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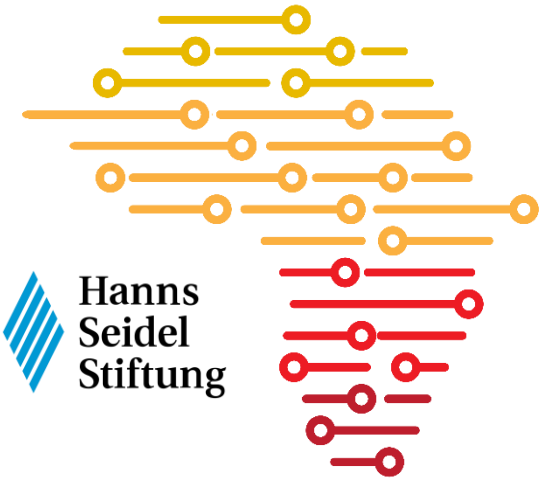
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African Governance in the Digital Age



Governance of digital for transformative change in Africa

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The promise of digital technologies and digitalisation

Digital technologies and digitalisation continue to transform modern societies, systems and structures in increasingly unprecedented manners. From healthcare and education to transportation, agriculture, services and finance, digitalisation and digital technologies continue to demonstrate their impact on and potential to transform life as we know it in sub-Saharan Africa (SSA) and globally (Daniels et al., 2022a and b; Daniels et al., 2020a; GSMA, 2022a; Schelenz and Schopp, 2018; WEF, 2022). For example, globally, digital technologies and digitalisation are a) transforming work and the way we work, including the shift towards online and more hybrid/remote working cultures, b) disrupting the nature and type of work, as expressed in the recent concerns around artificial intelligence (AI) and the types of work that are available in the movie and entertainment industry, c) redefining healthcare, for instance, the use of AI in pharmaceutical and drug research and development (R&D), and d) education, whereby students are now able to more effectively deploy AI tools (such as ChatGPT) in their research and essays.

These transformations and disruptions, alongside the potential for economic growth from digital technologies and digitalisation, explain why the African Union (AU) Digital Transformation Strategy (DTS) (AU, 2020) was developed. The DTS demonstrates high-level political willingness and commitment by Africa's leaders to foster digital technologies and digitalisation as a mechanism for transforming the continent. This continental strategy is buttressed by digital policies and strategies at regional and national levels. Besides the AU's DTS, as of the year 2021, many African governments have formulated and are in the process of implementing their national digital policy, strategy or framework to help them take advantage of the opportunities arising from digital technologies and digitalisation. These countries include Botswana, Kenya, Nigeria, Ethiopia and South Africa (Daniels et al, 2022a and b).

Also on the positive side, the launch and growth of digital financial services has led to important transformative changes across Africa. Furthermore, it has spurred financial inclusion which has enabled many unbanked citizens to access finance in forms that include mobile money (GSMA, 2021). Africa is now home to more digital financial services deployments than any other region in the world. This makes the continent a global leader in fintech and mobile money, with about half (605m)[i] of the 1.35bn registered accounts based in SSA (GSMA, 2022a and b) and a home to many innovation and digital entrepreneurship activities (Azzioui et al., 2021; Daniels and Amadi-Echendu, 2021; Martins et al., 2021). Relatedly, the number of innovations, tech hubs and accelerators in Africa have continued to expand at unprecedented levels and experience tremendous growth (Daniels et al., 2021). Africa's tech start-ups in 2021 'received $4,77 billion in investment, with the emergence of at least five new tech unicorns (start-ups valued at $1 billion)' (WEF, 2022). Despite this progress, digital tech start-up and innovation ecosystems in Africa still require significant policy and business support (AUC, 2014; Nesbitt-Ahmed, 2020).

On the negative side, however, there are cases of countries and national governments using digital to infringe on citizens' rights, resulting in privacy, security and ethical concerns (Jili, 2022; Schelenz and Schopp, 2018; Zuboff, 2019). Examples abound where access to Internet or social media (especially Twitter and WhatsApp) has been cut off (in full or partial shutdowns[ii]) by national governments – including Chad, Ethiopia, Nigeria, Tanzania, Uganda and Sudan – during periods of political tension and crisis, or simply to suppress opposing or critical voices and reduce freedom of expression. Sadly, these Internet and/or social media shutdowns have significant cost and economic implications for the respective countries that implement them.

There are also instances where political economy factors have led some governments to impose a digital or 'social media' tax to either control speech, as in the case of Uganda, (although this has now been scrapped and replaced with 12% tax on Internet data (Boxell and Steinert-Threlkeld, 2022)) or to fill budget holes (The Economist, 2022). This has led to divergent views on the effectiveness of such interventions. Furthermore, it is largely unclear to what extent progress in areas such as e-government has contributed to socioeconomic progress in Africa, despite the decades of successive growth in e-government strategies and

approaches globally, not only in Africa. Or in what ways governance of digital may help address these challenges.

