



# POLICY BRIEF

## IMPACT OF DIGITAL TECHNOLOGIES AND THE FOURTH INDUSTRIAL REVOLUTION ON TRADE IN SERVICES



Task Force 1  
**TRADE, INVESTMENT AND GROWTH**

### Authors

JANE DRAKE-BROCKMAN, INGO BORCHERT, NIGEL CORY, ZIYANG FAN,  
CHRISTOPHER FINDLAY, FUKUNARI KIMURA, HILDEGUNN KYVIK-NORDÅS,  
MAGNUS LODEFALK, SHIN-YI PENG, HEIN ROELFSEMA, YOSE RIZAL  
DAMURI, SHERRY STEPHENSON, TU XINQUAN, ERIK VAN DER MAREL,  
MUSTAFA YAGCI

# موجز السياسة تأثير التقنيات الرقمية والثورة الصناعية الرابعة في ما يتعلق بتجارة الخدمات

فريق العمل الأول  
التجارة والاستثمار والنمو



المؤلفون

جان دريك-بروكمان، إنغو بورتشيرت، نايجل كوري، زيانغ فان، كريستوفر فيندلاي، فوكوناري  
كيمورا، هيلديغن كيفيك-نورداس، ماغنوس لوديفالك، شنن يي بنغ، روفسيماهاين  
رولفسيما، يوز ريزال داموري، شيري ستيفنسن، تو زينكان، إريك فان دير ماريل،  
مصطفى ياغسي



## ABSTRACT

Digital technologies are cutting trade costs for services, turning more services from non-tradables into tradables, and putting trade in services on a stronger relative growth path than trade in goods. Digital enablement of services depends on inputs of cross-border data flows, which are themselves growing exponentially. The shift to the digital economy has intensified during the COVID-19 pandemic as goods producers connect with customers via online platforms, and services like health, education, and entertainment are delivered online. Purchasing services offshore is not far behind, so e-service trade will likely continue to accelerate. However, regulatory frameworks are lagging, putting productivity gains at risk. We offer eight recommendations to the Group of Twenty (G20) leaders to start shaping a trade policy agenda for a digital future. For every nation to reap the benefits of the Fourth Industrial Revolution, sustained openness to international services trade, investment, and data flows is essential.

تخفيض التقنيات الرقمية تكاليف التجارة في الخدمات، وتحول مجموعة متزايدة من الخدمات من سلع غير تجارية إلى سلع تجارية، وتضع التجارة في الخدمات على مسار نمو أقوى نسبيًا من التجارة في السلع. ويعتمد التمكين الرقمي للخدمات على تدفقات مدخلات البيانات العابرة للحدود، والتي تنمو هي ذاتها نموًا مطردًا.

وقد شهد التحول إلى الاقتصاد الرقمي تطورًا كبيرًا خلال جائحة كورونا، حيث يتعامل منتجو السلع مع العملاء عبر منصات على الإنترنت. ويتم من خلال هذه المنصات تقديم خدمات صحية وتعليمية وترفيهية. لا يستغرق الأمر سوى إجراء خطوة بسيطة للشراء من الخارج. ولذلك، فمن المرجح أن تستمر وتيرة تجارة الخدمات الإلكترونية في التسارع. ولكن الأطر التنظيمية تعاني من التأخر - الأمر الذي يُعرض مكاسب الإنتاجية للخطر. نقدم هنا ثمان توصيات إلى قادة مجموعة العشرين للشروع في عملية صياغة جدول أعمال السياسة التجارية من أجل مستقبل رقمي. هذا ومن الأهمية بمكان الانفتاح المستمر على تجارة الخدمات والاستثمار وتدفقات البيانات الدولية، حتى تتمكن كل دولة من جني ثمار الثورة الصناعية الرابعة.



## CHALLENGE

The increasingly rapid uptake of digital technologies, like 3D printing (3DP), artificial intelligence, cloud computing, 5G, and the Internet-of-Things, is launching the global economy into the “Fourth Industrial Revolution” and the next wave of globalization (Montresor 2016).

