelligence, (blockchain-based) crypto-assets, cloud computing, social media platforms, virtual and augmented reality, and services automation.

3.1.3. Regulating the 4IR

The effort to initiate a policy response to the issue of the 4IR in relation to gambling is aligned with broader departmental and national policy-making processes. As noted above, the dtic is currently developing a 4IR policy response, led by its recently established 4IR Directorate. At a national level, the Presidential Advisory Commission on the Fourth Industrial Revolution has been established, and is tasked with leading a national multi-stakeholder engagement to chart South Africa's way forward in the current era of technological disruption.

As has been mentioned in the previous section to this report, the development of new laws and policies to regulate emerging and advanced technologies, such as those of the 4IR, often falls behind the pace at which these new technologies are developed. One of the ways in which regulators have sought to overcome this is by looking at existing legal provisions which may support conducting a social impact assessment of new technologies before they are deployed in society. The European Union General Data Protection Regulation (GDPR) requires under Article 35 that data protection impact assessments must be undertaken before new technologies are used in society (Ni Loidiean and Adams 2019).

In response to the regulatory challenges posed by the 4IR and related technologies, various new regulatory approaches are being discussed and trialled at the global level. These include promoting agile governance and regulation which can more swiftly and effectively respond to regulatory concerns associated with new emerging technologies. Agile regulatory measures include developing regulations and codes under statutory law which tend to be promulgated far quicker and are easier to amend. Other responses include the promotion of co- and self- regulatory models which place soft law or principle-based obligations on business actors to ensure transparency and accountability in their use of technology. Co-regulatory measures include bestowing relevant industry authorities with mandates to set industry-wide standards and to investigate disputes. Lastly, there has been an overall endorsement of the paramountcy of the ethical and responsible use of technology by public and private actors in order to prevent against exploitation and misuse of power.

3.2. The Regulation of Gambling in South Africa

Gambling was considered a morally offensive activity by the South African apartheid government. Historically, gambling had long been outlawed in South Africa, with laws prohibiting the activity

dating back to 1673 (Bickford-Smith, 1998/1999). In 1965 the Gambling Act (51 of 1965) was passed banning all forms of gambling activities except betting on horse-racing. The prohibitive regulatory response to gambling by the apartheid government pushed gambling activities into the so-called homelands or Bantustans, which were nominally independent and therefore served as less-regulated spaces at a distance from the hand of apartheid law (Sallaz, 2009). Sun City, for example, was originally established in Bophuthatswana by Sol Kerzner in the 1970s.

In the dawn of South Africa's new democracy, gambling was legalised. The legalisation of gambling was in part in recognition of the high prevalence of gambling activities across the country. Thus, the National Gambling Act (33 of 1996) was promulgated to set national norms and standards for the regulation of gambling in South Africa, form a system for granting casino licences, and to establish a National Gambling Board (NGB) mandated to oversee the regulation of legalised gambling.

Since 1996, gambling laws and regulations in South Africa have undergone a series of reviews, including:

➢ The promulgation of the National Gambling Act in 2004 that repealed the NGA 1996;
➢ The gazetting of Notice of Prescribed Maximum Numbers of Casino Licences in Terms of the National Gambling Act 2004, Government Gazette 28571, General Notice No. 350, dated 27 February 2006;
➢ The gazetting of Regulations under the National Gambling Act 2004 on Limited Payout Machines, Notice No. R. 109, Government Gazette 29602, dated 6 February 2007;
➢ The development of the National Gambling Amendment Act in 2008 which, to date, has not yet come into force;
➢ The review of the gambling industry commissioned by the dti in 2009/2010 and the resultant report of the Gambling Review Commission, 2010;
➢ The development of the National Gambling Policy in 2015; and
➢ The drafting and parliamentary review of the National Gambling Amendment Bill 2018.

These reviews, and their effectiveness to strengthen the regulation of gambling in South Africa in the face of technological modernisation, are traced in the following sections. The broader regulatory frameworks that governs certain aspects of gambling in South Africa and that may play a more significant role in future within the context of the 4IR are also considered.

3.2.1. National Gambling Act 2004 and the Role of the National Gambling Board

The NGA of 2004 repealed the earlier NGA of 1996. The NGA of 2004 was promulgated in order to strengthen the regulation of gambling in South Africa and, particularly, to ensure that national laws and standards were enacted to govern interactive gambling and horseracing, and to mitigate the over-

stimulation of the latent demand for gambling. In addition, one of the key objectives of the NGA 2004 was to promote coordination between national and provincial regulatory functions, with the description in the Act's Preamble describing how national and provincial institutions will 'together […] determine and administer national gambling national gambling policy in a co-operative, coherent and efficient manner'. Further, the new Act arose as a response to the recognition of the need to regulate the growing interactive gambling industry (GRC, 2010, p. 33). However, as noted below, the NGA 2004 sets out limited provisions in relation to this new form of gambling, which then necessitated the development of the National Gambling Amendment Act in 2008 in order to set out concrete provisions for the regulation of interactive gambling. Thus, as it stands, it is a statutory offence to contravene sections 11 and 15 of the NGA 2004, pertaining to the unlicensed interactive gambling activities and advertising such activities respectively. Contravention of these sections can result in a fine not exceeding R10 million or imprisonment not exceeding 10 years, or both, in terms of Sections 82 and 83.

3.2.2. National Gambling Board

While the NGB was primarily established under the NGA of 1996 as a juristic person and came into effect with the appointment of its CEO in 1998, the NGA 2004 retained the NGB and extends its powers and functions. As set out under Section 65 of the NGA, the objects and functions of the NGB include: monitoring and evaluating the performance of provincial licensing authorities (PLAs) in granting licences; establishing and maintaining the national register of excluded persons; monitoring the socio-economic aspects of gambling and its impact, as well as the causes and consequences of gambling addiction and problem gambling; and provide board-based public education programmes on the socio-economic impact of gambling and gambling addiction. The NGA 2004 further sets out an institutional relationship between the NGB and the National Gambling Policy Council (NGPC), established in terms of Section 61 of the Act. Accordingly, the NGB is required to advise the NGPC on issues relating to the number of licenses granted, as well as national policy and norms and standards relating to gambling. In addition, the NGPC is capacitated in terms of Section 36 to facilitate the settlement of disputes that occur between PLAs and the NGB.

As discussed further under Section 3.2. below, new legislative developments in the regulation of gambling envisage the augmentation of the responsibilities of the NGB with respect to the NCEMS, and an extension of the data processing capabilities of NCEMS to monitor and report on a broader range of gambling modes beyond just LPMs (National Gambling Amendment Bill 2018).

Moreover, the NGA 2004 further mandates the NGB to establish and maintain a national register of gambling machines and devices. Section 21 provides that this registry must include 'every gambling machine or device manufactured within or imported into the Republic', and further that:

> **21.** (2) If a gambling machine is networked with other machines or systems of machines, each machine in that network is deemed to be a separate gambling machine for the purpose of this Act.

Section 22 also provides that the NGB can only register machines that meet the certification requirements set out under the Standards Act 29 of 1993, and any transfer of ownership of gambling machines must take place in accordance with Section 23 of the NGA 2004 and with prior authorisation from the NGB.

In this regard, the NGA 2004 and its envisaged role for the NGB, is based on a broad understanding of gambling systems and products functioning on specifically identifiable hardware machines. However, the NGA 2004 further provides that NGB must keep abreast of international developments in the field of gambling, and advise the minister and NCGP therein. The extent to which the Section 21 national register of gambling machines and devices can be maintained in the context of the 4IR and increasing digitisation and use of software programmes, is an outstanding area in which further research will be required.

In terms of enforcement, the NGB is mandated under Section 76 to appoint a national inspectorate to assist the NGB in fulfilling its powers in terms of Sections 33 and 34 of the Act with respect to monitoring the granting of licenses, conducting oversight of gambling activities in the provinces, and, particularly, in detecting unlicensed gambling activities. Section 76 provides that the NGB,

> May appoint any suitably qualified person as an inspector and assign the inspector to monitor, investigate or evaluate any matter on behalf of the board, subject to the control and direction of the board.

Under Section 77, the gambling inspector is granted broad search and seizure powers, and is subject to the Criminal Procedures Act 51 of 1977 (and its various amendments) in terms of conducting criminal investigations. The NGA 2004 further requires that all illegal gambling activities be reported to the NGB for further investigation. In some cases, the Financial Intelligence Centre (FIC) also needs to be appraised of such matters where they involve potential money-laundering.

3.2.3. National Gambling Amendment Act 2008

In comparison to the NGA of 1996, the NGA 2004 presents a significantly modernised legal framework for the regulation of gambling. One of the key ways in which the NGA 2004 sought to modernise the regulatory framework for gambling activities in South Africa was through the inclusions of provisions relating to "interactive gaming". However, as noted, the provisions for the regulation of interactive gaming under the NGA 2004 were limited, ultimately leading to the drafting of the National Gambling Amendment Act in 2008 (Amendment Act). This Act has been passed by both houses of Parliament and gazetted in the Government Gazette, No. 31245 of 14 July 2008, however a date has not yet been provided for when the Act will come into effect. According to the National Gambling Policy of 2016, the Amendment Act has not been implemented 'due to concerns regarding the proliferation and potential easy access [to gambling activities] by minors' (p. 6). The original definition of interactive gambling is provided under Section 1 of the NGA 2004:

> ''interactive game'' means a gambling game played or available to be played through
> the mechanism of an electronic agent accessed over the Internet other than a game
> that can be accessed for play only in licensed premises, and only if the licensee of
> any such premises is authorised to make such a game available for play.

The NGA 2004 provides that only interactive gambling authorised in terms of the Act is legal. Despite this limited definition and in broad recognition of the increasing relevance of interactive gaming or gambling, under the Schedules of Transitional Provisions of the NGA 2004 is the provision that the NGB must establish a committee to consider and report on the development of a national policy on interactive gambling. It had been envisaged that the report of this committee would result in the promulgation of national legislation on interactive gambling by 2006 (Schedules of Transitional Provisions, Section 5.5.). Ultimately, this provision of the NGA 2004 led to the development of the Amendment Act in 2008, which includes various updated definitions and terminology, including "website", "the internet", "software", "electronic betting or wagering", and "data".

In addition to expanding the provisions of the NGA 2004 in respect of interactive gambling and extending the functions of the NGB to handle interactive gambling disputes (Section 6B), the main objectives of the 2008 Amendment Act were to update the NGA 2004; to provide further provisions to protect against the negative socio-economic impacts of gambling and gambling addiction, including for minors; to bring the NGA 2004 in line with the Financial Intelligence Centre Act (FICA); and to prevent gambling being associated with money-laundering and activities related to organised crime or the financing of terrorism.

2.3.4. Gambling Review Commission

In 2009 the Gambling Review Commission (GRC) was established by the Minister of dtic with a broad mandate to 'consider if the currently legalised gambling activities can/should be expanded or curtailed considering the number of casinos, limited payout machines and bingo outlets already licensed', having regard for the 'socio-economic consequences attached to gambling, such as problem gambling, youth gambling and other social concerns'. The impact of new technologies on the sector – and particularly interactive and online gambling – constituted a key focus of their study.

The GRC report noted that little is known about the prevalence of online gambling in South Africa, and that further research on its size and impact is a necessary pre-cursor for developing appropriate regulatory frameworks in this regard. With regard to the current regulatory framework governing interactive gambling, the GRC stated that, 'the current distinction in South African law between interactive gambling and other forms of online gambling, such as bookmaking, the tote and the lottery, which offer their services online as well, is artificial and does not provide punters with uniform protection' (p. 24). However, the report also concluded that 'the illegal use of interactive gambling sites, even if regulated in South Africa, will be hard to curb and monitor due to continuous technology development' (GRC 2010, p. 36).

3.2.5. National Gambling Policy 2015

Following from the report of the Gambling Review Commission in 2010, the dtic began a consultative process to develop a revised national policy on gambling in South Africa. The National Gambling Policy Review Document (the Policy 2015) was then gazetted in November 2015.

The Policy outlines a number of key regulatory developments for the South African gambling sector which are relevant for this study. The first is that the Policy envisages a revised role for the NGB as a trading entity of the dtic. To this effect, the Policy states:

> The NGB will accordingly be repositioned and changed into the National Gambling Regulator (NGR) headed by a Chief Executive Officer, as the case may be. The NGR will continue to conduct oversight as it currently is empowered to assist with monitoring coherence and policy coordination, conduct research, develop and implement education and awareness, develop and implement measures to combat illegal gambling, effectively operate the Central Electronic Monitoring System (CEMS) and to combat problem gambling by providing treatment for problem gamblers (2015, p. 1-2).

In addition, the Policy seeks to establish stronger enforcement mechanisms to combat illegal gambling. To this end, the Policy prescribes that,

> Measures must be implemented to combat illegal gambling, including empowering the regulatory bodies to be able to block online gambling websites. The inspectorate must be improved, resourced and empowered to ensure that cases can be investigated and prosecuted without significant involvement of the South African Police Services if the latter happens to be over committed in other crimes. Education and training of police and prosecutors by the NGR must be improved to ensure that cases in the gambling sector are successfully prosecuted. (2015, p. 4).

