



South Sudan and Technology in 2050

Better Aid Forum Briefing Paper

Glen Aronson

30 SEPTEMBER 2019

CSRF

Conflict Sensitivity Resource Facility
SOUTH SUDAN

SAFERWORLD
PREVENTING VIOLENT CONFLICT. BUILDING SAFER LIVES.

swiss
peace

Introduction – why technology matters

The Conflict Sensitivity Resource Facility's (CSRF) **Better Aid Forum** (BAF) is a series of events and discussions with different stakeholders to consider the long-term objectives and ambitions of the aid sector in South Sudan. It focuses beyond the timeframes of ongoing political and security dynamics in order to drive collective analysis about the approaches and principles that should underpin international engagement in South Sudan over the longer term.

In June 2019, a two-day event, the **Better Aid Forum Experts Meeting**, was held in Nairobi to reflect on findings from the Better Aid Forum process thus far, and debate how long-term trends may shape South Sudan's context over the coming decades – and what this means for aid. The CSRF commissioned a number of input briefing papers that consider long-term trends underway in South Sudan, regionally, and globally that are likely to play a role in shaping South Sudan's future. This BAF briefing paper on technology and innovation is the first publication of the BAF briefing paper series that will also consider economy, climate change and demographics.

When considering South Sudan's prospects for 2050, perhaps the largest unknown is the potential impact of technology on the country's economy, social relations and politics. Technology provides ever-evolving possibilities to transform the economy and the aid sector and to mitigate challenges related to climate change and demographic growth. There is little accurate data on use of technology in South Sudan. As such, this note relies on estimates of technology use and emerging regional and global technological developments, more often posing questions rather than providing specific predictions about the implications of future technology use.

About the author

Glen Aronson is a data scientist with a background in GIS and management consulting in the developing world.

© UK Department for International Development, September 2019. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise, without full attribution to the authors. The UK Department for International Development, Saferworld and swisspeace welcome and encourage the utilisation and dissemination of the material included in this publication.

The views expressed in this paper are those of the author(s) and do not necessarily represent the views of the CSRF/BAC, Saferworld, swisspeace or our donors.

Current Technology Context and Trends

Modern technology is dependent upon electricity, and South Sudan has among the lowest per-capita electricity consumption in the world.¹ Lacking a national electricity grid connected to economical power-generating sources, the country's use of technology is constrained by its dependence upon expensive imported fuel; many citizens and all private sector enterprise rely on their own generators and/or small-scale solar power² to ensure access to electricity.

Mobile phones are popular in areas with reliable network coverage, though less than a fifth of South Sudanese have mobile phone subscriptions.³ Although mobile phone access costs are higher in South Sudan than in neighboring countries, telecom operators have reported a drop in mobile subscriptions and considerable financial losses during the current armed conflict,⁴ waiting for post-settlement opportunities to build new infrastructure to reach future customers in rural areas. It is generally the practice of the authorities to demand cellular service providers to cut off access to mobile communications and access to data in areas affected by conflict. Over the past few years, most cell tower power supply systems have been upgraded to local photo-voltaic systems from more difficult and expensive to maintain and service diesel generators.

Internet in South Sudan comes through expensive mobile phone and satellite-based providers, but fiber optic connections under construction are

expected to lower access costs and increase connection speed.

2019 saw the introduction of mobile money to South Sudan, twelve years after the pioneering development of M-Pesa in neighboring Kenya. With fewer than 10% of adults currently possessing a bank account,⁵ the long-overdue introduction of mobile money to South Sudan may transform the nation's banking and payments systems as well as cash-based assistance programs.

Though closely integrated into regional markets, South Sudan has historically lagged behind its neighbors in terms of technology adoption. At present South Sudan lacks the physical and educational infrastructure to compete with regional technology leaders like Kenya, but South Sudan's large, widespread globally and educated diaspora is well positioned to develop and import regional and global technologies to address local problems.

Most modern technologies used by South Sudanese – from electricity to the internet and social media – were pioneered by the US, but future breakthrough innovations are increasingly likely to come from China and other non-Western nations.⁶ China leads the world in solar panel and telecommunications equipment production, among other high tech industries. Chinese retail and social media services are reaching global consumers through AliExpress and Tik Tok, and Chinese companies have taken large ownership stakes in

1 Per the International Energy Agency's 2014 estimates. https://www.oecd-ilibrary.org/energy/key-world-energy-statistics-2016_key_energ_stat-2016-en

2 South Sudan's total annual solar photovoltaic electricity output is a paltry 2 Gigawatt hours – equivalent to the energy in 1,000 barrels of oil – relative to the 450+ Gigawatt hours of electricity generated by oil. <https://www.iea.org/statistics/?country=SSUDAN&year=2016&category=Energy%20supply&indicator=RenewGenBySource&mode=chart&dataTable=RENEWABLES>

