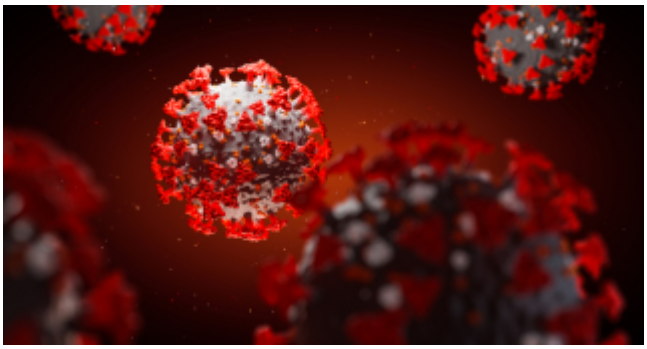
Small Island Developing States, COVID-19 and Digital Technology



Posted by David Fellows[1] and John Leonardo[2]

The impact of COVID-19

COVID-19 has changed behaviour throughout the world and social distancing has been the key driver. Workers in factories, shops and offices have been protected by creating greater space between workstations, erecting protective screens and using protective clothing. Distancing requirements have been introduced in bars, cafes, restaurants, hotels, markets and shopping centres. All economies have suffered, especially the hospitality industry, air travel and public transport. Unemployment has soared. Schools and higher education colleges have closed. Many countries are turning to the IMF for support.

The internet has proved a beneficial facilitator of economic

activity, allowing most administrative work and the ordering of goods and services to be undertaken at home. Video conferencing has facilitated meetings with colleagues, business partners and clients, and helped maintain contact with friends. Online learning has featured in reopening plans for higher education and some schools. In this new world digital technology has achieved an elevated significance beyond its already pervasive presence in the pre-COVID era. In some ways it has already established a new normal.

This brief piece focuses on small island developing states (SIDS) but even here the challenges are not identical. Some countries depend heavily on a now-dormant tourist industry and shoulder severe difficulties. These include poverty, remoteness, disbursed communities and the need to combat the threat of natural disasters. The virus demands a minimisation of personal contact for which the absence of good quality, low cost digital communication leaves many states poorly prepared. The UN E-Government Survey 2020 notes that of the SIDS only Singapore and Bahrain have high overall scores; almost half scored less than 50% of Singapore's score for infrastructure.

Communication infrastructure

Good quality digital communication requires fibre-optic broadband cabling to support business use and homeworking with adequate resilience, even including 4G and Wi-Fi. 5G is costly and has potential shortcomings at present. This option requires specialist advice.

Understanding behaviour is important to government strategy. Contributing factors include levels of public education,

affluence, user tariffs and local cost factors. Lobbying based on knowledge of the operational intentions of the marine cable-laying industry could be important.

Regional collaboration could provide impetus to network improvement strategies, regulatory frameworks and licensing agreements.

Technology applications

The digital service revolution discussed above and already taking place across the world, accelerated by the onset of COVID-19, is inescapably relevant to SIDS. There are many specific business applications of relevance to SIDS, including: health advice (including C-19) and personal consultations; agricultural monitoring and market information on crops and livestock; and weather monitoring for fishing, agriculture and general safety considerations. Additionally, expatriate monetary transfers are being undertaken increasingly using digital systems. The creation of digital services relevant to developing countries gathers pace and must be encouraged.

Video conferencing, email and document handling systems provide an essential communication layer that is particularly useful to achieve social distancing.

Apart from their use of major business applications governments can make use of social media for public messaging, for instance, demonstrating transparency and engaging citizens the struggle against corruption when resources are so scarce.

Technology skills

Digital communication infrastructure must be complemented by a capacity for: upgrading, expansion and rerouting of infrastructure; installing application software; implementing major software packages; and even the development of service applications. This requires learning at various levels gained from school, college, in-service courses and practical experience.

An understanding of the technology is also required to educate potential adopters about the possibilities that digital communication offers them. This includes the general public, small businesses, the public sector and larger private sector organisations.

Digital technology skill development is essential to help SIDS adjust to the current situation.

Towards cost-effective solutions

COVID-19 is forcing change to the way people live throughout the world and economies are in crisis. Digital communication offers the capacity for helping maintain business continuity. Most SIDS would benefit from a higher standard of affordable digital communication supporting improved digital service delivery.