To date, it appears that these policy objectives have not been implemented.

With respect to the impact of new technologies on the gambling sector, the Policy is deliberately quiet, stating that 'more research and impact assessment need to be conducted to inform whether these new forms of gambling should be allowed. It is important to develop an enforcement capacity to deal with illegal operations before new activities like online casino gambling are permitted' (2015, p. 79).

However, the Policy does seek to respond to some of the emerging trends around advertising. It recognises that, with the proliferation of social media and communication technologies, the mediums through which gambling advertising can reach potential punters is vast. In this respect, the policy position put forward is to prohibit 'unsolicited advertising through telecommunication messages, emails and any form of social media', and that this prohibition 'should extent to advertising, promotions and invitation for gambling schools' (p. 42).

3.2.6. Broader Regulatory Framework

While the laws and policies outlined above constitute the principle regulatory framework governing gambling in South Africa, there are a number of other laws which have a bearing and which gambling providers are regulators are obliged to comply with. Moreover, with the growing ubiquity of 4IR related technologies, and particularly artificial intelligence (AI), certain laws will become more prominent and have an impact on the regulation of gambling. As has been seen in Europe, data protection law in the form of the European Union (EU) General Data Protection Regulation (GDPR), now constitutes the leading regulatory framework for all activities that involve data processing, including AI (Ni Loideain and Adams, 2019). The broader regulatory framework that governs certain activities related to gambling in South Africa are listed and discussed here, with a particular focus on

those which are likely to become more prominent with the increasing use of 4IR related technologies in the industry.

Given that gambling activities involve monetary transactions in various forms, financial laws play an important role in the overall regulatory framework of the sector. Moreover, these laws exist in tangent with the NGA 2004 to ensure mechanisms are in place for the effective detection and reporting of any suspected money-laundering related transactions. Thus, under the NGA 2004, PLAs and the NGB are required to operate in compliance with not only the provisions of the NGA but also that of the Financial Intelligence Centre Act (FICA), 38 of 2001. In particular, PLAs can request a probity report from the FIC containing past financial reports of a gambling provider in considering a licence application. Overall, the responsibility of overseeing compliance with the requirements of FICA lie with the NGB. This includes notifying authorised financial institutions, including the FIC, when suspected or actual illegal gambling operations are taking place in order to prohibit the processing of financial transactions.

Protection of Personal Information Act

As noted above, data protection law constitutes one of the key regulatory frameworks that govern the processing of data that is inherent in any AI-driven system. South Africa's data protection law is the Protection of Personal Information Act (POPIA), 4 of 2013, which establishes the Information Regulatory (IR) as the country's data protection authority. The IR came into being in 2016; POPIA is thought to fully come into effect in mid-2020. POPIA sets out a series of principles to be followed in collecting, retaining and processing personal information, as well as a series of rights for the data subject. Section 71 of POPIA regulates the use of automated decision making, and is largely considered to be very progressive in its understanding of the ways in which automated decision making can legally and materially affect people's lives and can lead to discriminatory bias. In the gambling sector, it will be important to ensure that the use of AI keeps the human in the loop and does not arbitrarily subject players to automated decision making where it could lead to detrimental substantial or legal consequences.

Within the context of rapidly advancing AI technologies, POPIA will become South Africa's key legislation for protecting against the exploitation of personal data and the violation of individual privacy. Within the gambling sector, specific regulatory measures will need to be established to ensure the fair processing of the personal information of players and the protection of player privacy. In this

regard, the NGB could consider exercising its mandate to develop a sectoral code for the gambling sector under POPIA. Any efforts in this regard will need to be proceeded by a discussion with the IR. The revised objectives of the NGA 2004 under the Amendment Act 2018 include the protection of the privacy of players (Section 4). However, no further provisions are included within the Amendment Act which speak to how this objective is to be achieved, or in what circumstances the protection of the privacy of players is particular paramount. No further references to player privacy are included either in the National Gambling Policy of 2015 of the National Gambling Amendment Act of 2018. In the absence of any such provisions, the provisions relating individual privacy under Section 14 of the Bill of Rights of the Constitution and the provisions for the protection of personal information under POPIA, 2013, have broad application.

In addition, under the Amendment Act of 2008 various provisions are included which relate to the collection and retention of personal information that will need to be brought in line with POPIA if effected. These provisions relate to the registration of players and the establishment of national databases to track player activity, both of which would require express consent from the data subject (the individual whose personal data is collected), a specified and singular purpose for the collection of such information, and readily available information about what type of information is held and how this information can be accessed, changed or deleted.

Advertising Standards Authority Code of Practice

The NGA 2004 sets out a broad framework to regulate advertising of gambling services, including that such advertising must not be false or misleading, and a prohibition of advertising that markets a gambling activity as being available for free. Further, as noted above, the National Gambling Policy 2015 recognises the potentially adverse effects of advertising gambling products on social media.

However, it is broadly recognised that there the regulatory framework pertaining to gambling advertising needs to be further expanded. The Advertising Standards Authority Code of Practice – which regulates all forms of advertising in South Africa and governs the work of the Advertising Standards Authority (ASA) – does not provide specific guidance, norms and standards, for regulating the advertising of gambling services. The GRC, too, noted a lack of enforcement of the provisions which do exist, and lament the absence of a dedicated regulatory body for monitoring gambling and casino advertising, despite concerns raised by the courts over the advertising of online gambling services.

In other jurisdictions, measures have been implemented to strengthen the regulation of gambling advertisement in response to the impact of 4IR technologies on the industry, particularly the

proliferation of advertising on social media (Report of the UK Advertising Standards Authority). Given the high usage of socio-media across South Africa, consideration will need to be given to strengthening the framework governing gambling advertisement, and enforcement thereof, in line with the policy positions of the National Gambling Policy 2015.

South African Bureau of Standards

One of the functions of the NGB under the NGA 2004 is to maintain a national registry of gambling machines and devices, as noted above. These machines and devices must meet the requirements set out under the South African Bureau of Standards. However, as 4IR related technologies – and particularly software products developed for gaming and gambling – become more prevalent in the industry, appropriate standards will need to be developed to ensure that software products both comply with nationally set standards for public-use commodities, and can be monitored and tracked by the NGB or similar national regulatory authority. Given the ubiquity of online and digital gambling technologies, and the complexity involved in server and database systems – some of which may not be physically based in South Africa (and therefore within the jurisdiction of South African law), further research is needed to understand what kinds of national registries might be most relevant under such circumstances and whether, given the proliferation of gambling activities undertaken on smart phones or personal computers, maintaining such a registry is possible in industry 4.0.

National Payment System and the Regulation of Crypto-assets

The National Payment System, established under the National Payment Systems Act (22 of 2004) and the South African Reserve Bank Act (90 of 1989, Section 10), and overseen by the South African Reserve Bank (SARB), may play a larger role in future should cryptocurrencies, become a more popular tender within gambling transactions.

Currently, however, crypto-assets (the encompassing designation for all digital assets which use cryptography, are built upon secure blockchain technologies and available on a public ledger) are not recognised as legal tender in South Africa. The SARB's 2014 'Position Paper on Virtual Currencies' state that as crypto-assets are not backed – or guaranteed – by the SARB, there is no recourse for those who use or trade such currencies (outside of common law principles). In addition, as such currencies are not backed by the SARB they are subject to fluctuation in value and therefore pose a risk to users, traders and intermediaries.

Competition Act and the Competition Commission

Noting the dominance of big tech companies in the AI and 4IR space, the role of competition law is integral to a well-functioning oversight framework that ensures space in the market for small and local business providers. With respect to the gambling industry, the potential for market dominance was identified in the NGA of 1996 which provided that one of the objects of the NGB is 'to monitor the existence of any dominant or over-concentrated market-share in the gambling industry in the Republic' (Section 10c). In the NGA 2004, Section 54 sets out competition issues to be considered when granting licences. The Act further provides under Section 65 that the NGB must refer certain matters to the Competitions Commission, established under the Competitions Act 89 of 1998:

> The Board may:
>> monitor market share and market conduct in the gambling industry and refer any concerns regarding market share or possible prohibited practices to the Competition Commission in terms of the Competition Act, 1998.

Maintaining effective referral systems between the NGB and the Competitions Commission is one of the key regulatory measures that should be in place to prevent monopolisation of big tech companies as 4IR technologies become more dominant in the gambling sector.

Intellectual Property Law

Some of the concerns around the regulation of 4IR technologies relate to a supposed tension between intellectual property (IP) laws, on the one hand, and standards on transparency and accountability, on the other. IP laws protect technology and systems designers from disclosing key components of their designs. However, as has been seen with the concerns over bias in AI-driven algorithmic processing, it can become difficult to detect design flaws which may negatively discriminate or impact on individuals or groups where such details are protected by IP and patent law.

Going forward, it may become necessary to review the IP and patent laws for new technologies developed for the gambling sector to ensure that access to design details can be disclosed on inspection by regulators.

Further Relevant Laws

In addition to the above, the following laws also feature as part of the broader regulatory framework governing gambling in South Africa:

Provincial Laws:

- Gambling and Betting Act, 1997 (Eastern Cape)
- Free State Gambling and Racing Act, 1996
- Gauteng Gambling Act, 1995
- KwaZulu –Natal Gambling Act, 1996
- Mpumalanga Gambling Act, 1995
- The North West Casino, Gambling and Betting Act, 1994
- Northern Cape Gambling and Racing Act, 1996
- Northern Province Gambling Act, 1996
- Western Cape Gambling and Racing Law, 1996

National Laws:
- Constitution of the Republic of South Africa, Act 108 of 1996 (Schedule 4 and Section 162 on co-operative governance)
- Companies Act, 71 of 2008
- Consumer Protection Act, 68 of 2008
- Prevention of Organised Crimes Act, 121 of 1998
- Protection of Constitutional Democracy Against Terrorist and Related Activities Act, 33 of 2004
- Prevention and Combating of Corrupt Activities Act, 12 of 2004
- Income Tax Act, 58 of 1962
- Electronic Communications and Transactions Act, 25 of 2002
- Broad Based Black Economic Empowerment Act, 53 of 2003
- National Regulator for Compulsory Specifications Act, 5 of 2005
- Promotion of Access to Information Act, 2 of 2000
- Promotion of Administrative Justice Act, 3 of 2000
- Regulation of Interception of Communications and Provision of Communication-Related Information Act, 70 of 2002.

Industry Standards and National Policies:
- Institute of Directors, King IV on Corporate Governance, 2016 (Principle 12 on Technology and Information, and the responsible use of technology by business)
- National Cybersecurity Policy Framework, 2015
- National Integrated ICT White Paper, 2016

3.3. 4IR technologies in the gambling sector

The Fourth Industrial Revolution, and the multiple technology platforms that act as its main drivers, are generating rapid and fundamental changes within the gambling sector in South Africa, many of which require regulatory responses. Our review of 4IR technologies in the gambling sector covers the major technological platforms that are driving these changes, including artificial intelligence, blockchain, virtual reality, and social media, amongst others. In addition, some of the broader technological changes that characterise the 4IR are considered, including the global move towards increasingly digital business models.

The 4IR is characterised by rapid technological change. This, in its broad sense, creates challenges for regulators. In a tightly regulated sector such as gambling, new technologies often arise in a context in which there is no technology-specific regulation that is available to govern its usage in gambling products and services. This has the overall effect of constraining the technological development of the sector. At the same time, regulatory constraints are necessary in order to protect the public from technologies that may potentially be harmful.

Our review of 4IR technologies in the gambling sector, and their implications for regulation, take two main approaches. Firstly, we directly examine some of the key technological changes, including artificial intelligence, blockchain, data analytics, digitalisation, social media, automation, and virtual reality. Secondly, we take a thematic approach, focussing on how technological change is impacting on some of the key regulatory challenges in the gambling sector, including the advertising and promotion of gambling, the prevention of problem gambling, underage gambling, and the regulation of sports betting. From each of these analyses we draw out key issues for regulators, which in turn form the basis for our concluding reflections and recommendations.

3.3.1. Artificial intelligence

'Artificial Intelligence' (AI) refers to digital systems that display intelligent behaviour by responding, with some degree to autonomy, to inputs (whether data, sensory or otherwise), in working to achieve specific goals. AI systems can be embedded in both software (such as facial recognition technology) and hardware (such as self-driving cars and robotics). The term is most commonly applied to neural-network based learning systems that require big data for training.

AI can have a wide variety of applications, including many that have not yet been conceptualised or implemented. In the gambling sector, potential use cases can largely be imagined through an analysis of potential data flows to feed machine learning. For example, consumer information could be used in real or online casinos (the use in the online space would be illegal in South Africa) to monitor and predict consumer behaviour, and, through this, support operator objectives such as profitability and

security. Casino operators can use AI machine learning techniques to create and serve advertising to current or potential clients through real-time personalisation. Another example is the potential for operators to detect cheaters and fraudulent activity more easily by using AI which draws on security data inside physical casinos.