This article presents a balanced picture based on a critical analysis of the state of affairs on the governance of digitalisation. Using a methodology based on the critical review of literature and secondary data, I argue that the potential for digital technologies and digitalisation to contribute to transformative change and achieve the *Africa We Want* (AUC and OECD, 2019; AU, 2016a and b) far outweighs the downsides that have contributed to the techno-pessimism across the African continent. However, for Africa to harness the full potential of digitalisation for transformation, the governance structure must be reorganised to adopt a citizen-centric approach. I conclude by showing how this objective can be realised across the continent.

The discussion is organised as follows: In the next section, I discuss the state of affairs on the governance of digitalisation in Africa. Then, I cover digitalisation and the notion of transformative change. The potential for digital technologies and digitalisation, enabled by effective governance, to contribute to transformative change is discussed subsequently. This is followed by a conclusion on the governance of transformation and considerations for policy, research and practice. The insights articulate four broad themes: Government—citizens relations, Government—private sector relations, Private sector—academia relations, and Relations between politicians and the electorate.

The state of affairs on the governance of digitalisation in Africa

Deepening our understanding on the state of affairs on digital is vital to charting the way forward towards the governance of digital for transformation in Africa. As mounting evidence indicates, in many instances digital is transforming lives and societies for good at an unimaginable pace. Nevertheless, in other contexts and sectors, digital is exacerbating social challenges, such as inequality, exclusion and crime, and economic challenges, such as poverty. This highlights some of the 'dark' sides of innovation, digital technologies and digitalisation (Martin, 2015). To the wider society, these dark sides of digital undermine the case for

digitalisation, and dampen the potential of digital technologies and digitalisation to foster transformative change.

The effective governance of digital is vital because digital technologies and digitalisation present both positive and negative sides in Africa, as in the rest of the globe. The positive aspects of digital in Africa include improved financial access to the otherwise excluded and marginalised communities, for example, through online payments and mobile money (such as M-Pesa) and the deployment of digital technologies in service delivery, for example, in health service delivery to populations in remote areas and online education that enables education for citizens in remote and rural areas. On the contrary, the negative aspects of digital in Africa range from limits on privacy and restrictions imposed by governments on social media, which in some countries are important business tools, to concerns around infringements on privacy, security and ethical considerations. This tension between the positives or the progress in digital, on the one hand, and the negative aspects of digital, on the other hand, have led many Africans to question the high hopes raised by digital technologies and digitalisation as a means to transform the continents' political, economic and social structures and systems for the better.

It is important to note that these high hopes are not a recent phenomenon. They have been with us since the early to mid-2000s, starting even much earlier with the spread of ICTs from the 1970s globally. And now, decades later, there is rise in the techno-optimism that dominated the narratives and ideas held by many Africans, elites, decision-makers and policymakers. To the techno-optimists, such as policymakers and digital technology industry experts, the view initially was that ICT followed by digital technologies and now 4IR would help the continent leapfrog, catch-up and transform her societies, systems and structures in ways that could enhance competitiveness and economic growth. Nevertheless, this techno-optimism, influenced by the prevailing political economy considerations (Daniels et al., 2020b), ideas and narratives held by decision-makers and policymakers, has increasingly given way to techno-pessimism, not only in Africa but globally (Kelly, 2022).

Globally, concerns about the 'Rise of the Robots' and robotics, automation, automated workplaces and automated decision-making are some of the contemporary popular

narratives. These are becoming more commonplace, for instance, in interviews, recruitment and selection exercises, or in the future of work that has fuelled techno-pessimism (Andrejevic, 2020; Kelly, 2022). From a social angle, we have concerns about, for example, inequalities and ever-widening power asymmetries between workers and employers, and the failure of economic growth, largely driven by digital, to trickle down to the poorer segments of the society, thereby contributing to (social) exclusion and marginalisation.

In Africa, there are many reasons for the increase in techno-pessimism in relation to digital technologies and digitalisation across the continent. I provide three points for illustration. First, African governments have, in general, become more effective in their ability to capitalise on the digital revolution and exploit the opportunities that digitalisation offers. The weaknesses in African governments' ability to effectively exploit opportunities in digital meant that other actors and stakeholders – such as the markets and the private sector, who are often risk-averse – have been better at using the benefits of digital technologies. A case in point is the example of M-Pesa, in which the bulk of the financial benefits goes to Vodafone and Safaricom. By formulating digital policies and strategies, African governments are demonstrating their improved capabilities to reap the benefits from digital. Digitalising Africa's economies[iii] and harnessing the opportunities from digital are central to the continent's ability to address many of its development challenges. Digitalisation can help address the youth unemployment challenge, raise the GDP per capita by about 46% over 30 years[iv] and potentially double the female labour force, if digital technologies are more widely adopted (Cusolito et al, 2022).