Digital technology must be designed to the needs and circumstances of individual states. Nevertheless, there could be much to gain from cost-effective collaboration between SIDS

for the purposes of sharing and developing:

(i) an understanding of the economic and social impact of COVID-19 and ways of mitigating these effects through digital communications;

(ii) market-shaping policies and practices for increasing the availability of digital communication at an affordable price;

(iii) strategies and programs to support the provision of expertise in digital technology and its use by business, public services and the general public; and

(iv) knowledge of relevant progress made on these issues throughout the world.

Such an initiative, whether on a global or regional basis, could include SIDS, development agencies, the digital service industry, other private sector partners and potentially the Commonwealth Small States Centre of Excellence. Is this a step too far?

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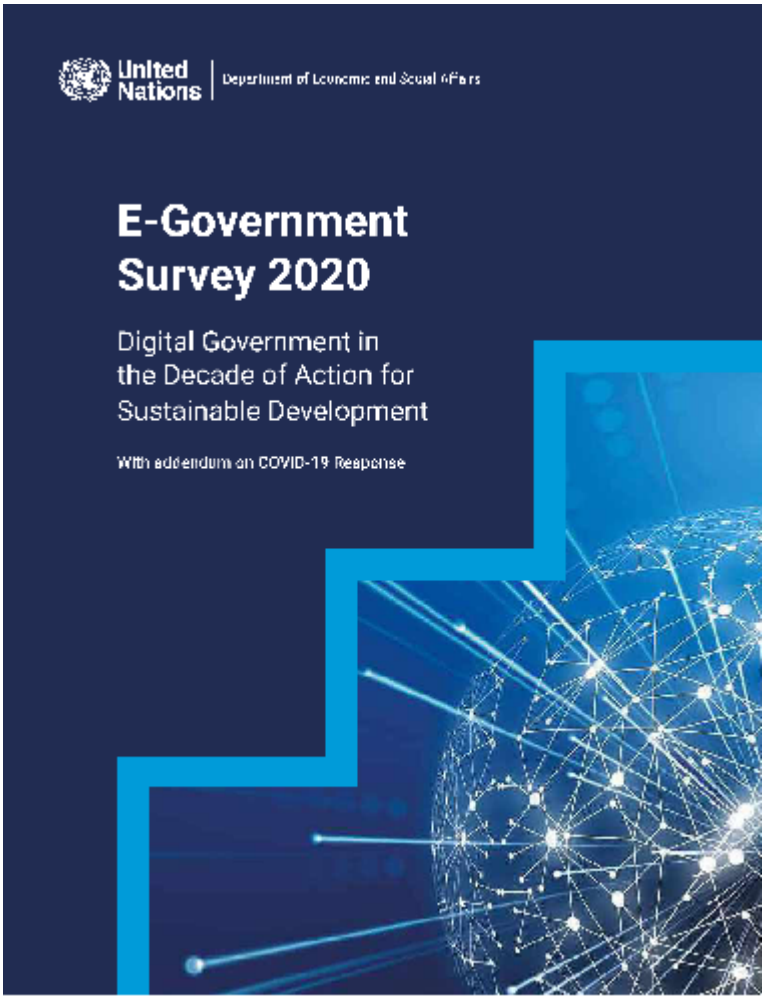
World e-government coverage remains limited



World e-government coverage remains limited according to the 2020 edition of the United Nations E-Government Survey which was released on 10 July 2020 (1). This is in spite of most countries and municipalities currently pursuing digital government strategies, many with innovative initiatives.

The 2020 ranking of the 193 UN Member States in terms of digital government – capturing the scope and quality of online services, status of telecommunication infrastructure and existing human capacity – is led by Denmark, the Republic of Korea, and Estonia, followed by Finland, Australia, Sweden, the United Kingdom, New Zealand, the United States of America, the Netherlands, Singapore, Iceland, Norway and Japan.

Among the least developed countries, Bhutan, Bangladesh and Cambodia have become leaders in digital government development, advancing from the middle to the high E-Government Development Index (EGDI) group in 2020. Mauritius, the Seychelles, and South Africa are leading the e-government ranking in Africa. Overall, 65 per cent of Member States are at the high or very high EGDI level.

In responding to the health emergency, governments have put in place new tools, such as dedicated COVID-19 information portals, hackathons, e-services for supply of medical goods, virtual medical appointments, self-diagnosis apps and e-permits for curfews. Many countries were quick to deploy tracking and tracing apps, and apps for working and learning from home.