Operationally casinos could potentially introduce greater efficiency through the use of AI technologies. These include better customer service based on AI technologies making customer interaction automated but more human-like, through the use of big data to make personalized service offerings to potential clients. Consequently, this also creates the potential for job-losses, with machine based dealers and security operators potentially proving to be more efficient and attentive than their human counterparts. This ultimately cuts long terms human resource costs, drives profit and makes the business of operating a casino more efficient and highly attractive to investors.

The addictive nature of gambling could be exploited through the use of big data to understand user behaviour and design gaming and algorithms to shift the odds in the favour of casinos and against users. This would lead to an increase in profits for operators, implying a greater sense of responsibility on regulators to enforce standards against the unfair practice and opportunity that AI could present.

Operator firms identified AI applications as being a critical future technology, and indeed as already playing a significant role. The stakes are high enough to merit significant investment in AI technologies in order to stay abreast of rapid changes in the sub-sector. However, the use of AI is often not visible to consumers, and this also holds true in the gambling sector. *Equipment and service provider 1* highlighted a significant distinction in use of AI in the gambling sector – that between 'front end' consumer-facing applications, and 'back-end' applications used by service providers:

> AI, while it's not visible at the front of gambling, which is where the players interact with the gambling equipment, on the backend, from a design perspective, AI has been used quite a lot by gaming studios to design games, to alternative certain algorithms, when it comes to designing specific components of the games.
> Equipment and service provider 1

Facial recognition and security

AI systems can be trained to develop facial recognition capabilities that far exceed those on non-AI based systems. Facial recognition is one of the most widely used applications of AI globally, largely integrated into CCTV cameras. There is little information in the literature on the extent to which

casinos in South Africa utilise AI-powered facial recognition technologies. *Gambling board 6* indicated that casinos in South Africa are monitoring the potential of AI technologies for facial recognition in casinos, and was aware of only one casino where such technology was in use – in particular to link facial recognition to the casino's security data system and security management system.

The use of such technologies in casinos internationally is commonplace and part of a broader biometric-based identification regulatory system to monitor problem gambling and strengthen security (Kaplan 2010; and Moser et al 2015). According to Sumner (2019) the South African Goldrush Gaming Group is developing various internal control procedures (ICPs) – a licensing requirement from the provincial gambling boards – with advanced technology to strengthen security. Sumner writes that Goldrush Gaming Group has developed an interface 'In conjunction with a systems integrator to link transactions to the online monitoring system in real time. With this interface unit we are now able to monitor all transactions live at the cashier booth with direct overlay and automatic interrogation. All information is displayed in real time in the surveillance monitoring office' (Sumner, 2019). He further notes that Goldrush is seeking to utilise 'interfacing surveillance with bespoke systems, including artificial intelligence and facial recognition' (Sumner, 2019).

Testing and assessment 1 voiced concern for the protection of privacy in the context of facial recognition technologies:

> At the G2E show in Vegas, this year, they were showing facial recognition which one of the big companies introduced where it can track people's behaviour… start recognising people; how much time they spend in the casino… The regulators are also now a bit worried now because how do you protect people? ... And based on your face, it can offer you certain games that you like and don't offer you the games that you don't like.
> Testing and assessment 1

Computational gambling

Operator 2 reflected on the technical role of AI for bookmakers, centred on the need to develop more advanced gaming intelligence than punters (or risk systematically losing bets and going out of business). More broadly, AI has the potential to initiate a fundamental shift in the market dynamics, culture, and practices of gambling:

> Artificial intelligence is going to play a role in the future of betting... Somebody is going to come up with a system and… say this can count your cards in a casino without any of them

knowing, at the blackjack table, this can predict the outcome of a horserace bet, better than anyone else in the world, or better than the bookmakers, so you can beat their odds and make a consistent profit just by following this piece of software. That kind of analytical tool is at some point going to get out there... I think that's potentially a big one... Analytics and big data may at some point have an impact on the industry and may create a secondary industry of people selling these tools to customers of ours. And casinos and most of the betting market. Operator 2, 20/11/2019

This signals a type of escalating technological competition in the relationship between gambling operators and punters, in a manner similar to the role that AI has played in the financial trading sector. Like financial trading, gambling involves the prediction of risk and the investment of resources in response to risk predictions. Advanced AI systems can, in narrow applications, out-perform human assessments of risk, and allocate resources more effectively. The growth of similar applications in the gambling sector would initiate an escalation of the computational powers available to both punters and operators. For operators, such technologies may open up opportunities to become more profitable. For punters, it may become possible to identify weaknesses within gambling systems that may be exploited. This may be particularly pronounced in the area of sports betting, where real-world data may be effectively processed by AI systems to reach more accurate sporting odds than bookmakers who do not use AI systems to determine their own odds portfolios. However, the use of such AI technologies may be difficult to regulate. For an operator, the use of computational technologies to determine gambling parameters is a legitimate aspect of their business model. For a punter, using computational technologies to generate intelligence to inform gambling technologies is equally legitimate. The challenges that are raised by this technological escalation are therefore more relevant for determining the overall technological trajectory and competitive dynamics of the sector, rather than having direct or immediate impacts on regulation.

Key issues and recommendations for regulators

In all applications of AI that rely upon consumer data, data privacy is a critical issue for regulation. All use of consumer data must adhere to South African data privacy law. It is therefore advised that any use of AI in the gambling sector must be proceeded by the provision of evidence to regulators that consumer data is protected. Data protection law seeks to address some of the ubiquity and invisibility of AI systems by providing that data subjects be informed when data about their activities and preferences is being mined and collated.

In addition to posing major concerns around privacy, facial recognition technologies have been shown to betray significant racial bias. This is largely because these technologies have been trained on the

faces of only a minority of the global population, rendering other population groups vulnerable to misrecognition. The potential for misrecognition and false positives, as well as for racial profiling and bias, must be taken seriously, particularly within the context of South Africa's recent history.

Looking beyond the fundamental imperative for the protection of data privacy, it is necessary to differentiate between different applications when constructing appropriate regulation. Some uses, for example manipulating player behaviour to increase profit, or over-stimulating demand for gambling, may result in negative social impacts and should therefore be restricted. Other applications, for example for security purposes, may lead to a social good, and therefore may be regulated in a controlled manner. This mode of differentiation is international best practice: in Macau, which boasts a technologically advanced gambling sector, gambling regulation has restricted the use of AI technologies where they are used to boost casino profit. AI technologies are only approved for security purposes, and may not be used for tracking or nudging player behaviour. In Macau, the installation of AI-driven facial-recognition software can only take place following approval from the gaming regulatory authority (Yogonet, 2019).

Finally, regulators face a rapidly changing technological landscape. The escalating computational powers available to both operators and punters will require ongoing attention and research. It may be the case that in future, should such powers continue to grow exponentially, that regulatory intervention becomes necessary in order to control the use of AI on both sides of the gambling equation, or risk instability in the fundamental drivers within the gambling sector.

3.3.2. Augmented reality and virtual reality

Virtual games, and even virtual casinos, are made possible by virtual reality (VR) (Cipresso et al, 2018). Advancements in software and hardware capabilities have led to the rise of VR games such as slots, blackjack, and roulette. The advantages to gamblers include the potential to have a gambling experience from any online point, to participate in real-time multiplayer games, to choose avatars or characters in virtual worlds, and to integrate chat and voice functionalities with gaming. For operators, it is possible to modify or improve games without investing in physical infrastructure. It may be the case that virtual reality grows as a gambling modality in future.

Augmented reality (AR) uses similar technology to virtual reality, but overlays virtual reality sensory information (audio and video) over the real world (Cipresso et al, 2018). This could make it possible to sit at a table opposite a number of other real human players, in realistic virtual casino environment, with an augmented reality dealer. However, the technology for augmented reality is still developing,

and is not yet widely used in the gambling sector. Given further technological development, AR might also be a growing modality for gambling.

In our analysis, augmented reality and virtual reality are grouped together as they utilise similar underlying technologies.

Examples of interactions between behavioral, computer science and design sciences can be seen in the unique partnership between the University of Las Vegas (UNLV) and the Caesars Entertainment groups "blackfire innovation space"[1]. This facility on the UNLV campus provides a simulated casino environment, complete with games, hotel rooms, sports betting and hospitality areas to drive innovative projects and future trends within the gaming industry. This facility will lead RandD efforts in multi-disciplinary areas to propel the gaming and casino business into the future using virtual and augmented reality as well as related technologies.

Stakeholder interview participants reported that AR has not been utilised in the gambling sector in South Africa, although its future potential was highlighted as significant. Civil society international 1 reported current use of AR and VR in non-gambling games located in resort gambling locations, but not significant uptake in gambling uses. In jurisdictions where mobile gaming is permitted, AR and VR applications for mobile phones have been used for gambling purposes. However, only a few jurisdictions have approved such use, and their commercial viability remains in question. However, the technologies have been flagged as future-oriented, within the strategies of the gambling industry to attract younger generations. Overall, market dynamics and technological dynamics point towards significant potential over the medium term - as the sector further develops the technologies, as more jurisdictions make provision for their use, as mobile gambling grows in scale, and as the industry makes further efforts to attract younger consumers:

> When it comes to VR, there's even more of a question mark in terms of how do we commercialize it, how do we create some good gambling games using VR technology. They're being seen as key strategies to track millennials to the gambling industry, because a big concern… is how do we get millennials into the gambling industry, how do we get them interested in our games? And there have been a lot of strategies. In those jurisdictions where mobile gaming is allowed, AR and VR have been used. It tells of the future. You'll probably find a very limited rollout of AR and VR technology in the gambling sphere. You'll probably see just a few jurisdictions and… if it does happen in South Africa, it would probably be very

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1 https://www.prnewswire.com/news-releases/unlv-and-caesars-entertainment-create-innovative-technology-hub-to-test-and-showcase-new-gaming-and-hospitality-concepts-300839361.html

limited because currently the… legislation has got to be enabled to allow for the technology to come into play in that regard.
Equipment and service provider 1

However, the regulation of VR and AR in gambling faces several technology-specific challenges, and regulators require time, research, and consultation before approving new VR and AR applications. Such applications are distinct from live gambling, in that different components of the game can potentially take place in different jurisdictions, and may operate in a grey area between live gambling and online gambling that challenges regulators to become more definitive in their responses. In VR applications it becomes necessary to verify to regulators that it is a live game taking place – otherwise the application could be abused to provide illegal 'online' gambling rather than a virtual version of legal 'live' gambling. The distinctions between these modalities are fine, and challenge regulators to be more specific in the parameters under which VR and AR are legal in South Africa.

Gambling Board 6 reflected on this process in the challenges faced in regulating VR applications in sports betting and poker:

> We have seen a virtual reality programme [submitted by one of our bookmakers] approved… but it took us two years plus to consider the pros and cons of that before we got to where casino games are through virtual reality made available to patrons. So you have the actual event taking place in another jurisdiction. Let's say it is a poker game - the patron places bets in terms of what the dealer will select and which card will win. I think the Western Cape was the first regulator that approved those bet types. But it took us two years to get to that stage just in terms of the regulation of the actual venue where the event takes place and what approvals are there, and how do we verify that it is a live game that is taking place. It is not the two of you having sat here last week and now patrons are told that it is a live game and they place bets on it whereas the bookmaker knew what the outcome will be… I think we, in the South African regulatory space, have put on the brakes in terms of saying let us be careful with incorporating new technology other than your server-based gaming, these virtual casino games that were considered… In terms of the Four IR process I think there is going to be loads opening up and that we haven't licensed yet. But I think we could have a conversation about what we're anticipating and in terms of the conversations we have had with our foreign counterparts on that and what ought to happen to gear towards that.
> Gambling board 6

Key issues and recommendations for regulators

Market dynamics and technological dynamics both point towards a future in which gambling operators are increasingly likely to approach regulators for approval of AR and VR applications. It is therefore recommended that specific protocols be developed, so that provincial regulators do not need to consider the issues *de novo* for each application for regulatory approval, and so that clear boundaries are established regarding what kinds of applications of VR and AR are legal in the South African context, and which are not. Key questions to be considered include whether VR applications can be verified as live games, whether they can be verified as taking place in within South African jurisdiction or not, whether they protect the data privacy of consumers, and whether they have the potential to over-stimulate gambling demand through their appeal to younger consumers.

3.3.3. Blockchain and financial transactions

'Blockchain' technology uses cryptography and a distributed ledger to act as decentralised digital archive to record and verify online transactions and events while storing them in a secure global database. Blockchain technology, particularly in its manifestation as crypto assets, makes secure transactions possible without the need for banks or other third parties. One example in the gambling sector is Bitbook, a platform based on the Ethereum blockchain that allows the use of different cryptocurrencies on gambling sites (https://ico.bitbook.ag/en/).