Second, beyond Internet and social media shutdowns, the gains from digital – for example, the high foreign direct investments (FDIs) in digital tech start-ups – have largely been unable to translate to broader economic progress, such as significant increases in employment for the broader segments of Africa's citizens. As noted above, the FDIs in Africa's tech start-ups in 2021 alone were in the region of $4,77 billion, resulting in at least five new tech unicorns (WEF, 2022). Granted, there is a sizeable number of jobs being generated in the mobile money sector, in terms of number of sales outlets, agents and kiosks (GSMA, 2022a), but the ratio of jobs created in the African economy remain comparably low in relation to the FDIs and the potential of the sector. Some of the factors that need to be addressed to help increase the

number of jobs emanating from the digitalisation include capabilities and skills (Bashir and Daniels, 2022), policies and regulations (Gastrow and Adams, 2022), weaknesses in the interactions and linkages among research and innovation ecosystem actors, and stakeholders and governance (Twiringiyimana et al., 2021).

Third, there are examples which indicate that digital, rather than fostering transformation, is helping to maintain the status quo. For instance, in cases where governments shutdown the Internet and social media during elections or to supress dissenting voices (Erforth and Martin-Shields, 2022; Jili, 2022; Zuboff, 2019). Empirical evidence is starting to emerge which indicates a negative correlation between the use of Internet and citizens' perceptions of corruption. That is, the adoption of digital tools and increased use of Internet leads to lower perceptions of corruption among citizens. Nevertheless, the ability of digitalisation to reduce corruption is hindered in countries where the government has a pattern of intentionally shutting down the Internet (Ouedraogo and Sy, 2020). In contrast, countries that successfully promote ICTs have higher positive effects from digitalisation and the impact on poverty reduction (Ouedraogo and Sy, 2020). In countries where governments have shut down the Internet, digital has been shown as one of the factors that makes it easier for the governments to maintain their stronghold on power, suppress democracy and the elections processes or continue corrupt (financial) practices (Ouedraogo and Sy, 2020).

The preceding discussions and examples help illustrate the reasons for an increase in techno-pessimism in relation to digital in Africa. Furthermore, they point to three broad categorisations of debates and literature that take a i) positive view – techno-optimism, ii) negative view – techno-pessimism, and iii) more 'balanced' view and approach to digital. In the first category (techno-optimists), the expectation is that digital technologies and digitalisation serves public good. As a result, the governance approaches should seek to promote, support and facilitate access, adoption and use of digital. In the second category (techno-pessimists), however, the dominant narrative is driven by the perception of risks and the ideas around precautionary principle. In this line of thought, digital technologies and

digitalisation pose threats and great danger to societies. Therefore, governance must, primarily, focus on understanding, assessing and mitigating these threats.[1]

A brief discussion of the third category is useful and important. Contrary to the techno-optimists' and techno-pessimists' categories, the third category takes a more 'balanced' view and approach. In this category, efforts are made to engage with literature and debates in a more critical manner and present both sides of the argument. The premise in this context is that it is important to deepen our knowledge on both the positive and negative aspects of digital technologies and digitalisation to better understand how to harness the potential while mitigating risk. In this view, governance of digital must adopt a systems change perspective, that is, explore both the positive and negative impacts of digital at systems level. This involves a multi-sector and multi-systems approach that focuses on economic alongside social and environmental concerns. Calls for a human-centred approach, experimentation and multi-stakeholder participation in co-creating the potential outcomes and solutions are also indicated.[2]

The totality is a balanced set of discussions that provides ample information and knowledge in helping to understand the state of affairs. These broad categorisations of literature point to how each category treats the governance of digitalisation. The discussions that follow in the next section help unpack the state of affairs on the governance of digitalisation in Africa. Further justifications are provided on reason improvements in the governance of digital are both relevant and important. In the following section, the discussions centre on digitalisation and the notion of transformation with emphasis on the sustainable development goals (SDGs) as the overarching policy framework for transforming our world.

[1] For more on this, see, for example, Friederici et al., 2017.

[2] For more discussions and insights on scholarly works and policy documents in this group see, for example, Beduschi (2022), Daniels et al. (2022a and b), Twiringiyimana et al. (2021) and AU (2020).

Digitalisation and the notion of transformative change

Transforming our world: the SDGs as the policy framework for transformation



The UN Agenda 2030, the sustainable development goals (SDGs), provides one of the clearest definitions and conceptualisations of the notion of transformation and transformative change (UN, 2015). The SDGs, a global policy framework, argues that, to transform our world, attention needs to be paid to 17 key areas, or goals, referred to as SDGs1-17. A close look at the SDGs reveals that they cover three dimensions that are core to transformation – economic, social and environmental. Broadly, SDGs that focus on addressing economic challenges include SDGs 7, 8, 9, 11 and 12; while SDGs that target social challenges include SDGs 1, 2, 3, 4, 5, 10. The third category, SDGs that relate to environmental challenges are SDGs 6, 13, 14, and 15. There is a fourth category of SDGs. These are cross-cutting and target framework conditions, such as policies and regulations, governance and political economy considerations – SDGs 16 and 17.