3 An estimated 22 mobile cellular subscriptions per 100 people, with many users having multiple subscriptions. <https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=SS>

4 Budde (2018) *South Sudan – Telecoms, Mobile and Broadband – Statistics and Analyses*, available at <https://www.budde.com.au/Research/South-Sudan-Telecoms-Mobile-and-Broadband-Statistics-and-Analyses>

5 8.6% in 2017, according to the World Bank. <https://data.worldbank.org/indicator/FX.OWN.TOTL.ZS?locations=SS>

6 China has eclipsed the US in scientific research output and continues to close the gap with the US in global innovation rankings, according to the World Intellectual Property Organization: https://www.wipo.int/pressroom/en/articles/2018/article_0005.html

existing US-based internet platforms.⁷ As South Sudan and neighboring nations turn to China for infrastructure and financial assistance, it is likely that they will follow the lead of countries like Kenya and

Angola and source advanced technology – including domestic surveillance systems – from China’s market-dominating artificial intelligence export industry.⁸

‘Peering’ into the future: Technology in South Sudan by 2050

As a whole, technology is generally seen as being value-neutral and capable of being used to ameliorate or exacerbate the economic, social cohesion, political, and climate change-related challenges facing South Sudan. The ways in which technology influences South Sudan’s development depend upon how its citizens and leaders use it in a future shaped by the accelerating pace of global technological change.

How is technology likely to affect South Sudan’s economy?

Widespread adoption of renewable energy sources including solar, wind, bioenergy, hydro, and geothermal have the potential to revolutionize electricity provision to underserved populations. By 2020, wind power and solar photovoltaic systems are projected to be consistently less expensive sources of new electricity compared to fossil fuels, with cost reductions for renewable technologies projected to continue for the foreseeable future.⁹

South Sudan has abundant hydropower potential¹⁰, but the scale of investment required to realize its ambitious hydroelectric development plans – to say nothing of the disruption that these plans would entail for rural livelihoods and ecologies – is daunting given the country’s instability. Off-grid electricity is already common in cities in the form of diesel-powered generators, but increased adoption of cheaper and more reliable decentralized renewable energy sources – particularly solar power¹¹ – will almost certainly reshape economic life in rural areas.

Increasing availability of renewable-energy based electricity will enable the development of related markets dependent upon electricity-consuming technological devices such as smartphones and next-generation mobile internet-based technologies. The cost of computers, mobile phones, and other internet-connected devices should continue to decline, and if South Sudan follows global trends, we can expect the speed of internet connections to increase and the cost of access to decrease. 5G technology¹² is expected to rapidly transform data and device management and the mobile phone/

⁷ Reddit is partly owned by a Chinese firm, and the US government is pushing the Chinese company that owns Grindr to sell it over fears that foreign access to sensitive information about US citizens threatens national security.

⁸ E.g., <https://www.nytimes.com/2019/04/24/technology/ecuador-surveillance-cameras-police-government.html>

⁹ International Renewable Energy Agency (2019). *Renewable Power Generation Costs in 2018*. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/May/IRENA_Renewable-Power-Generations-Costs-in-2018.pdf

¹⁰ The Norwegian Development Agency had developed plans for a hydro electric project just upstream from Juba, during the Addis Ababa peace period (1972–1983) which would utilize turbines below the surface of the Nile, but when this project was brought to Parliament in 2006 for approval, it was refused as it would not include a visible dam. “How will the Arabs in Khartoum know we have a hydro electric capacity if they cannot see a dam?”

¹¹ United States Institute of Peace (2018). *South Sudan’s Renewable Energy Potential* <https://www.usip.org/publications/2018/01/south-sudans-renewable-energy-potential>

¹² <https://searchnetworking.techtarget.com/definition/5G>

data industry. So as in the case of more undeveloped economies benefiting from technology gains (i.e. no investment in landlines in South Sudan – from nothing to mobile networks with greatly reduced time stress, infrastructure and lower costs) the transition to 5G may be transformative in South Sudan. 5G is expected to generate a variety of new applications, uses and business cases as the technology is rolled out.¹³

Broadly, citizen access to information is likely to increase as radio, television, and internet-based media continue to grow to satisfy the needs of a larger and more globally connected South Sudanese population. We can expect access to information to continue exhibiting an urban/rural divide, as full participation in the South Sudanese information economy is facilitated by the communications devices, cash-based economies, and higher education levels most prevalent in cities. While internet-based learning platforms offer a wealth of educational content to supplement formal education, rural and urban poor South Sudanese are not well-positioned to benefit from these technologies due to lack of money, network connectivity, and fluency in the languages of instruction.