The use of crypto assets for gambling has several advantages for players. Crypto assets are difficult for financial authorities to trace, and thus may offer advantages in terms of tax and international transfers. They provide anonymity for users and transactions. There is no transaction delay or transaction cost. These advantages may see increased use of crypto assets in future online gambling.

One of the major challenges raised by the use of crypto-assets in gambling is that of financial regulation. Crypto-asset transactions are difficult to trace, monitor, regulate, or tax:

> That's completely unregulated territory. And the big question in my mind is how would you regulate that? Who would you go and regulate? Normally it's a bank that issues you a savings account and a checking account and so on. Who would regulate that particular domain? Who's the issuer? I don't know, it's the internet… So, what that would mean is that every crypto as a trading platform has to be licensed. We're just trying to figure out the nuances of who the licensing entity would be. Is it the FSCA or is it the SARB, together, I'm not sure.
> Financial institution 1

Crypto assets are not currently recognised by the South African state as being legal tender. Yet, at the same time, they are increasingly used for financial transactions. The response of the Reserve Bank and

other institutions towards this tension between regulation and usage will impact on the gambling sector:

> In South Africa at the moment, we don't allow cryptocurrencies, because they are not a legal tender in terms of the instructions from Reserve Bank… Then the challenges come in terms of how we regulate these changes that the technology's bringing… it's a reality of life that it's there, but the law doesn't recognise it as a currency at the moment until the state recognises that as a currency, as regulators would discourage its use in the industry because of the taxation issues and the exchange rate that would come into it…. When you look at the virtual currencies, each type of virtual currency is its own exchange centre… so how then do you regulate that into tax?... A lot of people are already talking about cryptocurrency, the use of cryptocurrency and we don't even have legislation to deal with that… they're not able to get your taxes and so, things can get haywire very quickly.
> Gambling board 3, 22/11/2019

Key issues and recommendations for regulators

The use of crypto-assets for online gambling is illegal, and the challenges facing regulators are largely those of enforcement. Crypto-assets are extremely difficult to trace, compounding the nature of this challenge. Gambling regulators will need to take direction from the South African financial authorities, who, at the time of writing, are investigating potential measures to regulate the use of crypto-assets in South Africa. In the medium to long term, gambling regulators in South Africa will require a broad strategy to address the use of crypto-assets, including the development of a clearly defined position on crypto-assets, mechanisms to detect its use, and tools to enforce the controls and regulations that would emerge from the gambling boards' and Reserve Bank's rules in this regard. Part of this process should also be deepened cooperation with the FIC to combat the illegal use of crypto-assets.

3.3.4. Data management

The world of data is evolving rapidly. Network infrastructure continues to develop, leading to higher data speeds and lower latencies. The advent of 5G will further accelerate this process. These changes underpin the ongoing digitalisation of technologies, economies, and cultures, and the gambling sector is no exception. Digitalisation includes increased access to and sophistication of online gambling options, including illegal online gambling and legal online sports betting. Digitalisation includes the enablement of technologies such as blockchain-based crypto-assets, virtual reality and augmented reality, AI, and many other emerging technology platforms. As infrastructure continues to develop, these technologies will continue to evolve and play increasingly significant roles.

The data-intensification of gambling raises a number of significant challenges for regulators. Data management is one of the core functions of the NGB. Under Section 65 of the NGA, the NGB is tasked with monitoring and evaluating provincial licensing authorities, maintaining the national register of excluded persons, monitoring the socio-economic aspects of gambling and its impact, monitoring the causes and consequences of gambling addiction and problem gambling, improving public understanding of the socio-economic impact of gambling and gambling addiction, maintaining a national register of certified gambling machines and devices, detecting unlicensed gambling activities, and co-operating with the FIC to prevent money-laundering. All of these roles may be strengthened through improved data management – and here the question of strengthening the data management capabilities of the NGB becomes critical.

From an industry perspective, the degree to which information about clients is leveraged and put to use within service offerings is critical for improving customer experience and attitudinal equity associated to the brand or business. Real-time responsiveness is a critical factor within the gaming industry, not only delivering a better user experience, but also opening additional revenue streams through leveraging user information to deliver value added services to a relatively captured audience.

With the data-intensification of gambling, issues of data privacy become increasingly important. Key issues affecting regulation include the need for boundaries with respect to the ways in which consumer data can be collected and processed, means for consent for data gathering and processes, and clear guidelines for the application of national data regulations to the gambling sector, in line with the provisions of POPIA.

> If it's data that's generated from me as the consumer through my behavior and actions and so on, you must declare that data, I must be aware that you're collecting that data, I must be aware of what that data is... I think the difficulty is how do you know when it's happening? …How would you police that data? With great difficulty.
> Financial institution 1

The 2018 Draft National Gambling Amendment Bill sought to extend the capabilities of the National Central Electronic Monitoring System (NCEMS) to monitor and provide data on all forms of gambling in South Africa. The data would be used for reporting, to develop national statistics, as well as to determine taxes and levies (PMG 2019). It is considered to be a significant regulatory step in responding to, and taking advantage of, the 4IR in South Africa. In Mr Nkoatse Mashamaite's – Director: Gambling Policy and Law, the dtic – presentation to Parliament on the Draft Bill he noted, with respect to the proposed augmented reach of NCEMS, that:

The intention is to consolidate information throughout the country from all legal modes of gambling. This is a great step towards the government's effort to implement the 4th industrial revolution and have enhanced regulatory oversight over the PLAs and gambling industry (PMG, 2019).

At present, NCEMS is a national monitoring system that collects data on the use of limited payout machines (LPMs). However, the proposal to extend NCEMS under the Draft National Gambling Amendment Bill was, as noted in the minutes of the Parliamentary Public Hearings on the Draft Bill, was not well received:

Stakeholders, including the Casino Association of South Africa, the South Africa Bookmakers' Association, the Bingo Association of South Africa, the Western Cape Gambling and Racing Board and the Provincial Treasury, commented that the imposition of the NCEMS on operators was not justifiable and the proposal lacked research and consultation. Operators had the notion that the gambling industry in South Africa was over regulated and the introduction of the NCEMS would be another burden that would be hard on them. Extension of the NCEMS to different gambling modes would constitute a mammoth challenge that would be impossible to resolve, as each gambling mode operated with a unique set of parameters. The introduction of the system to other gambling modes would have the greatest impact on the poor in rural areas, where there would be a loss of jobs, capital and social investment, and gambling levies would be the most severe where they could be least afforded (PMG, 2019).

Reconciling the concerns of these stakeholders with efforts to ensure that regulation of gambling in South Africa complies with South African data law will be an important role for the NGB going forward.

Key issues and recommendations for regulators

Given the scope of the NGB's mandate, which includes many data management functions, which operate in a context of increasing scale and complexity of data systems, strengthening the data management capabilities of the NGB becomes critical. For example, the extent to which the Section 21 national register of gambling machines and devices can be maintained in the context of the 4IR and increasing digitisation and use of software programmes, is an outstanding area in which further research will be required.

With due considerations to the concerns of stakeholders, it appears that the collection of data from LPMs should be included in the NCEMS in a manner that does not produce insurmountable technical challenges. It may be the case that technological solutions may be found for these challenges, and these should be explored by regulators in partnership with sector stakeholders.

Key issues affecting regulation include the need for boundaries with respect to the ways in which consumer data can be collected and processed, means for consent for data gathering and processes, and clear guidelines for the application of national data regulations to the gambling sector. In particular, compliance with the POPI Act is critical, and will require research and development into how to ensure the fair processing of the personal information of players and the protection of player privacy, and possibly (in discussion with the information regulator) the development a sectoral code for the gambling sector under POPIA. Any efforts in this regard will need to be proceeded by a discussion with the IR. This could include more specific protocols for the protection of the privacy of players, for the collection and retention of personal information, and for the registration of players and the establishment of national databases to track player activity.

However, the technological changes of digitalisation also provide potential solutions – for example the automation of processes that protect data privacy:

> In designing these products you've got to take into account data privacy, you've got to make sure, for example, that all the licensed gambling operators and licensees have policies in place in terms of data protection. Where 4IR comes into play, is to automate some of those policies to ensure that if your policy says for example, only specific departments may have access to gaming financial data, you can actually set it on your monitoring and control system. You can only indicate access rights for those departments, for example. So, you can automate data protection, not just in terms of POPI but also in terms of, for example, GDPR, the General Data Protection Regulation. When 4IR can come into play, is to help automate and make it easier to implement compliance to those policies.
> Equipment and service provider 1

It is therefore recommended that gambling regulators in South Africa explore the potential for the automation of processes to ensure data privacy, in line with international best standards around privacy by design, including controls over which entities gain access to data, and that all data processes comply with the POPI act. The NGB can discuss with the IR about developing a code to protect player information privacy for the gambling sector under POPIA, in line with its mandate to advise the Minister on the development of gambling policy.

3.3.5. Online Gambling

Online gambling, with the exception of licenced online sports betting, is a statutory offence in terms of sections 11 and 15 of the NGA 2004. However, regulators are under increasing pressure to a) define online gambling and b) enforce the prevention of online gambling. This is due to the rapid growth and diversification of online technologies and offerings. In the report of the GRC of 2010 it noted that 'South Africa should pay particular attention to new forms of gambling', and that 'we simply do not know what the impact of online gambling will be' (GRC, 2010 p88). The GRC report noted that little is known about the prevalence of online gambling in South Africa, and that further research on its size and impact is a necessary pre-cursor for developing appropriate regulatory frameworks in this regard. With regard to the current regulatory framework governing interactive gambling, the GRC stated that, 'the current distinction in South African law between interactive gambling and other forms of online gambling, such as bookmaking, the tote and the lottery, which offer their services online as well, is artificial and does not provide punters with uniform protection' (p. 24). However, the report also concluded that 'the illegal use of interactive gambling sites, even if regulated in South Africa, will be hard to curb and monitor due to continuous technology development' (GRC 2010, p. 36).

Almost ten years since the publication of this report there remains little literature around the extent and impact of online gambling in South Africa. Despite this, it can be broadly surmised that with the proliferation of smart phones and increased access to internet technologies generally, there has been an increase in opportunities to engage in online gambling.

According to a recent report from PwC on the prevalence of online gambling in South Africa:

> Three-quarters of online gamblers are in the 18-to-34 demographic group who visit the nearly 100 online sites that accept gamblers from South Africa, principally through mobile phones. In addition, Internet cafés often provide the opportunity to gamble online as a means to attract patrons, an activity that is subject to criminal prosecution and fines of up to R10 million. Slot machines are the most well-liked type of online gambling activity, but popular illegal online gambling modes also include other games and forms of betting (2017b: 3).

In 2014, a report entitled 'Measuring the extent and nature of Internet Gambling in Gauteng' (Scott and Barr) was commissioned by the Gauteng Gambling Board, which addresses the issue of online gambling within the Gauteng area, although with a notably limited sampling size. The report made use of data collected in a survey of 350 randomly selected respondents across a PPS (Probability

Proportionate to Size) sample of suburbs of Johannesburg. The findings of this research therefore reveal insights about gambling behaviours in specific Gauteng suburbs, but can't be generalised to provide insights about South African gambling more broadly. Analysis of the sample demographics shows that 75% of respondents had completed Grade 12 or a higher level of education; 85% lived in "free-standing" brick houses; and 67% were in full-time, part-time or self-employment. In addition, about two-thirds (65%) indicated that they possessed cellphones which allowed access to the internet, 64% had satellite television, and 33% had access to a device which permitted internet access, other than their cellphones (Scott and Barr, 2014, 6). These statistics suggest bias towards the middle class and wealthier sectors of the population. Nonetheless, the survey findings provide some insight into the gambling habits and behaviour of a sector of Johannesburg residents.

The survey asked respondents whether and in which types of gambling activities they participated, either using the internet or not. Just six of the respondents (1,7%) indicated explicitly that they participated in gambling on the internet. However, responses to other questions in the survey revealed that significant proportions used the internet at least some of the time for the purchase of lottery tickets or for betting on instant scratch cards, sports matches or horse races, bingo, poker, casino or slot machines. Based on previous studies, it was concluded that people whose only internet gambling activity is purchasing lottery tickets 'can be regarded as a group of gamblers whose motivation for gambling as well as patterns of gambling behaviour is distinctly different from other gamblers (who may or may not also buy National lottery tickets)' (Scott and Barr, 2014, 8). Therefore, excluding those who only purchased lottery tickets on the internet, the study inferred that 94 respondents (27%) could be 'identified as internet gamblers' because of their use, at least some of the time, of internet gambling offerings.

About two-fifths (42%) of those who were categorised as internet gamblers had purchased scratch cards online, 30% had placed bets on horse racing or sports matches online, 29% had played online slot machines, 28% casino table games, 5% poker, 1% bingo online. Approximately 30% of those in the internet gambler category gambled online once a month or more frequently, as opposed to about 15% of non-internet gamblers. The mean spend per gambling session for internet gamblers on slot machines (R558), casino table games (R721) or poker (R506) was generally higher than that for their non-internet gambling counterparts (slots R516; casino R443; poker R113). Conversely, non-internet gamblers tended to spend more on scratch cards (R38), sports betting (R226) and bingo (R150), than internet gamblers (scratch cards R37; sports R122; bingo R16). However, low reported participation rates in poker and bingo might have distorted the statistics. Automatic online data gathering mechanisms such as explicit registration information, cookies and Google analytics would therefore have been accumulating and compiling personal profiles of these online gamblers. The commercial interests involved would have been using such technologies to target potential clients.