Building on the SDGs' conceptualisation of transformation, for change to be truly transformative, it must target the three dimensions of economic, social and environmental challenges; it must take into consideration the framework conditions that enable or hinder change. As I argue in this section, achieving this level of transformative change requires governance with a view to deep and long-term systems change. In addition, transformative change demands a focus on the impact at systems levels, which transcends single sectors but involves multi-sector and multi-systems interventions. Furthermore, transformative change with a long-term view calls for a focus on whole-of-government and human-centred approaches that are enabled by active (multi) stakeholder participation, reflexivity on the part

of ecosystems actors and attention to directionality. Until now, technologies, science and innovation systems have focused, like the majority of other sectors, on the first dimension of the SDGs – economic growth and development – often neglecting the other two dimensions, social and environmental.

African leaders, decision-makers and policymakers have committed to meeting the SDGs by 2030. To this end, the continent's long-term development, encapsulated in Agenda 2063 (AU, 2015; 2016a), *The Africa We Want,* is aligned to the SDGs (AU, 2016b; Royo et al., 2022). In this vein, African member states have conducted their Voluntary National Reviews (VNRs)[v], which show their progress towards achieving the SDGs. As signatories to the SDGs and Agenda 2063, African countries are required to conduct a regular review of their frameworks and implementation mechanisms geared towards achieving both agendas, with a view to fostering inclusive growth and development that contributes to transformative change across systems, structures and societies.

Guiding theoretical and conceptual frameworks for transformative change

Until recently, technologies (especially digital technologies and digitalisation in the context of this section), science and innovation have focused on, predominantly, economic growth with less attention to social and environmental concerns. Social concerns in this context include poverty, inequality and unemployment, peace and just transition, while environmental challenges range from climate change and biodiversity loss to pollution of air and water. Attempts have been made to explain the inability of science, technologies (again, with emphasis on digital technologies and digitalisation) and innovation (STI) systems to effectively target social and environmental concerns through theories and frameworks, such as political economy analysis (PEA), the market failure, innovation systems failure and transformation failures. Often, these theories and frameworks have proved to be inadequate in that they do not explicitly outline how to redirect science, technology or innovation to target social and environmental challenges alongside economic goals, as articulated in the SDGs. As discussed above, for the change to be truly transformative it must target these three dimensions.

A leading framework that attempts to achieve transformative change, in line with the SDGs framework and conceptualisation, is that put forward by Schot & Steinmueller (2018) (see

also Daniels et al., 2020). In this theoretical and conceptual understanding (Figure 1 below), rather than continue the trajectory of refocusing digital technologies and digitalisation on research and design (R&D) and innovation with a view to achieving economic growth that trickles down to the wider publication, the goal is to redirect STI in ways that help to confront social and environmental challenges. In the process, this hopes to achieve public welfare, clean environments and economic growth that are more sustainable. This is a major improvement on prior theories and frameworks on STI, such as the market failure, PEA, National Systems of Innovation (NSI), Triple Helix, Technology Innovation Systems or Political Economy Analysis, which focus on economic growth with less attention on social and environmental challenges.

Empirical evidence is now emerging which suggests that digitalisation, of its own account, does not lead to sustainability. In this regard, policy, regulations, interactive learning among actors and stakeholders and effective governance frameworks (Twiringiyimana et al., 2021), that support robust coordination mechanisms among multiple systems, stakeholders and interventions, are essential to steer digitalisation towards sustainability and transformative change. This helps to address directionality failure (Daniels et al., 2020; Schot and Steinmueller, 2018).

There are cases where the use of social media and online platforms has helped to exacerbate ethnic conflicts. In the case of Sudan, for example, the UN notes that hate was spewed online, with a UN Special Advisor expressing 'particular concern that violence and reprisal attacks have been fuelled by hate speech and incitement to hatred, exacerbated through social media and in ethnic gatherings' (UN, 2022).[3] Relatedly, facial recognition technologies have contributed to persecution of dissidents, while artificial intelligence (AI) tools and big data have increased risks to privacy and pose threats to the human rights of many citizens across the globe (Erforth and Martin-Shields, 2022; Jili, 2022). These challenges arise because technologies are not neutral, especially digital technologies. The design and development of

[3] UN News 'Resurgence of ethnic clashes in Sudan's Blue Nile region triggers death and destruction', 4 November 2022, https://www.un.org/africarenewal/magazine/november-2022/resurgence-ethnic-clashes-sudan%E2%80%99s-blue-nile-region-triggers-death-and (accessed 15 July 2023).