Innovative digital government responses to COVID-19 include online dashboards in Canada and Australia to share information and track emergency responses. In China, chatbots are used to assess patients' risk of being infected. A community engagement app in Estonia allowed local governments to directly interact with their constituents, including through sharing COVID-19 information, posting photos and videos and even organizing virtual events. In Croatia, a "virtual doctor" is powered by artificial intelligence and developed by technology firms in cooperation with epidemiologists. In London, the use of cameras, sensors and AI algorithms, normally intended to control traffic, now measures distance between pedestrians to control social distance.

E-government progress still

hindered by digital divide

As a development tool, the E-Government Survey examines countries' strengths, challenges and opportunities, and informs policies and strategies. The 2020 edition found that progress has been made across all regions, even in the least developed countries. Over 22 per cent of countries were promoted to higher levels of e-government development.

Yet, despite the gains and major investments in e-government by many countries, the digital divide persists. Seven out of eight countries with low scores are in Africa and belong to the least developed countries group. The regional average index scores for countries in Africa are almost one third lower (at 0.3914) than the world average EGDI of 0.60.

Alongside these trends, the COVID-19 pandemic has now not only reinvigorated the role of digital government in its conventional delivery of public services and in ensuring business continuity, it has also brought about innovative ways in managing the crisis, such as in contact tracing, e-health, online learning, and remote working.

About the UN E-Government Survey

The UN E-Government Survey, published by the UN Department of Economic and Social Affairs (UN DESA), is prepared over a two-year period following an established methodology. It looks at how digital government can facilitate integrated policies and services across 193 UN Member States. The Survey supports

countries' efforts to provide effective, accountable and inclusive digital services to all and to bridge the digital divide and leave no one behind.

(1) This blog is an amended version of the accompanying UN press release

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Virtual Schooling in the United Kingdom

by David Fellows (1)

The closure of schools to combat Covid-19 is a dramatic response to the virus that presents significant challenges concerning the continuity of education and the pupil/teacher relationship. This article offers some thoughts on the application of digital technology to support school-aged education at home whether made available by their normal school or stand-in facilities that come to market. Reference is made to virtual schools already in existence, home schooling networks and relevant BBC materials that are already available.

The Virtual School

Schools in the UK are at different stages in their use of digital communication. The Covid-19 virus lockdown involving school closures is both a challenge to the continuity of education and an opportunity for schools to extend the range and sophistication of teaching aids, methods of communication with pupils and parents and collaboration within the teaching community.

The technology requirements necessarily follow the interactions between the teacher and the student: programmes of learning; lesson plans and notes; conversations between teachers and pupils (both on a personal basis and open dialogue for class participation); the provision of source material; the setting of course work questions, the submission of responses and the return of work with marks and comments; examinations set and taken; student records maintained and reports issued. All these interactions can be provided in formats devised by the teacher or supplied by developers.

Online document stores(e.g. Dropbox, Google Drive) can be used for distributing: programmes of work; lesson plans; teacher's introducing the year, term, week or learning programme via video recording; video recordings of lessons (the presenter need not necessarily be the teacher); lesson notes and with references to supplementary material that can be found in text books or on the web; work sheets for online completion; or headers for projects and essays. All this may need adult support for younger pupils.

Document handling systems can be used for: questions of clarification and answers from teacher (transparent to whole class); lodging responses to assignments (allowing teachers to see at a glance who has returned an assignment and who has not); tick-box answer sheets; and class performance records held confidentially by teachers.

Video conferencing (e.g. WebEx, Skype, Zoom) is an excellent medium for: small groups working on difficult assignments and personal interactions between pupil and teacher.

Email is a good all-purpose facility. It can be used for: general document handling; the return of marked assignments; following up outstanding work; and dialogue between teachers and parents (e.g. parents advising of pupil's illness). It can fill virtually any gap in systems under development.

Social media can facilitate: short affirmative comments from teachers on class progress; general feedback from pupils/students on topics, levels of difficulty, pace of learning; and general feedback from parents on demands placed on them but the tenor of these exchanges should be upbeat if they are to be sustained and this should be made clear at the

outset.

Communities of practice can be developed between teachers using these facilities. For teachers the medium lends itself to sharing materials with colleagues.

This approach can be adapted to virtually every level of primary and secondary learning. Primary needs to bind in parents to a much greater degree in earlier years and the technology may present challenges when applied to entry level although small group teaching by video conferencing with adult support at home could prove practicable with a preparatory session for adult helpers prior to a group of lessons on a particular topic. It has to be accepted that equipment must be available either from home, school, library or community centres (it has to be acknowledge that communal facilities may not be available).