Amongst the 10 respondents who provided insight into their internet gambling behaviour, most (60% or more) indicated that they gambled on their cell phones. They generally made payments by credit card, and gambled between 18:00 and midnight for between fifteen minutes and three hours. Amongst the online gamblers, the advantages of gambling online were most commonly stated as being convenience (42%), range of betting options (39%), more enjoyable (44%), comfortable being at home (40%), and the social features such as message boards, forums and instant chat functions (26%). The main disadvantages of online gambling were said to be the addictiveness thereof (47%), ease of spending money (43%), illegality (42%), and the safety of account and personal information (33%).

Firms in the gambling sector largely perceived increased demand for online gambling to be closely related to the broader global move towards online platforms and business models. This perception underscores the important role of regulators in constraining access to online gambling and the high social costs associated with it:

> Everything governing our way of life has now moved into the online sphere. We're doing our banking online. We're buying cars online. We're buying houses online. People are getting married online. So it's only natural, when it comes from a gambling perspective, that people will be attracted to, they want to go online to gamble.
> Equipment and service provider 1

On the other hand, the state has clearly articulated a position against online gambling, on the basis of potential loss of employment:

> Our Minister was not convinced that we need online gambling. His major concern was… that we have casinos who contributed a huge investment in infrastructure development that actually created jobs, directly within those environments. And the fear was if they allow online gambling, there can be migration to that and then the jobs are lost…
> Government department 1

Moreover, online gambling has a high social cost, and greater potential for addictive behaviour than destination-based gambling. Some of the concerns that have been raised regarding online gambling – particularly important from a regulatory perspective – include that the identification of problem gamblers becomes far harder. Best practice for identifying problem gamblers in casinos relies, in part, on well trained staff who are able to spot problem gamblers and have a range of mechanisms at their disposal with which to deal with the case on the spot. The challenges raised with regard to problem gamblers is exacerbated by the fact that online gambling encourages more frequent use, given that it

is more accessible than land-based gambling facilities: 'there are indications that Internet gambling is associated with increased play, increased gambling spend and potentially increased risk of problem gambling' (Scott and Barr, 2014 p22). In short, online gambling could be readily identified as more addictive than many other forms of gambling.

> You could become a worker by day and an addict through the night, you could go four hours, for days… They go to work, they play poker right through the night, eventually they fall over, and they've got to take a day's sick leave to catch up and that's what they do. Not feeling well today, I want to sleep.
> Operator 5

The shift toward the provision of gambling services within the online sphere constitutes a critical element of the transformation being wrought by the 4IR on the sector. However, the regulatory reviews and reforms which sought to strengthen the governance of online gambling in South Africa have, to date, not come into effect or been implemented. Online gambling threatens the current policy position on the regulation of gambling in South Africa which has been framed around the destination approach. As a borderless mechanism for engagement, transactions and communication, online gambling poses an immediate risk to the sovereign regulation of gambling, as evidenced by the fact that the NGA 2004, like many South African laws, does not have extra-territorial application. Addressing this regulatory vacuum will be a critical aspect of the review of the regulation of the gambling sector in light of the impacts of the 4IR.

Online gambling case law

In the matter of *Casino Enterprises v The Gauteng Gambling Board* heard by the Supreme Court of Appeal in 2011, the court considered an application from Casino Enterprises, a registered land-based and online casino operating company. Casino Enterprises sought declaratory relief from the Court following the take down by the Gauteng Gambling Board of radio adverts advertising their online casino to potential punters in Gauteng. Casino Enterprises argued that as their company is registered in Swaziland, players playing in Gauteng are not contravening either the NGA or the Gauteng Gambling Act. The Supreme Court of Appeal, following the earlier judgment of the High Court against which Casino Enterprises was appealing, determined that despite the online casino being registered in Swaziland, if it is accessed and played in South Africa, this is in violation to national and provincial gambling law.

With regard to the territorial application of the NGA to a Swaziland based online casino operator, the SCA noted that:

The prospective player is 'seduced' in South Africa, he or she takes and activates the crucial decision to gamble here, he or she is impoverished here; the internet casino intrudes upon the field of licensed operators here and it does so without payment of dues to the State. The legislature is concerned with substance, not form, and if gambling takes place in South Africa it is of no consequence what means are employed to facilitate it and whether those means are employed outside the country (2011: paragraph 35).

In short, the court determined that the legislation is applicable where the gambling activity is taking place. The court further clarified that the purpose of South Africa's gambling laws 'is to control the effect of gambling on South Africans in South Africa whatever the source of the temptation may be' (2011: paragraph 36).

In an earlier case (*Online Lottery Services (Pty) Ltd and Others v National Lotteries Board and Others* 2010) regarding trademarks of companies licensed in terms of the Lottery Act (1997), the Supreme Court of Appeal further examined the issue of the jurisdictional territoriality of South Africa's gambling laws. The court noted that 'it is notorious that gambling is no respecter of international boundaries', and that therefore a broad interpretation of the NGA in cases regarding online gambling should be taken:

In construing the NGA as a remedial statute designed to meet the challenges posed by, for example, the internet as a developing platform for cross-border gambling activities its terms should be understood in a broad rather than a narrow sense where such extension is feasible (2010: paragraph 23).

It is notoriously difficult for the police to detect illegal online gambling. For obvious reasons, these types of offences are committed in the secrecy of people's homes or business premises. Where prosecution has, in the past, taken place, police and other investigating authorities have had to make use of intelligence and undercover agents to infiltrate the applications to gather evidence of illegality. In some cases, this has led to the seizure of computers, hard drives, discs, and other movable property found to be used in illegal online gambling activities (*Van Rooyen and Others v Minister of Police and Others* 2017).

Online gambling accessibility in South Africa

There are abundant opportunities for online gambling in South Africa. An internet search quickly yields links such as www.gamblingsites.com and www.gamblingsites.org, which offer multiple links and suggestions for the pursuit of such gambling on the internet. For example, www.gamblingsites.com suggests several internet options, namely Bovada, BetNow, BetOnline, Betway, WilliamHill, Ignition Casino, JackpotCitycasino, MagicRedcasino, MyBookie, SpinPalacecasino and SportsBetting. The site recommends that a range of criteria should be used to assess the merits of any particular online gambling offering. These are listed as trustworthiness, ownership, licensing, payment methods, bonuses and rewards, payout speed, device compatibility, customer support, game variety, and betting options. The site indicates which online gambling sites are most popular in the United States, United Kingdom, Canada, Australia, India, New Zealand and Ireland. Additionally, the betting options that are offered online are listed. These are Sports Betting, Online Casinos, Horse Racing, Esports Betting, Poker, Entertainment and Political. Payment methods are also highlighted as PayPal, Credit Card, Neteller, and even cryptocurrencies namely Bitcoin, Litecoin and Ethereum.

The approach taken by www.gamblingsites.org is similar. Recommendations for the 'Top Sites' by country and by gambling type are made. There are articles for beginners, and guidelines on sports betting, football betting, strategy for online casinos and slot machines, online bingo, and poker. Readers are also able to find information pertaining to 'real money' gambling, Esports betting, gambling apps, banking options, cryptocurrency gambling, daily fantasy sports, blacklisted sites, skill games, horse racing, virtual reality, gambling laws, history, popular biographies, and a Las Vegas guide. The site suggests that the best South African online gambling sites are Betway Africa and Casino Cruise. Hinting at legality issues, it is stated "If you're unsure which gambling sites you're allowed to gamble on based on your location, we've got you covered. Below, you'll find recommended websites for gambling organized by different regions. In these guides, you'll find hand-selected betting sites for both sports betting and casino gaming specific to your area". This is followed by some insights on a gambling in different contexts, summarised thus:

- United States: For a while, gambling was the wild west in the US, then legislation locked things down, and now we are seeing the resurgence of online gambling in the states but under a much more regulated pretense [sic].
- Canada: Open to most worldwide operators, but they also have one of the highest abundance of Canada-specific online casinos and betting sites.
- Europe: A lot of countries in the region have extremely welcoming laws and regulations surrounding gambling and online gambling. That being said, things are not exactly the same all across Europe as each country has its own little legal nooks and crannies to know about.
- United Kingdom: The UK gambling market is one of the most highly regulated markets in the world. While this may sound like a bummer, it's actually a positive. Regulation may make

things tough on the providers, but it makes for a safer, more secure, and overall better gambling experience for you.

- Australia: There have been quite a few setbacks to the growth of online gambling in Australia. While this is not pleasant to hear, there are still options available[2].

Pertaining to the legality of online gambling, the comment is made that **"..**legislation is always changing, and most online publications are behind the ball and are referencing laws and statutes from decades ago. ….. we've put together some extensive legal guides for all of the major regions…."

The key message emerging from these online sites is that online gambling is easily accessible to South Africans, and that online gambling websites place responsibility for adhering to gambling laws in any particular jurisdiction upon punters.

Enforcing regulations against online gambling

The enforcement of regulations prohibiting online gambling presents many challenges Challenges include issues related to detection and monitoring, tracing financial flows, the characteristics of cloud-based data, jurisdiction, and taxation. These challenges – and some potential technological solutions – are explored below. Enforcement is clearly a high priority for the state, which has articulated a desire for more effective mechanisms to prevent online gambling:

> [The Minister's] major concern was there needs to be enforcement, a clear-cut enforcement. If people are operating illegally and the Act says it's illegal, you can be arrested for up to ten years and fined up to ten million for gambling. That we should have some of these operators who are offering online gambling arrested and prosecuted with those. And that has not been happening properly and people are just operating… there is legally no enforcement on that. Government department 1

One clearly-identified solution for more effective enforcement is that of greater co-operation with Internet Service Providers (ISPs). Such co-operation has the potential to prevent consumer access to identified gambling sites, or to run heuristics within ISPs that flag and block such sites:

> There's no internet service provider that blocks this… You've got the legislation that says that internet gambling, online gambling is illegal. Then you must… design a process so you can have a memorandum of understanding of over, I think 180 ISP's in this country alone, that they will sit around a table and with the banks and itself and you develop a whole process

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[2] https://www.gamblingsites.org/countries/

around it to block all of these illegal websites… Sit around a table with the ISP's and say, "These are the legal websites. These are the white lists. Those are the blacklists." [Currently, consumers] are not even blocked anywhere within our internet service providers because it's the freedom of choice.
Gambling board 6

One of the major challenges facing efforts to enforce rules against online gambling is that it takes place across multiple jurisdictions, which are oftentimes untraceable. This makes it difficult to access information or monitor activities. Gambling boards in particular voiced concern other these challenges:

A person can gamble from anywhere in the world, and they gamble with anyone. And that also brings the challenge because now we're going to extra territories and how would we regulate them, or how do you deal with issues of disputes if someone gambles with an operator who is outside South Africa, but accessible in South Africa?
Gambling board 3

If we deal with issues of online gambling, we need to look at issues of jurisdiction. Because once you go online gambling, you are talking international. So, how do we deal with such issues?
Gambling board 1

The challenge that you may have is that some of these online gambling sites are outside the country, their servers are outside the country, so it might be difficult actually to monitor that.
Gambling board 4

Another regulatory concern for online gambling relates to the difficulties of tracing money flows, both for provincial gambling boards and for SARS (Scott and Barr, 2014). During the Parliamentary debates on regulatory reform in the gambling sector in 2010, Standard Bank submitted that it was unable to distinguish between a service provider that engages in land-based gambling transactions and one that engages in online gambling transactions (PMG, 2010). It further noted that, on account of this, compliance with the provisions set out in the Lotteries Act, NGA as well as Exchange Control Regulations, was difficult.

Cloud-based data is largely stored and processed outside of South Africa. This raises issues for monitoring online gambling, and for the enforcement of regulation that prevents online gambling:

including questions about where and how data is stored, how regulators can gain access, how privacy can be safeguarded, and consumers protected:

> Regulators go to the casino, they know exactly who is who; who does what. But in the online space its operating off a Cloud… controls and measures are not that clear cut because everybody might not have access to it… is the data in South Africa? Is the data somewhere else? Where is the regulation happening? What jurisdiction does a regulator have over that data?
> Testing and assessment 1

> What is the definition of online: should it be server-based, should it be cloud-based? Who should have access and how should regulators have access to that? Those are the questions that we need to have answers for before we can comfortably say, let's move into the space… And at what level will a province deal with a particular [matter], if it may be cloud-based for an example? Who will have access to deal with a particular aspect?
> Gambling board 1

> Physical servers are starting to disappear, everything is going to Cloud-based. So, it sits somewhere in the Cloud and I think for regulators… their main concern is how do they regulate it? Because now they don't have a physical device to go to. So how do they verify that the content on there is the content that's actually been approved?
> Testing and assessment 1

Differences in stakeholder perceptions

Interviews identified clear differences in stakeholder perceptions with regard to the regulation of online gambling. Experts, consultants, government, and civil society institutions all presented serious concerns about the risks and negative social impacts of online gambling, and the imperative for regulators to play a greater role in the prevention of online gambling. For example, Consultant 1 described a scenario in which online gambling becomes addictive and uncontrolled: '[If] my husband has been sitting on the computer every night at one o'clock in the morning betting on some of these online sites, who am I going to report it to? You know? How can I even stop it?'.