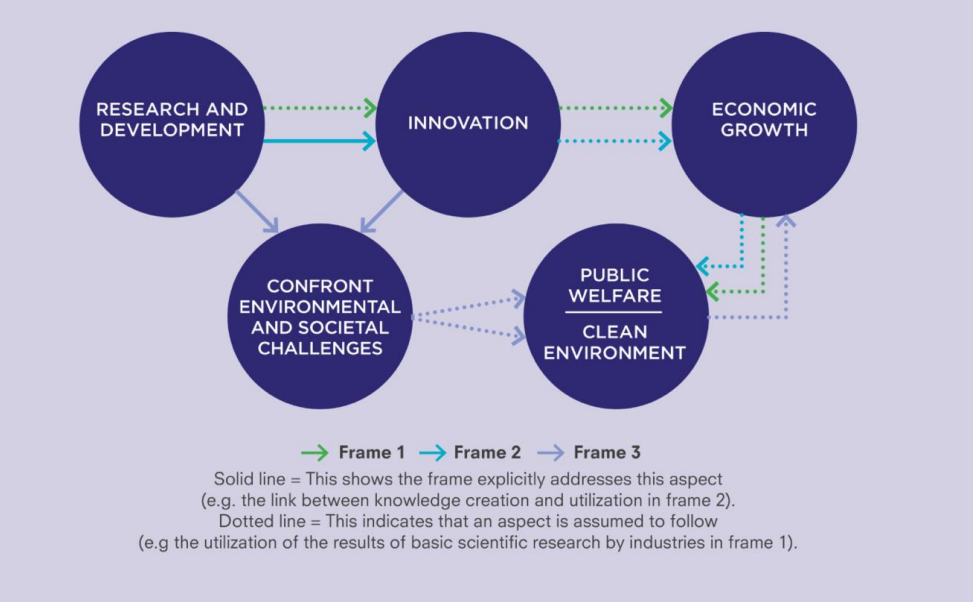
technologies could reproduce inherent biases, while the deployment of such technologies may have important consequences for the respect of human rights, ethics, security and privacy (Beduschi, 2022).

Similarly, on the (digital) technologies and innovation fronts, we find cases where, for example, artificial intelligence (AI) programmes reproduce existing biases, social exclusions and inequalities or exacerbate human rights concerns, including privacy, security and ethical concerns. In Africa, while some countries, for example, Kenya, Nigeria and South Africa, rightfully, adopt the European Union's (EU) GDPR with the inherent citizens/human-centred principles; other countries, such as Ethiopia, use technologies[4] to spy on their populations, in violation of their citizens' human rights, including privacy and security, freedom of speech and social welfare (Jili, 2022). If not well thought out, technologies, science, innovation and practices that focus on promoting economic growth could exacerbate social and environmental challenges, such as inequality, employment and job creation, exclusion or gender gaps, climate and biodiversity loss. In this context, it is essential that digital governance models go beyond data protection and adopt a holistic approach to human rights' protection.

It is vital that these concerns are addressed in the conceptualisation, design and implementation of governance frameworks and systems to help to ensure that digital technologies and digitalisation take a human-centric and citizens-centred approach. To this end, in developing such governance frameworks and systems, the approach adopted must be informed by the transformative change theoretical framework and approach. This approach places social concerns, such as human rights, inclusivity, reduction in inequality, education, and healthcare, and environmental concerns, such as biodiversity and sustainability, at the heart of STI systems, alongside economic challenges (Figure 1 and Table 1 below).

[4] Mostly Chinese of Chinese origin, but also from USA and elsewhere

Figure 1: Conceptual framework for transformative change



Sources: Daniels et al., 2020; Schot and Steinmueller, 2018

Table 1: The three frames of STI for transformative change rationale

Framing	Key features	Policy rationale
Frame 1: Innovation for growth	Science and technology for growth, promoting production and consumption.	Responding to **market failure**: the good public character of innovation necessitates state action.
Frame 2: NSI (National systems of innovation)	Importance of knowledge systems in development and uptake of innovations.	Responding to **system failure**: maintaining competitiveness, coordinating system actors.
Frame 3: Transformative Change (focus on the SDGs)	Alignment of social and environmental challenges with innovation objectives.	Responding to **transformation failure**: pathways, coordination domains, experimentation and learning.

Sources: Daniels et al., 2020; Schot and Steinmueller, 2018

The potentials for digitalisation to contribute to transformative change

The digital economy has key foundational pillars that effective governance must seek to address for digital to contribute to transformative change. These pillars are data; capabilities and skills; digital infrastructure; digital payments, policies and regulations for ecommerce. Other pillars include privacy, ethics, trust and security (AU, 2020; Cusolito et al, 2022; Daniels et al., 2020, 2021, 2022). It is vital to understand these pillars and address the challenges that hinder progress related to the pillars for effective exploitation of the potential and opportunity for digitalisation to contribute to Africa's labour markets and employment generation (Banga, 2022), and industrialisation (Aynaoui et al., 2022). Digitalisation can also support transformation in other areas, including revenue mobilisation (Agyei-Holmes et al., 2022) and the ability of the continent to exploit the benefits of the biotech revolution through AI (Pauwels and Tilmes, 2022).