Acquiring Proficiency

The starting point for the development of virtual schooling will depend on current use of the technology by individual schools. With encouragement by head teachers and centres of expertise within the teaching body and through external support arrangements rapid progress is perfectly feasible. Costs can be quite limited at the outset and as the proficiency of teachers and students develops through experience decisions can be taken about increased sophistication of design concept and technology.

The processes and formats will develop naturally through

familiarity and experimentation. Pupils and parents can be expected to offer useful contributions. At each stage of development some institutional choices will need to be made concerning objectives, facilities, management and technology to avoid the aggregation of a multitude of systems, licenses, technology support arrangements and the dissipation of expertise. Nevertheless, scope for personal choice by groups of users is likely to facilitate adoption and improvement.

Learning from Others

There are a variety of universities in the UK and around the world that offer online courses and together with the UK's Open University (operating largely as a virtual college) they offer a great deal of readily accessible experience.

Specifically focusing on the UK's primary and secondary school sector there are a number of institutions offering material and advice:

- The BBC offers an extensive package of content for both primary and secondary pupils in its Bitesize series. GCE level material is tailored to the various examination bodies. Details can be found at: www.bbc.org.uk/bitesize . This material could be used as the basis of school-directed home working. The BBC has announced its intention to expand this service following the Covid-19 school closure announcement.

- There are also several groups that use the internet to support those families that have opted for home education as a long-term preference, including: The Home

Education Network and Home Education UK.

Australia has several institutions that have developed into virtual schools and these could be used as models by UK schools that wish to continue to direct the work of pupils registered with them during the closure period:

- Western Australia's School of Isolated & Distance Education (SIDE) supports students in remote areas, students living with their families abroad and those whose lives (say in the artistic field) are difficult to reconcile with conventional school attendance. Digital technology is used for: online learning management (Moodle System); conferencing (WebEx); and a learning materials library. Email is used as a general communication medium. There is also a site that provides parents with insights on student progress, assignment deadlines and school events.

A brief overview of the School can be found on Western Australia's Department for Education site at: www.det.wa.edu.au. The School has an extensive site at: www.side.wa.edu.au.

- The School of the Air was formed out of the Flying Doctor Service and is based in South Australia. Its ethos is one of immediacy of communication with its students. It uses WebEx for conferencing and Google Drive for materials. Its 25th Anniversary Report describes the origins and development of the School up to the present day. It can be found at: www.openaccess.edu.au.

Conclusions

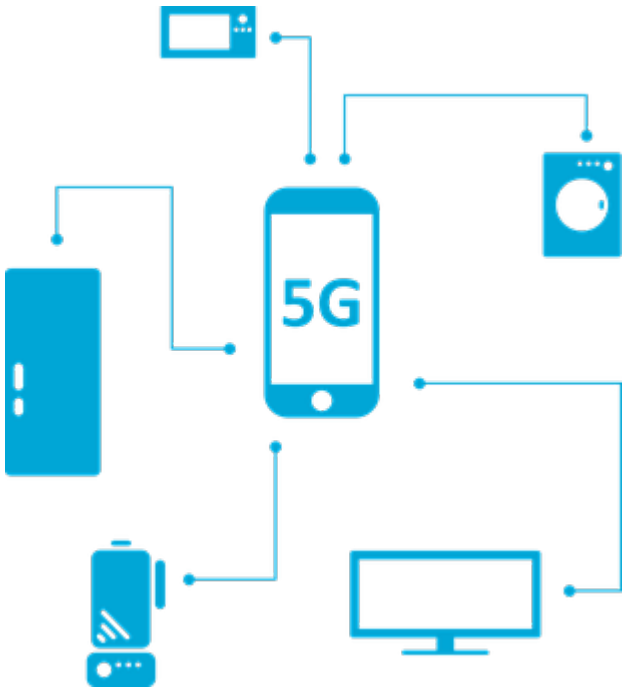
The use of document storage and handling systems for educational purposes is not complex but they can benefit from development and refinement following experience. The technology lends itself to the refinement of processes, editing of instructions and repurposing of teaching materials. The preparation of video-based presentations is feasible on various platforms as is video conferencing which can range from an inexpensive and simple format to more expensive offerings with a variety of sophisticated features.

The key issues for users to resolve include the rules of engagement, the choices of technology and the degree of uniformity in approach to be adopted within an institution. There is clearly scope for some initial commonality followed by experimentation and realignment in an iterative process.