In comparison, private sector actors largely framed online gambling as a business opportunity that should be enabled by regulators. The argument made by private sector actors is generally that regulated (legal) online gambling would be preferable to unregulated (illegal) online gambling. It is argued that online gambling will take place whether it is legal or not:

The technology is there, it's not going to go away. At some point, and in line with say specific gaming jurisdictions in Europe, they're going to have a look at regulating certain aspects of it because this is where 4IR can impact the industry, and create opportunities for people to develop gambling websites. They can use the 4IR technology to develop gambling portals, but they can't do it if the regulator's framework isn't there... It would be positive actually. It would create an opportunity for us to branch out to look at how can we become part of the value-chain that's involved with the online gambling enterprise. We could find any number of ways to participate. We could be a software developer, a software provider, we could open up a whole research and development branch. We did it a few years ago, I hope we can do it again. There's a lot of opportunities that we can look at employing in the online gambling sphere, so it's very positive in that sense.

Equipment and service provider 1

Since 2004, South Africans have been able to wager and bet and gamble on sites outside of South Africa, and nothing is stopping them. In fact, those numbers are growing like crazy. Why don't we legislate that? We say we protect the consumers by banning it, that's not stopped anything if the industry is growing.

Operator 3

People who want to find a way around the system will. So the alternative is, create it in a regulated environment. Create a solution that is protecting your consumer, collecting your taxes and control. Who are these people offering this product? Are they authorized to do so and are they fair and fit and secure and proper to do so? At that moment it's like no, we'll stop them. Well, show me how you're stopping them because you're not. We can see you are not.

Online betting 3

The views of private sector actors should be treated with caution, as their primary incentive is that of business opportunity, rather than that social good. Taking the negative social impact of online gambling into consideration, the focus of regulators should be on enforcement, rather than enablement. The view that online gambling is impossible to prevent is not accurate – it is certainly difficult to detect and control, but with the appropriate regulations, technological tools, and collaborations, increased prevention is certainly possible.

Key issues and recommendations for regulators

Stakeholders largely perceived the question of online gambling to be the most significant regulatory issue arising from technological change. The status quo, in which online gambling (except for sports betting) is illegal, is commonly perceived by stakeholders to fall short of the regulatory complexity necessary to adequately address the needs of society or the needs of the industry. The primary issue here is that without monitoring and regulation, there is little control. The fact that online gambling is illegal reportedly does not prevent the use of online gambling sites, since these can largely be accessed without passing through any regulatory or monitoring controls. A variety of other issues arise from this fundamental challenge. Children are vulnerable to online gambling sites. The South African gambling sector stands to lose market share to international gambling sites. Illegal financial flows may be facilitated by international gambling sites, including those that offer crypto-asset payment mechanisms. It therefore seems that regulation needs to move beyond the generalised prohibition of online gambling, towards consideration of more effective means to monitor and control such activity.

It is recommended that stronger mechanisms and processes be developed for growing public awareness about the risks of online gambling, monitoring online gambling, intervening where online gambling is detected, and blocking access to online gambling. Since the NGA 2004 does not have extra-territorial application, it is recommended that gambling regulators consider revising the mechanisms by which gambling conducted by South African consumers, interacting with online operators outside of South Africa, are regulated and restricted.

Currently, the financial constraints to online gambling are one of the most effective enforcement mechanisms. These should be further strengthened through dialogue with banks and internet service providers:

> People are already gambling online, the only reason why it hasn't really gone extreme is because any winnings that people get online get trapped at the banks and get confiscated, so obviously they're not going to be gambling as often as what they say people gamble at a casino, or an LPM site.
> Equipment and service provider 1

Given the major vested interests of private sector, regulators need to continue their efforts to frame online gambling as a potential social harm, rather than as a potential business opportunity to draw the public into easily accessible modes of gambling.

The National Responsible Gambling Programme (NRGP) has a broad mandate to promote responsible gambling in South Africa, including through developing educational programmes. In this regard, the NRGP should be called upon to develop an educational programme around 4IR technologies and the

risks associated with using 4IR based technologies for gambling. This is particularly warranted given the chronic lack of understanding around the social impact of gambling (Scott and Bar 2012) as well as around the 4IR and related technologies (SASAS 2019). This programme should extend to schools. Educational programmes to raise awareness of the negative effects of online gambling should be made accessible.

Given the potentially high problem gambling rate that online gambling can generate, and the limitations of traditional mechanisms for addressing such problems, the NGB should consider undertaking further research with the aim of developing programmes to promote responsible online gambling, as well as providing online-based therapy for those in need.

3.3.6. Promotion of gambling

Since the NGB is mandated to prevent the over-stimulation of gambling, an assessment of the impact of new technologies for the advertising of gambling is salient to the broader re-assessment of gambling regulation. In particular, to achieve the vision of the National Gambling policy of 2015, to prohibit 'unsolicited advertising through telecommunication messages, emails and any form of social media', and that this prohibition 'should extent to advertising, promotions and invitation for gambling schools', will require renewed efforts to constrain online advertising, particularly the use of social media, geolocation, and microtargeted messaging.

In other jurisdictions, measures have been implemented to strengthen the regulation of gambling advertisement in response to the impact of 4IR technologies on the industry, particularly the proliferation of advertising on social media (Report of the UK Advertising Standards Authority). Given the high usage of socio-media across South Africa, consideration will need to be given to strengthening the framework governing gambling advertisement, and enforcement thereof, in line with the policy positions of the National Gambling Policy 2015, and in line with the provisions of POPIA which will be valuable in addressing personalised microtargeted messaging.

The combination of geo-location technologies, artificial intelligence systems, and social media systems creates an environment in which personal data is harvested by firms and processed in order to generate micro-targeted advertising messages. Gambling firms, whether operating legally or illegally, have such technologies at their disposal, and are actively using them. Regulators need to consider whether the use of such targeted messaging constitutes the over-stimulation of gambling, in addition to the privacy concerns it raises. It could conceivably be the case that vulnerable consumers, including problem gamblers and underage gamblers, may be drawn into gambling activities through micro-targeted messaging. It may be the case that regulators, in order to safeguard vulnerable groups,

need to constrain the use of technologies for geolocation and microtargeted messages by engaging with online social media platforms that offer such services to advertisers:

> Geo-location, if a patron walks past, I've got a book-making shop here, a patron walks past then the geolocation will actually pop an ad to him and say, "If you come in now you could get a R50 free bet".
> Gambling board 6

University academic 1 demonstrated concern about some of the data privacy issues related to the use of personal data for targeted advertising:

> They are using AI very intentionally so you would take a card and use it in a machine instead of money. And then you can close it down and take your card to another machine and that machine would then know about you… So the biggest concern seem to be security and privacy, they can tell you went gambling at a certain time, how much you gambled, whether you played these type of machines or these other types of machines. So they can do targeting marketing.
> University academic 1

New technologies also provide new tools for regulators to provide positive messages about gambling. Consultant 1 reflected on dynamics in the area of advertising for gambling. Her overall message was that, in order to meet the NGBs mandate of preventing the over-stimulation of gambling, more effective messaging and more effective controls over advertising are required.

> There is a need to regulate the advertising of gambling. I think that is getting totally out of control. I think it's highly abused, the protection and the measures to prevent is no longer there. I think the [relevant authorities] have lost their impact and many of them are voluntary bodies... They don't even deal with gambling matters because they believe that the National Gambling Board should be dealing with it. But I think there's a need to look at the legislation, because it needs to be very much stronger than it was previously. To say that… gambling shouldn't be made to be exciting and attractive. It's there for people who want to use it, but we shouldn't be over-stimulating it.
> Consultant 1

Another option for constraining the over-stimulation of gambling would be closer collaboration with South African sports betting operators who are seeking to restrict advertising by international competitors in the South African media. By reporting unlicensed international competitors to major advertising and social media multinationals such as Google and Facebook, local operators have acted

to constrain the extent of gambling advertising. Closer collaboration between regulators and South Africana operators in this regard has the potential to reduce the potential to incite problem gamblers and underage gamblers to gamble, and provide a market advantage to South African operators in comparison to international operators.

> [We] have said, hey Google, you're not allowed to serve this traffic to South Africa. These guys aren't licensed in this territory. If you wish to show their result on a South African search or on a South African display, they require a license. Otherwise you Google is in breach of an advertising rule in South Africa… But this is the operators chasing out the bad guys… What's my method to stop him? Show you the license that I hold to those platforms and say, are they showing you your license? The same applies to Facebook, the same applies to Twitter, the same applies to any of these big digital channels. They're going to look… these guys have licenses, we better check if these have licenses. Oh, they don't have licenses. Tell them, you're not allowed to be here to stop serving their traffic.
> Operator 3

From an industry point of view, it was recognised that gambling advertisements should not "entice" punters to gamble, how this provision should be interpreted was not well understood. In effect, to advertise is to entice potential punters to a particular product, and so the regulation that provides that gambling advertisement is allowed but must not entice new punters appears somewhat a contradiction in terms. The question of advertising for gambling services becomes even more important in the context of growing online advertisements, particularly on online platforms such as Facebook. Industry stakeholders indicated that there is little clarity as to how Facebook gambling advertising operates, including how it is regulated (whether by Facebook itself or the NGB), and what the process for take-downs are.

Gambling board 2 highlighted the role of AI in processing consumer data in order to generate targeted advertising across multiple media and platforms. Through this function, AI plays a critical and growing role in the promotion of gambling:

> [Data allows operators] to target and improve marketing and solutions to the gambling sector and to the people that are registered… Your loyalty schemes allow you to provide for promotions and advertising that are specific or unique… So, if you log in to your home, and you also have a gambling account, you might find that your Android offering on your TV then brings up the latest offerings, the latest sports that you might be interested in and the linkage between the marketing and the best offer around it. That's where we're going with artificial intelligence and that's where we're going with the fourth industrial revolution.

Gambling board 2

Broadly speaking, it is recommended that the framework governing gambling advertisement, and enforcement thereof, be strengthened in order to more effectively align with the policy positions of the National Gambling Policy 2015. This may take the form recommended by the GRC, which called for a dedicated regulatory body for monitoring gambling and casino advertising to be established.

New technologies greatly increase the options available for advertising gambling products and services. Regulators need to adapt in order to adhere to their mandate to prevent the over-stimulation of gambling, and to protect vulnerable groups and problem gamblers. Tighter monitoring and control over the use of geolocation technologies, micro-targeted messaging, and social media to advertise gambling may be required.

At present, there are no national standards for gambling advertising in South Africa. Co-regulatory approaches between the Advertising Standards Authority and NGB could be considered. Further, it is recommended that the NGB engage directly with Big Tech providers (such as Facebook) regarding online advertising of illegal forms of gambling.

3.3.7. Prevention of problem gambling

Traditional methods of identifying problem gambling behaviour rely on self-driven or peer / family pressure to self-identify as a problem gambler and placing ones name on an exclusionary list[3]. AI technology allows for the identification and communication about potential problem gambling behaviors directly to users and taking action based on gambling behaviour rather than relying on social support networks identifying behaviors around particular individuals. Companies such as GeoComply have been established to assist in ensuring regulatory and location based technologies to ensure compliance to local laws and thereby protect punters and society from unintended consequences of gambling. Companies such as Optima Gaming have incorporated propriety ISO certified technology into their gaming software to identify and prevent problem gambling by tracking gaming activity. Similarly, BetBuddy is a responsible gaming analytics platform that uses big data and AI analytics to predict and intervene where problem-gambling behaviour is forecasted for unique users. By working with casino operators, BetBuddy is able to respond in real-time to allow both the operator as well as the customer to make informed decisions based on tailored feedback from the BetBuddy algorithms

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[3] https://responsiblegambling.org.za/self-exclusion-2/

based on both amalgamated data and user specific behaviour data. FeatureSpace is a similar company that assists the industry manage risk of problem gambling and fraud to identify behavioural patterns prior to them becoming legitimate real world concerns[4]. Naturally, this raises commercial concerns surround norms for gambling behaviour and the damage associated with the AI identification of false-positive or false-negative problem gambling behaviors[5]. This however will improve tremendously as algorithmic technologies and large data set biases begin to normalize toward contemporary punter behaviors and historic data records.