The digital era is based on data, predominantly. Better management of Africa's data, privacy, ethical concerns and security of data will ensure the continent digital sovereignty, an essential factor in cementing her geopolitical position among other regions of the world (Erforth and Martin-Shields, 2022; Fritzsche and Spoiala, 2022). But other challenges remain – from gaps in capabilities, digital skills and adequate infrastructure (Bashir and Daniels, 2022; ITU, 2020) to the need to digitally transform to Africa's micro, small and medium Enterprises (MSMEs) and equip them to benefit from the Africa Continental Free Trade Area (AfCFTA) (Fafunwa and Odufuwa, 2022). In addition, there are challenges around privacy, politics and the need for cooperation in data protection (Erforth and Martin-Shields, 2022), and gaps in policies, regulations and related frameworks on digital (and STI in general) (Gastrow and Adams, 2022).

Furthermore, three key areas of challenge relate to effective citizen and stakeholder engagements that put people at the centre of digital policies, strategies and regulatory frameworks (Abah et al., 2022); digitalisation and transformative learning that ensure sustainable futures for populations in the rural areas of Africa, hence leaving no one behind (Shetye et al., 2022), and inclusivity at two levels – first for women and second for digital

entrepreneurs in general, but more specifically for female entrepreneurs (Beleyi, 2022; Dosso et al, 2021; Sladkova and Bashir; 2022).

Although these challenges are real and significantly hinder Africa's ability to harness the full benefits of digitalisation, they are not insurmountable. Governance is essential to realising these potentials and exploiting the opportunities that digitalisation holds for Africa. An important starting point is the identification of the range of factors that hinder interactions, learning and collaborations among key actors, including the gaps in governance responsibilities and accountabilities, policies and structural transitions, and capabilities (Twiringiyimana et al., 2021). To this end, a brief revisit of some of the challenges and the roles that governance could play in addressing the challenges is useful to inform the conclusions and the recommendations that follow in the next section.

With respect to the challenge of addressing the gaps in Africa's labour markets and employment generation (Banga, 2022), digitalisation holds the promise of creating millions of jobs and contributing $1.6 trillion to the economy of Middle East and North Africa (MENA) and North Africa over the next 30 years. This demonstrates the potential that needs to be exploited (World Bank, 2022). Over the same period, the number of females employed is projected to double. In addition, it is estimated that an increase of 5% in manufacturing employment and reduction of unemployment from 10% to 7% can be anticipated (World Bank, 2022). With SSA accounting for about 50% of the total number of digital payments used globally, a far higher ratio than MENA and North Africa; the SSA region is expected to make similar gains in digitalisation. Nevertheless, careful attention must be paid to ensure that the appropriate policies, regulations and governance frameworks and mechanisms are put in place to help steer these gains in ways to help achieve transformative change. Strategic partnerships and cooperation in digital will also be useful in Africa's efforts to harness the benefits more adequately from digitalisation (Daniels et al, 2020a; EC, 2019; Fritzsche and Spoiala, 2022).

Small and medium enterprises (SMEs) and MSMEs are vital to industrialisation, job creation and resilient societies (Aynaoui, et al., 2022; Fafunwa and Odufuwa, 2022). Active involvement of SMEs, many of which are in the informal sector, speaks to inclusivity, helps

address inequality and is thus essential to fostering transformative change. Digitalisation is vital for MSMEs, which constitute 90% of firms and which generate about 60% private-sector employment in Africa (ITC, 2020).

To this end, equipping SMEs and MSMEs with the relevant digital skills, capabilities and resources can help these important segments of Africa's societies and production systems to benefit from AfCFTA and other initiatives that relate to continental free trade area, such as the Digital Single Market (DSM). However, while the governance framework and mechanisms adopted should promote economic growth, care must be taken to target social and environmental concerns. One way to do this is through policy instruments and interventions that, for example, prioritise SMEs and MSMEs which operate on the nexus of social, environmental and economic challenges as opposed to those that focus solely on economic considerations and are unable to demonstrate long-term social and environmental impacts from their activities. Digitalisation that targets social and grassroots innovation is, therefore, important in this context.