Emerging mobile phone-based financial technologies could change how South Sudanese pay for goods and services, secure loans, and manage the foreign remittances that constitute a critical source of the country's foreign currency.¹⁴ The historically high cost of cross-border transactions is likely to be reduced as the currently dominant financial service firms compete with multinational technology firms offering more favorable foreign exchange rates. The prospect of stable global digital currencies such as Facebook's proposed Libra could

potentially mitigate some of the difficulties posed to South Sudanese consumers by the nation's weak currency and highly variable exchange rates,¹⁵ while ceding some of the state's monopoly on domestic fiscal matters to foreign-owned technology firms. Existing and future cryptocurrencies are likely to be used to facilitate effectively untraceable bribes and payments for contraband as well as payments for legal goods and services.

South Sudan's educated diaspora based in regional and global centers of technology innovation are poised to reshape the country's economy through their understanding of how emerging technologies can be leveraged in South Sudanese contexts. Though there are handful of foreign-subsidized tech initiatives based in Juba, it may be some time before South Sudanese technologists attract foreign venture capital with future versions of the agricultural and financial innovations presently drawing global investment in Nairobi.

How is technology likely to affect social relations?

Just like everyone else in the world, South Sudanese primarily use communications technology to build and maintain social connections. For South Sudan's large diaspora community and the one in three South Sudanese who have been displaced by the current conflict,¹⁶ communications technologies will continue to provide an invaluable link to family, friends, and potentially life-saving news and resources.¹⁷ Research into how South Sudanese use communications technology in the context of the current civil war tends to focus on divisive, identity-based hate speech on social media platforms,¹⁸

¹³ Each generation of cellular technology is separated by not just their data transmission speed, but also a break in encoding methods which requires end-users to upgrade their hardware. 4G can support up to 2Gbps and are slowly continuing to improve in speeds. 4G featured speeds up to 500 times faster than 3G. 5G can be up to 100 times faster than 4G.

¹⁴ The World Bank estimates that remittances are 35% of the country's GDP. <https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=SS>

¹⁵ E.g., the Libra White Paper: <https://libra.org/en-US/white-paper/#introduction>

¹⁶ Per UN-OCHA 2018 estimates. https://reliefweb.int/sites/reliefweb.int/files/resources/South_Sudan_2018_Humanitarian_Needs_Overview.pdf

¹⁷ A 2018 Harvard Humanitarian Initiative study finds internet connectivity plays a critical role in the lives and well-being of refugee populations. https://datasociety.net/wp-content/uploads/2018/04/Refugee_Connectivity_Web.MB4_8-2.pdf

¹⁸ For instance, multiple social media hate speech reports published by Peace Tech Lab in 2017. <https://www.peacetechlab.org/combating-online-hate-speech-main>

disproportionately representing aggressive voices from the internet-connected diaspora. Regardless, the future tone of South Sudanese social media discourse will continue to be influenced by the underlying logic of social media business models: if user engagement continues to be monetized through advertising which incentivize the spread of outrage-inducing content, online discourse will trend toward divisiveness.¹⁹

South Sudanese will continue to face the same high-level challenges confounding all people connected to the global internet – namely, the spread of malicious propaganda via social media, “deepfakes” which cannot be easily distinguished from accurate content, and the growth of identity- and ideology-based “echo chambers” insulated from outside and credible information sources. As long as South Sudanese rely upon popular internet communication platforms owned by foreign companies, the country’s future information landscape will be affected by external legal decisions and regulations of these businesses’ practices (e.g., Europe’s General Data Protection Regulation (GDPR), potential antitrust action in the US).

Given the emergence of regionally developed technological innovations like mobile banking and mobile-phone based medical diagnostics, it is likely that South Sudanese find increasing utility in using technologies developed by engineers solving problems unique to the Global South. Additionally, it is possible that the presently dominant US-based technology platforms will be replaced by regional- or non-Western platforms which better appeal to South Sudanese user preferences or are willing to comply with authorities’ demands for information about the platforms’ users.

How is technology likely to affect relationships between citizens and authorities?

Social media has proved to be an effective social mobilization tool and will likely continue to be used to unite disparate groups toward common purpose. Well-documented tensions between citizens and authorities regarding free speech will likely continue – authorities worldwide have a history of restricting access during incidents or periods of civic stress, to electricity, mobile networks, and individual internet sites to limit communication among citizens, and are now acquiring increasingly sophisticated tools to monitor citizens.

Encrypted messaging applications should continue to be among the technological means by which citizens mitigate the surveillance of private communication.

While it is impossible to project the relative future balance of power between authority surveillance versus citizen information-sharing capabilities, hardware and software companies will continue to face pressure to create “backdoor” access to user information as well as produce censored versions of their products.²⁰ Contrary to social media companies’ stated missions to empower people to build global communities,²¹ their business models depend upon authority-friendly surveillance algorithms used to serve targeted, behavior modifying advertisements to individual users.²² Global artificial intelligence leader China is reportedly pioneering the export of facial recognition and social media monitoring technologies to authorities in Africa and Asia in order to quell discontent, manage protest, control ethnic minorities, and delegitimize political opponents.²³ Authorities facing restive populations or governance crises will continue to be ideal customers for such technologies.