Around the world, regulatory enjoinments are shifting and adapting enhanced technology bases solution in both physical and online gaming areas to prevent and reduce problem-gambling behaviours. AI company Human has developed facial recognition technologies to make active assessments on player anxiety and affective state to make decisions related to potential gambling behaviours issues. This highlights a significant social responsibility issue within the industry globally, and respond to this need from both the perspective of this responsibility as well as the commercial interests of its clients. The regulatory environment in Japan has responded to these technological shifts, considering the implementation of these technologies within domestic casinos[6]. At a slightly lower technological level, the Canadian government has in discussion with gaming operators to leverage data from within loyalty programmes to isolate and identify problem gambling behaviours earlier and support gamblers with addictive tendencies[7].

Civil society 1 reported the recent development of an AI-powered application that monitors gamblers in order to predict problem gambling behaviour and intervene accordingly. Through a conversational interaction – similar in style to that of Apple's Siri AI – gamblers can engage with the application, which will in turn provide appropriate information about gambling, risks, and mitigation specific to the individual using the application. The application is designed according to the principles of cognitive behavioural therapy. However, our in-depth interviews did not determine the extent to which this technology is currently in use, as no participants were aware of any current applications in the south African context.

Key issues for regulators

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[4] https://www.featurespace.com/
[5] https://www.kindredgroup.com/news--insights/2017/can-ai-spot-problem-gambling-earlier/
[6] https://www.casino.org/news/facial-recognition-technology-to-be-used-at-japanese-casinos
[7] https://www.vegasslotsonline.com/news/2019/03/15/ai-and-loyalty-programs-could-target-problem-gambling-at-vancouver-casinos/

Given the wide range of new technologies that can be applied to the issue of problem gambling, it is recommended that the NGB support the adoption of selected technologies in the South African gambling industry in a way that is respectful of personal data rights.

3.3.8. Robotics, Automation, and manufacturing

Robotics is a key driver of the Fourth Industrial Revolution, but doesn't currently play a major role in the gambling sector in South Africa. However, in the imagination of some of the interview participants, robotics may have a role to play:

> Instead of having people on the floor you have robots on the floor that are waitresses that come and serve you. You punch in, at your machine, for instance, what you want to have to drink and whatever and you have a robot delivering it for you.
> Gambling board 6

Additive manufacturing, also known as 3D printing, is another core technology of the 4IR. The primary application reported by interview participants was that of product prototyping. However, there were no significant regulatory issues related to this application.

> 3D printing helps our OEMs in terms of prototyping of components, in terms of prototyping concepts, so, whereas before in the old days you'd probably use a program like AutoCAD to design a slot machine, but that slot machine, as a concept, would only exist in two dimensions. Now thanks to 3D printing, you can print out a small prototype model of a slot machine or you can even print out components for the slot machine for research and development purposes. So, 4IR has not only entered the realm of product development, it's already been used as a standard operating procedure by OEMs.
> Equipment and service provider 1

The 'internet of things' (IOT) is the extension of the internet to sensors and wireless tags that make it possible to keep track of objects and processes, like parcels in transit or monitoring household items such as geysers and lights. IOT is already widely used in the international gambling sector, in which gambling machines feed data back to central servers, whether on site or cloud based, which process data in real time to provide diagnostics and management information. If the South African gambling sector is to move in line with global trends, the use of IOT will become more deeply embedded, leading to the use of sensors and networked systems throughout physical gambling infrastructures, including the increased development of linkages to AI systems. However, none of the stakeholders interviewed

reported a significant role for IOT in the gambling sector at present, suggesting that IOT isn't at this stage a significant driver of technological change in the sector.

Changes in manufacturing, including advances in robotics and 3D printing, are affecting the technological characteristics of the gambling sector, but not in a way that has significant implications for regulation at this point. However, in the long term, regulators will need to pay attention to possible uses of robotics to automate tasks in the casino environment – these may lead to unemployment, or other unanticipated consequences.

3.3.9. Sports Betting

Sports betting has a long history in South Africa, and is moreover the only legally permissible form of online gambling. Horse racing, as an arena for sports betting, has distinct history and market dynamic, and as such is treated separately in this report. Many of the technological dynamics of online gambling also apply to sports betting, with the primary distinction being that for sports betting, the challenges relate to the regulation of a legal activity, while for other forms of online gambling the challenges relate to the detection and prevention of illegal activity.

One of the consequences of the opening up of sports betting to online activity is heightened competition between South African and international operators. South African online gambling operators reported that their international competitors are technologically more advanced, which gives them a competitive edge over local firms, as well as provide access to a much broader range of sports on which to bet. Moreover, international online betting firms are less likely to establish a physical presence than are South African firms, which renders a difference in terms of employment creation, and distinct competitive dynamic that is focussed on the online space. This market competition takes place against a broader backdrop of the increasing digitalisation of sports betting, both globally and in South Africa. South African firms are therefore challenged to maintain market share:

> They don't even have a shop that opens its doors, they have an office which is their registered premises of that licence… They've got the technology, they're ahead of the South African market… and they come and they throw a lot of money at it. If you look at the advertising spend at the moment, Bet Way is one example… And they're high profile in terms of advertising, marketing spend and they can do that investment... The South African guys compete with us on a brick and mortar basis, and often you'll find our stores almost next to each other, but the foreign players that are coming in are competing with us in an online space.

And again, that is making it harder for us to grow the digital side of our business because we don't necessarily have the money behind us and we don't have the technology behind us that they've already developed… It's difficult, because ultimately the online market is going to become the market. And brick and mortar is going to continue to shrink and shrink.
Operator 2

It may be the case that more fiscal and socio-economic benefit can be derived from the process of licencing international firms for sports betting activities in South Africa. Sports betting conducted on unlicensed international sites does not contribute tax to the South African fiscus. Moreover, international firms contribute less to employment and supply chain activities in South Africa. This creates a rationale for constraining the operations of unlicensed firms, and increasing licencing fees for international firms seeking to operate in the South African market:

[International sports betting firms] don't need to comply with our law. We don't collect tax. The collection of tax also goes into society, into balancing that… We can't make that license too cheap. There should be a kind of investment required into society… Should you be saying look, if you want a licence, then you must put in some sort of socio-economic investment opportunity as well?
Consultant 1

Horse racing

Horse racing has a long history in South Africa. Between 1965 and 1996, betting on horse racing was the only legal form of gambling in South Africa, with the exception of casinos established in the Bantustan areas. Horse racing thus grew and become entrenched as a popular arena for gambling. However, since the promulgation of the National Gambling Act of 1996, the development of casinos in South Africa, together with forms of online gambling, have led to a decline in the popularity horse racing and betting on horse racing:

People can bet on the comfort of their homes, online, and account you can play on your phone. So people don't go to the racecourses anymore and that is what cuts off the demand. People don't go physically to the courses they know and there's a huge declining in income which leads to closing down of these places…Traditional horse racing… it's fading away, because it's lots of traditional where it's [old] people that are betting, but now they're passing, they are dying now and the new breed of youngsters are no longer interested in traditional horse betting.
Gambling board 1

Coming from the horseracing background, we are incredible people heavy, we've got a massive employment footprint versus something like a casino or most of the other forms of gambling… The horseracing industry is under threat. It's a diminishing industry, a lot of the historical customers, because of all the new opportunities, the customer base is shrinking because it's aging and it's not necessarily that easy to bring young blood in when casinos are so easy and easy to understand and easy to play. There's no barrier, you don't have to be taught about it or learn anything, and I mean that's not a problem that's unique to South Africa. It's horseracing industries in all jurisdictions where there's competing, fixed odds against totalisator, the industry itself is under pressure and shrinking.
Gambling board 1

Twenty years ago, 20 000 people would arrive at every race meeting because you had to go there to actually bet, the vast majority are now spread around the country in the regional stores.
Operator 2

While these dynamics have led to job losses and market shifts, they do not appear to suggest major regulatory changes, at least not in relation to the technological changes of the 4IR. The market shift away from horse racing, towards other forms of gambling, represent cultural and technological changes that are occurring as a result of the choices made by the public.

One exception here is the issue of virtual horse-racing. In the 2010 Gambling Review Commission report, virtual racing was included within its ambit and considered an interactive gambling game. To this end, the report recommended that virtual racing by regulated accordingly (2010: 174). However, there is little information regarding the prevalence of virtual racing in South Africa. In addition, while online wagering on horse racing is permitted – where licensed – in South Africa, whether the law extends to when the odds are stimulated in a virtual environment is yet to be circumscribed.

There is an ongoing debate about the blurry distinction between, and respective definitions of, gambling and betting. This has created confusion and hence loopholes for operators to offer online products related to different configurations of actual sports events versus virtual reality games. If this is even possible, clarification is necessary in the interests of both clearer policy formulation and more effective policy implementation. Gambling boards are grappling with the regulatory requirements of virtual racing, indicating that South African law needs to more clearly define the status of virtual horse betting, and prescribe parameters that may be followed by regulators:

> We received a request from one of the companies in Joburg that they do server-based racing. So, it's typically like your video game, but you're taking the odds on a virtual horse. So, we need to align ourselves to that thinking as we're moving towards that particular space.
> Gambling board 1

Following stakeholder interviews, it appears that the similarities between live horse-racing and virtual horse-racing are superficial. Live horse-racing has more in common with a sporting event – the outcome of which is determined by real-world events. Virtual horse-racing – while it might visually appear to be similar to live horse-racing, has more in common with online gambling, since the outcome is defined by randomly generated numbers. As such, the recommendation is that virtual horse-racing be subject to regulatory restrictions and controls as other forms of online gambling that depend on randomly generated numbers.

Again, in this instance, the interests of profit-driven operators in the gambling sector may apply pressure in a different direction. Virtual racing generates revenue through online gambling, and has become legalised in some international jurisdictions:

> Virtual betting… is completely random number generator driven. You've got a pretty picture, lots of graphics and it looks like you're watching a football game or it looks like you're watching a horse race but it's completely RNG driven, random number generated, results… There may have been a concern at one point that it might kill the live event, the live match, the live horserace, it actually seems to have complimented it in a lot of territories because it just becomes that fuller, the distraction while you're waiting for the real event. So there's a real horse race in 15 minutes, but I've got two virtual races in the meantime, so while I'm waiting for the one I really want to watch, let me have a little R10 on the virtual and it just keeps me entertained until such time as the live event happens, which is how it's been used a lot in the betting industry overseas.
> Operator 2

Key issues for regulators

The status quo for sports betting in South Africa did not raise significant challenges for interviewed stakeholders. The only significant issue raised was that of international competition. It may therefore be necessary for regulators to review the conditions under which international firms enter the South African sports betting market. It may be the case that further conditions for entry – such higher licencing fees and investment in local physical betting sites – may provide leverage to create local jobs, and also create more even market conditions for local firms to compete.

In the horse-racing sub-sector, technological dynamics, and an aging consumer base, are contributing to market decline. The use of virtual horse-racing is advocated for by online gambling operators. However, given that virtual horse-racing is in fact a form of online gambling, and not in any meaningful sense a form of sports betting, our recommendation is that it not be permitted in South Africa.

3.3.10. Underage gambling

The NGB has a mandate to minimise the social impact and negative impact of gambling on vulnerable groups, including children. Section 12 of the NGA 2004 provides for certain protection for minors against the negative effects of gambling. These provisions are based on the destination model of gambling, and therefore require that licensees ensure that minors do not have access into designated gambling areas.

However, online technologies increase access to gambling services for children. In addition, because online gambling is easier to access and less regulated, it is a broadly more acceptable form of gambling for children and youth. Evidence suggests that increased access to online gambling stimulates gambling among children and youth (Messerlian et al 2004). Alongside these concerns is the fact that gambling advertising is also more available to children in the online space. Indeed, oftentimes adverts for online gambling appearing alongside children related online content (UK Gambling Commission 2018). In the UK, the Gambling Commission is developing recommendations to curb child gambling, including by providing advice and education in schools, and engaging with the local advertising authority to ensure that 'the design, content and imagery used in gambling marketing, advertising and products [does] not have the effect of creating a particular appeal to children and young people' (2018: 2).

The evolutions on online social media and gaming platforms provides innocuous spaces for the development of problematic or addictive behaviors that in many instances may lead to gambling addiction. Gambling games that do not use real money or stakes (such as no bet poker or black jack), in-app purchases, as well as games of chance and luck all enter into social media and mobile devices through various application stores. Items in gaming platforms regularly referred to as *loot boxes* open one such avenue for gambling behaviours to take hold. Due to the nature of loot boxes, where real currency is used to buy an item for which the user has no real sense of its utility value in the game - essentially represents a gamble. Research has found a significant correlation between purchasing in-app loot boxes and gambling behaviours[8]. This highlights the tremendous risk posed to youth within

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[8] https://royalsocietypublishing.org/doi/10.1098/rsos.190049

these mobile and social media spaces when related to development and future risk potential as adolescents and later adults. Companies such as PayPal have responded to this risk by ensuring strengthened processes in preventing underage use and particularly gambling[9]. Following reports indicating that children as young as six years old are being targeted by gambling advertising, platforms such as FaceBook have begun to respond more meaningfully to this potential threat within their models[10,11].