The gains made by supporting SMEs and MSMEs in the adoption and use of digital technology complements efforts by large firms. Combined, the progress in digitalisation among the three groups provides a stronger basis for structural change, broader systems impact and long-term transformation in areas that include revenue mobilisation (Agyei-Holmes et al., 2022). The case of Ghana shows that digitalisation can significantly improve tax collection through, for example, implementing paperless port systems and integrating processing systems (Agyei-Holmes et al., 2022; OECD, 2019; World Bank, 2016a and b).[vi] Progress in this area depends, to a large extent, on efficient data management, which forms the bedrock of digitalisation.

The ability of Africa to exploit her rich genome base and benefits from the biotech revolution, through AI, big data and other 4IR suites of technology (Pauwels and Tilmes, 2022), depends to a significant extent on the continents' governance of data, privacy, ethics and security. Progress in this area of data management, enabled by appropriate governance frameworks and mechanisms, will speed up the process towards achieving digital sovereignty, improved geopolitical positioning globally (Erforth and Martin-Shields, 2022; Fritzsche and Spoiala, 2022) and competitiveness that contributes to realising the aspirations of Agenda 2063

(Daniels et al., 2022a and b). Linked to the need for effective data management are challenges around privacy, politics and the need for cooperation in data protection (Erforth and Martin-Shields, 2022). Addressing the gaps in policies, regulations and related frameworks on digital (and STI in general (AU, 2020; AUC, 2014)) is a necessary step towards effective data management that has people as the central focus and is enabled by the right policy frameworks (Gastrow and Adams, 2022). But all of these require capabilities and skills.

The African Union in their Digital Transformation Strategy (AU, 2020) outlines a goal to equip 300 million Africans with digital skills by 2025, using Massive Open Online Courses (MOOCs). This is a realisation that 'digital skills are fundamental to the digital transformation of societies' (Daniels et al., 2022: 185). However, the delivery of capabilities and digital skills programmes requires an ecosystem (Bashir and Daniels, 2022). This is where effective governance becomes vital as it helps provide the framework of interaction among ecosystem actors and stakeholders (education institutions, government, funders, civil society organisations, students and parents), spells out authority levels, responsibilities and accountabilities, and ensures optimum coordination structures that control the outputs, outcomes and benefits of digitalisation. This highlights the importance of key principles that must guide the design and deployment of governance frameworks to support interventions of this nature. I outline the principles in the section below.

A key area of challenge in the governance of digitalisation (but also STI in general) relates to effective citizen and stakeholder engagements. These are necessary for guaranteeing that people are placed at the centre of digital policies, strategies and regulatory frameworks (Abah et al., 2022). Stakeholder engagement should also include broader actors, such as development partners who shape and exert significance on digitalisation in Africa, for example, the African Union (AU-EU, 2022; EC, 2019; UK Government, 2019; Council of the EU; 2016, 2007). The European Union (EU), for example, in developing the GDPR, Data Governance Act[vii] and the legal framework[viii] for AI (EC, 2018), emphasises a human-centric approach that addresses fundamental rights and safety risks for citizens. This followed intense periods of stakeholder engagements and consultations and a further grace period of 15 months. However, this is not the practice in many African countries, as evidence indicates. More importantly, the Data Governance Act (DGA) (EP, 2022) covers economic data

(agriculture and public administration), social data (health and others) and environmental data ('combatting climate change, reducing CO_2 emissions and fighting emergencies, such as floods and wildfires')[ix], thereby aligning with the proposal in this paper on the need for addressing the three dimensions of transformative change.

For governance to contribute to achieving transformative change, it must, like other public policies and policymaking processes, be based on wide stakeholder engagement that involves both the State[x] and non-State actors[xi]. Collectively, these actors, working together, shape and influence the processes involved in the formulation, implementation, evaluation and governance of policies, regulations and law on digital technologies.

Abah et al. (2022: 174) report that, in the case of Nigeria, 'The limited engagement with technology focused CSOs [Civil Society Organisations] and ex post consultations meant that the policymaking process left important gaps in terms of consumer inputs into the NNBP [Nigerian National Broadband Plan]. Instead, policymakers wrote the policy and then consulted with industry associations to generate ideas for implementation and achieve shared goals'. In other cases, there have been reports of public confrontations, conflicts and low attendance, thus reflecting the general sense of apathy and powerlessness by citizens and other stakeholder groups (Abah et al., 2022).

Other reasons for weakness in stakeholder engagements, which is necessary for ensuring a citizen-centric governance of digital and STI in general, are low levels of familiarity with STI policymaking processes by the public and inadequate levels of outreach by the CSOs themselves. It is hoped that as more Nigerians across Africa acquire more advanced levels of capability and skill, increase their use of digital technologies and services, and improve their understanding of issues related to digitalisation, these might translate into improvements in public engagement.