¹⁹ Zuboff, S (2015) *Big Other: Surveillance Capitalism and the Prospects of an Information Civilization*. Journal of Information Technology, 30. <https://link.springer.com/article/10.1057%2Fjit.2015.5>

²⁰ E.g., Google has built a China-specific censored internet search engine to comply with Chinese Communist Party guidelines.

²¹ E.g., Facebook’s Mission Statement: “Give people the power to build community and bring the world together.” <https://www.facebook.com/notes/mark-zuckerberg/bringing-the-world-closer-together/10154944663901634/>

²² Deibert, R (2019) *The Road to Digital Unfreedom: Three Painful Truths About Social Media*. Journal of Democracy, Volume 30, Number 1. <https://muse.jhu.edu/article/713720/pdf>

²³ Feldstein S (2019) *The Road to Digital Unfreedom: How Artificial Intelligence is Reshaping Repression*. Journal of Democracy, Volume 30, Number 1. <https://carnegieendowment.org/files/201901-Feldstein-JournalOfDemocracy.pdf>

How can technology help manage risks associated with shocks?

Technology has great potential to continue helping citizens, authorities, and aid organizations better understand and coordinate responses to complex emergencies. Improvements in established technologies such as weather and famine forecasting will continue to help South Sudanese by providing advanced warning of life-threatening events and coordinating more precise responses. Emerging technologies such as delivery drones have the potential to deliver life-saving supplies to people unreachable due to cost, lack of transportation

infrastructure, or conflict. Private and humanitarian logistics operations will increasingly be augmented by sophisticated algorithms which could reduce the current inefficiencies and unknowns that drive the high cost and risk of working in South Sudan.

However, emerging technologies will almost certainly also be used in ways that will contribute to instability or otherwise result in unintended negative outcomes. For instance off-the-shelf drones are cheap and effective weapon of war,²⁴ and even the most sophisticated and thoughtfully designed humanitarian algorithms can lead to decisions that amplify inequality²⁵ or put people at grave risk.

What does all this mean for the aid community?

The ever increasing speed of technological innovation will play an outsized role in shaping South Sudan's future economic, social, political, and humanitarian developments. Current trends indicate that as South Sudan nears 2050, technology will:

- **Fundamentally alter the ways in which citizens, authorities, and the aid community interact with each other** by providing new avenues through which these groups communicate and negotiate relationships of power. Citizens may use technology to demand greater transparency from authorities and aid actors. Authorities may use new technologies to surveil and influence citizens and aid actors. Aid actors may use technology to improve aid delivery while guarding against physical and philosophical threats to their operations.

- **Overhaul the means through which aid is delivered** through processes that are more efficient, evidence-based and participatory. In terms of logistics, technology should facilitate improved inter-organizational coordination, reduced administrative overheads, increased demand forecast accuracy, and optimized distribution systems. Increased access to mobile-based technologies may empower South Sudanese to demand a greater role in aid organization decision making and practices.
- **Pose existential questions to the aid community** if the scale of humanitarian need does not abate significantly. If the most experienced practitioners using cutting edge technologies cannot effectively manage complex emergencies, perhaps the underlying assumptions or fundamental approaches to aid delivery in South Sudan require a complete overhaul.²⁶

²⁴ E.g., Yemeni rebels' use of cheap drones. <https://www.wsj.com/articles/mideast-insurgents-enter-the-age-of-drone-warfare-11556814441?shareToken=stb4d012f88e2d444f8a056823ae80ffca>

²⁵ E.g., Cathy O'Neil's 2016 book *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*

²⁶ E.g., The Overseas Development Institute's 2016 report *Time to Let Go: Remaking Humanitarian Action for the Modern Era*. <https://www.odi.org/sites/odi.org.uk/files/resource-documents/10422.pdf>

The Conflict Sensitivity Resource Facility (CSRF) develops and tests innovative approaches to helping the aid community in South Sudan better integrate conflict sensitivity into their work. The Facility, which is funded by the UK, Canada, Switzerland and the Netherlands governments, supports the building and practical application of knowledge around conflict sensitivity through research, analysis, trainings, mentorship and dialogue.

Conflict Sensitivity Resource Facility South Sudan, Juba, South Sudan

info@csrf-southsudan.org

www.csrf-southsudan.org

Cover photo: Livestock at the river Nile in Bor, South Sudan 2011.

© Martina Santschi



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Foreign Affairs FDFA



Global Affairs Canada
Affaires mondiales Canada



Kingdom of the Netherlands