Online communities of practice for teachers (and even for parents) may well be helpful to support continued development and problem-solving. School closures in Europe and now in the UK make this a regrettable but necessary moment that requires rapid progress in this field. The key challenge is getting the development process right: loose enough to draw the virtual communities of a school together giving them the opportunity to offer their contributions to the development of the initiative but tight enough to provide a thread of coherence and communal learning at school level. Importantly, where a virtual school is created out of an established day school under temporarily closure then it must find ways of retaining its ethos and identity. This represents an exciting and potentially rewarding challenge borne out of a grave situation.

[1] David Fellows is a specialist in public financial management and digital government reform. He has written various articles on Digital Communication including an outline proposal for the creation of an international public service academy. He is a director of PFMConnect Ltd (based in London, Liverpool and Brisbane) and a recipient of the Swedish Prize for Democratic Digital Service Delivery.

Progress with 5G Digital Coverage in the UK & Developing World Implications



Smartphone Technique

by David Fellows [1]

The 5G mobile communication offers the prospect of high bandwidth reception for rapid video downloads, gaming, instant replay coverage at major sporting events and simultaneous service to heavy concentrations of digital devices. It is a highly topical subject across the world including developing countries.

This article tempers expectations of widespread 5G coverage in developed countries on grounds of financial viability and suggests that developing countries are better served by centring digital infrastructure investment on broadband cable and lower frequency 4G mobile services.

Digital Communication costs and coverage

I start by introducing a sense of realism about internet speeds and coverage by looking at actual practice in the UK which has reasonably average internet services for a developed country.

Table 1: UK internet speeds

User	Mobile	Fixed Line	Comments

Personal devices	4G (15/30 Mbps) 5G (2/100+Mbps)	Approx 30 Mbps (usually advertised as 50)	4G reaches 75% to 90% of the population depending on provider. 5G has hardly started(see discussion below). All-fibre cabling of 120 Mbps will become common in the next decade.
Small/ Medium businesses	–	100Mbps/ 1000Mbps	In this group call centres tend to need the higher capacity
Major businesses	–	1000Mbps+	

Note: 4G speed depends on provider and time of day [2], the better the infrastructure provision the better the service. 5G is said to relieve congestion although this too is infrastructure-dependent (see Table 3). For some time to come, even in developed countries, 4G will outstrip 5G coverage by some considerable margin.

In 2016 Universities of Cambridge & Madrid undertook a study [3] into the viability of introducing 5G mobile communication in the UK. Tables 2 & 3 summarise some conclusions from the study.

Table 2: UK Demographic Profile (total population 63 million)

Settlement Type	Proportion of Population (%)	Approximate Distribution of Total 5G Cost (%)
Urban	8	2
Suburban	62	19
Rural	30	79

Notes: (i) total cost adds capex & opex (see Table 3 below); (ii) the study anticipates that the roll out of 5G will take place over the next decade.

Table 3: 5G Options for UK (selected from UC&M study)

Aspect	Option S2 £bn	Option S5 £bn	Option S8 £bn
Features	One 50Mbps network sharedby 4 operators	Using competitive 50Mbps networks except for ruralareas where a shared 50Mbps rural network applies	Using two 50Mbps networks shared by 4 operators except for rural areas where a shared 10Mbps network applies
Capital Cost	22	24	15

Revenue Cost (10 yr NPV)	13	17	10
Study Conclusion	Not viable; Scotland is dramatically more expensiveexcept for S8	Not viable; Scotland is dramatically more expensiveexcept for S8	Not viable; the lower rural bandwidth avoids the cost rising exponentially to cover the final 10% of population

Notes: (i) M**ost 5G signals are highly directional, require a direct line-of-sight between the antenna and the device receiving the signal and can be absorbed by humidity, rain, and physical object including trees, therefore they don't travel as far as the more robust, omnidirectional 4G signals (as a result they require very high aerial density and present problems for some applications under discussion such as driverless vehicles)** [4]; (ii) 5G networks can make use of existing 4G aerial stock and cable support but the higher aerial density makes the transition from 4G very expensive; (iii) the cost of covering the most expensive 10% of population at 50Mbps is equivalent to that for the first 90%; (iv) the study assessed the total cost (capex & opex for 10years) of 5G coverage for the UK's rail and motorway networks would be £0.922bn & £0.253bn respectively.