Besides the case of Nigeria discussed above, there are also examples where public engagements have proved vital in fostering digitalisation in Africa. Although digitalisation helped improve tax collection with positive implications for Ghana's resource mobilisation, gaps in digital infrastructure (such as reliable intranet/Internet) and active stakeholder

engagements that help ensure human-centric digitalisation, were highlighted as areas of challenge that need to be addressed (Agyei-Holmes et al., 2022). In the case of Ghana, success was achieved and explained in the following way:

> … an elaborate stakeholder mapping at the onset of digitalisation is key. The view here is to bring these stakeholders together for dialogue on how systems should be rolled out to meet the needs of users. In the Ghanaian experience, such stakeholder engagements proved to be very helpful, although it required significant capital outlays by a donor (UK-DFID). For example, the dialogue encouraged duty bearers to employ more staff where they were lacking, encouraged them to make changes to port infrastructure where necessary and also commit to an enhanced monitoring of their staff to prevent corruption. Dialogue with the public was also found to work best when local languages were used (Daniels et al., 2022: 141).

A key stakeholder group that is often not adequately included in governance and policy processes is women. Inclusion of women, at the two levels of individuals active in the digital and STI spaces and female digital entrepreneurs, as discussed above, is essential for progress in digitalisation and realising transformative change (Beleyi, 2022; Sladkova and Bashir; 2022). Inclusivity that helps reduce gender inequality, coupled with transformative learning, guarantees sustainable futures for populations, especially in the rural areas of Africa, thus leaving no one behind (Shetye et al., 2022).

Governance of digital for transformation: considerations for policy, research and practice

This paper examined the positive and negative dimensions of digital technologies and digitalisation, arguing that improvements in governance are vital to a) resolving the inherent tensions that currently exist and b) achieving transformative change. This balanced view is important because, currently, research, public debates and policy interventions that relate to digital technologies and digitalisation, broadly, tend to either exaggerate its transformative

potential (the positives, a positivist view), or to disregard the positives entirely, thereby, resorting to emphasis on the pessimistic and negative dimensions.

This leads us to three broad categorisations of debate and literature, those that take the a) positivist or optimistic view; b) negative or pessimist view; c) or a more balanced view and approach to digital. Effective governance, based on wide stakeholder engagement and sound principles that are human/citizen-centric, is vital to unifying the divergent views. Active engagement and participation of stakeholders in the governance of digital will help ensure that digitalisation does not focus on economic goals only but is equally directed at social and environmental challenges – the basis of transformative change, as defined in this paper.

With the existence of policies, strategies and regulations for digital across the continent – from the continental Africa Union Digital Transformation Strategy – to national policies on digital in countries that include Botswana, Kenya and Nigeria; there is the need for robust governance frameworks on digital at continental, regional and national levels. Such governance frameworks that draw on inputs from multi-stakeholders and are citizen-centric will, among other things, i) help improve implementation prospects, ii) support evaluation and learning, and iii) provide the framework of authority and accountability that defines and controls the outputs, and benefits from digital policies in ways that ensure optimum development outcomes and impacts from digitalisation.

Citizens face many challenges that hinder their ability to effectively engage with governance frameworks and policy processes. Some of these challenges include capabilities, skills and knowledge gaps, poor awareness of the processes involved in public policymaking, time constraints and poor outreach on both sides of the aisle – State and non-State actors. Nevertheless, for Africa to harness the full potential of digitalisation for transformation, the governance of digital must reorganise to adopt a citizen-centric approach that effectively engages with the different stakeholder groups. This is vital to ensuring that outcomes of digital do not exacerbate social challenges, such as inequality, exclusion, and poverty, and environmental challenges, while seeking to achieve economic objectives.

Seven key principles

The design and implementation of the governance frameworks must follow seven key principles, as discussed in the preceding sections. The digitalisation governance frameworks in Africa must:

i. Focus on transformation and continental development priorities;
ii. Prioritise people, that is, be centred on citizens;
iii. Engage with, and include, broad-based multidisciplinary stakeholder groups;
iv. Address social and environmental concerns, alongside economic challenges;
v. Support long-term systems change that is geared towards sustainability;
vi. Embed African values and promote the highest standards of openness, ethics, privacy and security of citizens, trust, fairness, transparency and excellence;
vii. Provide for efficient and effective risk management.

Concluding remarks

The effective governance of digital technologies and digitalisation in Africa, in line with the seven key principles outlined above, will safeguard the use of digital in ways that foster prosperity and support the transformative change that Africa aspires to, as articulated in Agenda 2063. Application of these principles will help guarantee that the governance, implementation and evaluation of digitalisation in Africa goes beyond basic compliance to legal provisions or simple tick box exercises, and rather embeds core values that support Africa's progress with a strong consideration for public good and long-term positive developmental impacts on societies. These principles, in line with the preceding discussions in this paper, must inform the considerations for policy, research and practice to be taken forward by stakeholders.

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[x] This refers to government ministries, agencies, and where applicable, the judiciary and legislature

[xi] Include private sector stakeholders and industry associations, civil society organisations (CSOs) and academia.