Stakeholders in interviews expressed concern about the wide spectrum of activities that could be interpreted as gambling, including online activities that are designed to entice children into gambling or gambling-like behaviours. Stakeholders called for increased regulation of online spaces in which children might be targeted by online gambling platforms and applications. This should include tighter controls on the marketing of gambling, and greater attention to games that are similar to gambling, for example games that require payment to advance to new levels, or in other ways entice children to spend money to progress:

> That's where your clarification of gaming comes in… I'm playing Candy Crush, and then I have to buy lives or points, and then I carry on with the game, so gambling regulators are debating and saying that's actually gaming because you have had to wager or spend money in order to progress with that social game.
> Gambling board 3

> Games that are casino games, video games or not video games, arcade games and games that are being played on the internet which have the opportunity or are close to a gambling game, are not even in our network of regulation space. And to me that is very addictive… I don't know how we are able to gauge impact when we are not regulating the space… The top of my list would be to manage the marketing of gambling. I think that is a big, big problem. The second thing would be to regulate the online gambling space and strictly regulate it, because we are allowing our children to grow up in an unprotected environment.
> Consultant 1

One potential tool for regulators is closer alignment with major online actors, such as Google, Facebook, and Apple. These actors have established safeguards against the promotion of gambling to minors. Operators are aware of these constraints (as indicated by Operator 4 below), since they have a direct impact on business models and promotion strategies:

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[9] https://coindoo.com/paypal-can-prevent-your-children-from-underage-gambling/
[10] https://www.telegraph.co.uk/technology/2019/04/03/children-young-six-bombarded-gambling-ads-online/
[11]   https://www.forbes.com/sites/simonchandler/2019/10/14/facebook-may-have-been-used-to-brainwash-children-into-gambling/#537f27224e48

About two years ago, you could have an app, a gambling app on the iStore, but you couldn't have on Play store. Google and Facebook are very, very tough with their advertising policies, as well as WhatsApp. WhatsApp Business as a gambling company you're not allowed to have a business profile, a business account because it's the same concern of attracting underage punters.

Operator 4

Private firms have a financial incentive to draw younger demographics into gambling activities. Interview participants indicated that gambling, at least in Casinos and horse racing modalities, appeals less to younger demographic groups than older groups. This is a long-term challenge to the revenue streams, and therefore profitability, of private firms in the sector:

40's I'd say about middle age. The youngsters don't really, you get a few youngsters but they far and few between because they don't really gamble. Say about 40's and 50's you know between that age.

Operator 6

This is a critical point at which the interests of casinos and other private firms in the sector diverge from the interests of regulators and the public. It is therefore recommended that regulators develop a clearly articulated principled position regarding the impact of gambling, the protection of youth, and the regulation of any attempts to draw young people, particularly minors, into gambling activity.

Key issues and recommendations for regulators

The marketing and promotion of gambling to minors needs to be more actively constrained, and these constraints need to be more actively enforced. More effective mechanisms for detecting the advertising of gambling to minors need to be developed. It may be the case that closer collaboration between South African gambling regulators and international social media firms may assist in constraining harmful online activities, including both gambling and the promotion of gambling, by developing mechanisms such as age restrictions.

Minors are active in a 'grey area' of online activity which borders on gambling, or exhibits gambling-like characteristics. Regulators need to provide clarity in this regard, by developing principles that distinguish between online games that are appropriate for minors, and online games that are sufficiently similar to gambling games that they are not appropriate for minors. The notion of interactive gaming or gambling, introduced in the NGA 2004, and the distinction between gaming and

gambling, must be more clearly differentiated, and more effectively regulated, in order to constrain opportunities for children to be exposed to gambling-like experiences which in turn may lead them into gambling.

As regulators continue to engage with the challenges of online access to gambling and gambling advertising, it is critical thatthe needs of minors and of the South African public are placed ahead of the financial interests of firms in the gambling sector.

4. Recommendations

Artificial intelligence
For regulators, AI has the potential to assist with data analytics and policy decision making. In the private sector, particularly amongst operators, including casinos, AI technologies should only be approved for security purposes, and should not be used for tracking or nudging player behaviour. Their use should only be permitted following regulatory approval. Any application of AI that uses consumer data in the gambling sector must be proceeded by the provision of evidence to regulators that data privacy is protected.

Augmented reality and virtual reality
Specific protocols should be developed to provide guidance to regulators considering VR and AR applications for regulatory approval – including clear boundaries regarding what kinds of applications of VR and AR are legal in the South African context, and which are not. Key questions to be considered include whether VR applications can be verified as live games, whether they can be verified as taking place in a South African jurisdiction or not, whether they protect the data privacy of consumers, and whether they have the potential to over-stimulate gambling demand through their appeal to younger consumers.

Blockchain and financial transactions
Develop a strategy to address the use of crypto-assets, including mechanisms to detect its use, and tools to enforce the controls and regulations that may emerge from the South African Reserve Bank. Cooperation with the FIC should be deepened in order to combat the illegal use of crypto-assets.

Data management
The data management capabilities of the NGB needs to be considerably strengthened in order to meet the challenges posed by an increasingly data-intensive gambling sector.

The collection of data from LPMs should be included in the NCEMS in a manner that does not produce insurmountable challenges – technological solutions for these challenges should be explored by regulators in partnership with sector stakeholders.

In order to enforce compliance with the POPI Act, the NGB needs to establish clear guidelines for the application of national data regulations to the gambling sector. This should include protocols for the protection of the privacy of players, for the collection and retention of personal information, and for the registration of players and the establishment of national databases to track player activity. AI systems have the potential to assist in this endeavour. This effort will require further research, as well as collaboration with the South African Information Regulator.

The potential for automated technological solutions for data management challenges should be explored.

Online gambling
Stronger mechanisms and processes should be developed for:
- Growing public awareness about the risks of online gambling
- Detecting online gambling and intervening where it is detected
- Blocking access to online gambling

The mechanisms by which South African consumers interact with online gambling operators outside of South Africa must be regulated and restricted. The financial constraints to online gambling should be further strengthened through dialogue with banks and internet service providers.

Promotion of gambling
The framework governing gambling advertisement, and the enforcement thereof, should be strengthened in order to more effectively align with the positions of the National Gambling Policy 2015. Online communication platforms and AI technologies have created an unprecedented escalation in the potential for both legal and illegal promotion of gambling, with the potential for significant social impacts. A dedicated regulatory body for monitoring gambling and casino advertising should be established – such monitoring requires a distinct set of capabilities and independent authority to detect the illegal promotion of gambling and respond accordingly.

Tighter monitoring and control over the use of geolocation technologies, micro-targeted messaging, and social media to advertise gambling are required.

Co-regulatory approaches between the Advertising Standards Authority and NGB could be considered.

The NGB should engage directly with social media providers regarding online advertising of illegal forms of gambling.

The National Responsible Gambling Programme should include reference to new technologies in its gambling education programmes. NGB should consider undertaking further research with the aim of developing programmes to promote responsible gambling, as well as providing online-based therapy for those in need.

Prevention of problem gambling
The NGB should support the adoption of emerging technologies focussed on the prevention and mitigation of problem gambling.

Robotics, automation and manufacturing
At present, due the functional structure of the gambling sector, automation is not having as large an impact as in other sectors. In the long term, possible uses of robotics to automate tasks in the casino environment may lead to unemployment, or other unanticipated consequences – such applications should be monitored by regulators on an ongoing basis.

Sports betting
Regulators should review the conditions under which international firms enter the South African sports betting market. Higher licencing fees and a requirement for investment in local physical betting sites may provide leverage to create local jobs, and also create more even market conditions for local firms to compete.

Virtual horse-racing is a form of online gambling that should not be permitted in South Africa under current law.

Underage gambling
More effective mechanisms for detecting the advertising of gambling to minors need to be developed. Closer collaboration between South African gambling regulators and international social media firms may assist in this regard.

The NGB should developing principles that distinguish between online games that are appropriate for minors, and online games that are sufficiently similar to gambling games that are therefore not

appropriate for minors. The distinction between gaming and gambling must be more clearly differentiated, and more effectively regulated.

Further research

Ongoing research is required to understand the real and potential impacts of new advanced technologies on the South African gambling sector. This includes considering the impact of the 4IR on jobs in the gambling sector and relevant skills training. Strengthening the research function of the NGB should be considered. This is broadly in line with the recommendations of the Gambling Review Commission of 2010 to establish an independent research function for gambling at a national level (19).

Digitalisation also creates a need for further research. In order for appropriate standards to be developed for software products that comply with nationally set standards for public-use, and can be monitored and tracked by the NGB or similar national regulatory authority, further research is required. Server and database systems have become highly complex, and in some cases may not be physically based in South Africa (and therefore within the jurisdiction of South African law). Further research is needed to understand what kinds of national registries might be most relevant under such circumstances.

Summary of recommendations

Artificial intelligence	AI has the potential to assist gambling regulators with data analytics and policy decision making. The use of AI technologies in casinos should only be permitted after regulatory approval, following evidence that data privacy is protected, and that the application does not over-stimulate gambling.
Augmented reality and virtual reality	Regulators need to specify what applications of VR and AR are legal in the South African context – guided by whether they can be verified as live games, as taking place in a South African jurisdiction, as protecting the privacy of consumers, as not over-stimulating gambling demand.
Blockchain and financial transactions	A crypto-assets strategy needs to including mechanisms to detect its use, tools to enforce controls and regulations, and cooperation with the FIC.
Data management	The data management capabilities of the NGB needs to be considerably strengthened in order to meet the challenges posed by an

	increasingly data-intensive gambling sector. The collection of data from LPMs should be included in the NCEMS. Clear guidelines for the application of national data regulations to the gambling sector should be established. The potential for automated technological solutions for data management challenges should be explored.
Online gambling	Stronger mechanisms and processes should be developed for detecting and preventing online gambling. Public awareness about the risks of online gambling needs to be strengthened.
Promotion of gambling	The framework governing gambling advertisement, and the enforcement thereof should more effectively align with the positions of the National Gambling Policy 2015. A dedicated regulatory body for monitoring gambling and casino advertising should be established. Tighter monitoring and control over the use of geolocation technologies, micro-targeted messaging, and social media to advertise gambling are required. The NGB should engage directly with Advertising Standards Authority and social media providers regarding online advertising of illegal forms of gambling.
Prevention of problem gambling	The NGB should support the adoption of emerging technologies, including AI, focussed on the prevention and mitigation of problem gambling.
Robotics, automation and manufacturing	Robotics-driven automation is not having as large an impact as in other sectors.
Sports betting	Regulators should review the conditions under which international firms enter the South African sports betting market. Virtual horse-racing is a form of online gambling that should not be permitted in South Africa under current law.
Underage gambling	More effective mechanisms for detecting the advertising of gambling to minors need to be developed, including closer collaboration with international social media firms. The distinction between gaming and gambling must be more clearly differentiated, and more effectively regulated.
Further research	Further research is needed to guide issues of jurisdiction and standards for software products, servers, and database systems, particularly where all or parts of systems are located outside of South Africa.

5. Conclusion

The fourth industrial revolution is having, and will continue to have, a significant and multi-faceted impact on the gambling industry in South Africa, raising a wide scope of new challenges and demands for regulators. Our assessment of these impacts included a scoping of the legal, policy, and regulatory environments, a scan of the technological dynamics of the 4IR and how these impact on the gambling sector, and in-depth interviews with a wide range of stakeholders. From a synthesis of these core knowledge resources, we have identified key issues for regulators, and summarised the recommendations that emerge from our analysis.

The 4IR paradigm is essentially dynamic, and at its conceptual core is the notion of change – the interplay between technological change, economic change, social changes, and political change (and, in some interpretations, climate change). The exponential growth of computing power and internet connectivity continues to drive rapid global technological development, which in turn acts as a driver of social and economic change. The overarching implication for regulators, including policy makers and legislators, is that change is becoming more rapid, and regulation needs to become more adaptable.

The recommendations emerging from our analysis fall into four broad areas, each of which address different modalities of adaptation to the changes brought about by the 4IR. Firstly, there are broad regulatory strategies that can be implemented in order to make regulation more responsive to technological change and to shorten the policy cycle. Secondly, there are strategies to adapt to broad global technological changes, such as digitalisation, automation and data-intensification. Thirdly, there is the need to respond to technological changes being brought about by specific technological platforms, such as AI, blockchain, and virtual reality. Finally, we reflect on the use of regulation that addresses the impact of technological change for meeting the core social mandates of the NGB, for example the prevention of problem gambling and the prevention of gambling by minors.

Through the implementation of these strategic and operational recommendations, the NGB will improve its effectiveness in carrying out its mandate. For the gambling industry, the NGB will be able to play a more effective role in updating regulation to govern new business models and practices. Perhaps most importantly, our recommendations may position the NGB to be more effective in carrying out its social mandate – the challenging task of regulating the gambling industry while continuing to protect the vulnerable, including children, from its negative impacts.

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