Part way through 2019 several UK mobile service providers have commenced or announced their intention to provide 5G coverage. Some have published city roll-out programmes although details

of schedules, geographical boundaries and bandwidth are sketchy at present. None of this equates to a city-wide coverage commitment let alone national coverage. Unsurprisingly the focus appears to be areas of potential high traffic where improved service reliability will be the driving advantage. Available bandwidth could be as low as 2Mbps for entry level packages.

5G services may be offered for pop concerts, major sporting events, shopping malls, some public buildings and crowded city centres. Some of the infrastructure could be provided by venue owners or organisers as Wi-Fi is at present.

The European Union produced a policy document '5G for Europe: An Action Plan' in September 2016 that seeks to drive progress towards realising substantial financial benefits from the technology. The Action Plan, quoted in a recent review of the Commission's achievements, seeks to harmonise European preparations giving priority to infrastructure coverage of major urban areas and transport routes by 2025.

Implications for Developing Countries

1. Given the financial viability challenges in developed countries such as the UK it is clear that rolling out 5G services in developing countries will be hampered to an even greater extent by the financial returns required to support infrastructure provision.
2. 4G coverage is indisputably more readily viable than 5G and is a more obvious objective for developing countries for the foreseeable future. Governments need to consider their bandwidth licencing programmes accordingly.

3. Conventional public Wi-Fi systems can offer mobile text communication to supplement overloading of 3G and 4G reception in public areas with high demand for digital services.
4. In the author's opinion 4G mobile coverage and fibre-optic cabling of CBD areas for super high bandwidth communication offer the basis for viable digital communication strategies in developing countries.

General conclusions

1. At the present time commercial ambitions for 5G in the UK appear limited. The financial viability of the aerial installation costs on a large scale compared to 4G is a considerable constraint. For some time to come 5G may be largely confined to high income high demand locations and some venues where owners provide the necessary infrastructure as an added attraction. It is a solution waiting for a killer application or acceptance as a social status imperative. The current service and economic priority for mobile infrastructure must be the completion of 4G coverage. This reasoning would seem applicable throughout the world although it is reported [6] that Malaysia intends to adopt 5G fully by 2023. Malaysia is undoubtedly a leader in digital technology but this claim is something that requires clarification.
2. It is generally presumed that the long-term intention of 5G service providers is transmission speeds of 50+Mbps but at current revenue levels this form of coverage is deemed to be unviable in UK rural areas. The UC&M study suggests that shared rural networks operating at 10Mbps would reduce cost significantly and a broadly similar cost reduction could be achieved by omitting 10% of the population (equivalent to 33% of rural population) from 5G coverage. Even these two reduced service options

would still appear unviable assuming current service revenues.
3. The UC&M study hints that technologies under development may deliver significant cost savings for 5G provision although details of how this might happen are not well understood at present.
4. 5G viability in the UK and other developed countries would therefore seem to depend on some or all of: (i) restricted service provision targeting areas of high demand; (ii) technological advances bringing cost-savings; (iii) user willingness to pay higher fee rates for 5G than its predecessor services; and (iv) modest, possibly shared, bandwidth in rural areas.
5. Given these 5G service limitations, upgrading to 5G-enabled smartphones may be a nuanced decision for many users for some considerable time. Roll-out costs and user hesitancy will, in turn, impact commercial investment.

In My Opinion

1. Countries have much more to gain from improving the reach of 4G mobile communication than encouraging service provider interest in 5G roll-out which will be a niche offering for some years to come. Developing countries should not feel that they must jump now or miss the bus.
2. 5G mobile communication is not a natural alternative to fixed cable support for business purposes. In this market fibre optic broadband cable services offer the ideal of high bandwidth, service reliability and relatively low cost.

[1] David Fellows is a specialist in public financial management and digital government reform and is a director of PFMConnect. He is a recipient of the Swedish Prize for Democratic Digital Service Delivery.

[2] See: https://www.ispreview.co.uk/index.php/2019/02/countries-ranked-by-4g-download-speed-at-different-times-of-day.html

[3] See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/577965/exploring_the_cost_coverage_and_rollout_implications_of_5G_in_britain_-_oughton_and_frias_report_for_the_nic.pdf

[4] See: Lifewire https://www.lifewire.com/5g-vs-4g-4156322

[5] See: https://5g.co.uk/news/ee-5g-launch-plans-roadmap/4900/

[6] See: OpenGov Asia (10th September 2019): https://www.opengovasia.com/malaysia-will-fully-adopt-5g-by-2023/