As new global supply chains are being constructed, this time for services, tasks are being divided more finely, opening new entry points for poorer countries’ services exports. Digitally enabled services are stabilizing global production networks, helping offset the reshoring thrust, and rejuvenating traditional exports across agriculture, fisheries, handicrafts, and tourism, including through better matching of sellers and buyers and finance access provision. New trade opportunities are emerging for developing and advanced economies alike.

Digitally enabled trade (henceforth “e-commerce”) has become the major global trade growth story. As the digital age takes hold, services (already dominant in most domestic economies) are growing in importance in international trade, both in their own right and as a support to trade in goods (WTO 2019b). Digitalization renders an ever-increasing range of services tradable across borders via digital networks<sup>1</sup>; roughly 50% of traded services are digitally enabled compared with 15% of traded goods (McKinsey Global Institute 2016).

Trade in digitally enabled services, in turn, depends crucially on cross-border data flows, which are growing exponentially and now contribute more to global GDP growth than trade in goods and services (McKinsey Global Institute 2016). The development of international rules on cross-border data flows and Internet-based activities is becoming critical to firm-level competitiveness, including for small and medium-sized enterprises (SMEs). These developments raise major new challenges for digital-age trade, investment, innovation, and industry policy settings. Harnessing the gains from digital technology in the realm of trade, especially in services, requires multilateral governance and regulatory frameworks geared for the 21st century.

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1. Trade in services is defined in the WTO General Agreement on Trade in Services (GATS) as comprising four modes of supply: 1. cross-border supply; 2. consumption abroad; 3. commercial presence; and 4. movement of natural persons. Mode 1 is analogous to trade in goods, that is, it occurs when a service is delivered from one WTO member’s territory to another’s—this includes services supplied over digital networks. The WTO World Trade Report 2019 highlights the growth in mode 1 cross-border service delivery via electronic means. WTO documentation also sometimes refers to mode 1 as “online supply.” This paper also uses expressions generally adopted by services industries and in policy literature, that is, trade in “digitized” services or “digitally enabled” services or “e-services.”

## CHALLENGE

The Group of Twenty (G20) must address these challenges and ensure the potential growth in international trade flows, so that consequent global gains in economic growth and development are facilitated rather than stymied.

As highlighted in the Appendix, the COVID-19 pandemic has impacted domestic economic activity and global value chains in both goods and services industries. Its most important short-run effect has been an intensive push toward digitalization. The adverse effects of widespread social distancing measures have been mitigated through a range of digital technologies and cross-border services (from online education to e-signatures and new modes of communication); many activities that would otherwise have been shut down have stayed afloat. While recent reliance on online interactions exposes new privacy threats that need to be addressed, the benefits of digitally enabled services, which rely on unimpeded cross-border data flows, for ensuring business continuity and agility, have been clearly proved (WTO 2020c). A push for international standards and disciplines regarding cross-border data flows would lock these benefits in and provide the ground for ongoing growth of digitized services.

Managing this transition to digital trade and fully realizing its benefits in a mutually beneficial way requires policy decisions that allow trade to flourish while achieving domestic public policy objectives. G20 members should assume leadership by implementing a best-practice policy and establishing interoperable regulatory settings so that every economy can reap the digital age's productivity gains.

The following section presents our policy recommendations, which address challenges in the transition to digital trade and propose concerted action by the G20 on eight fronts.



# PROPOSAL

## 1. Clarify the definition of and update global rules for digital trade

**Challenge:** We have entered the digital age, but do not have a single recognized and accepted definition or means of measurement of digital trade yet.

**Solution:** G20 members need to urgently confirm their understanding that cross-border data flows fall under the definition of trade, as indicated by the draft UN Handbook on Measuring Digital Trade.

The concept of digital trade is broadly perceived as encompassing international trade enabled by digital technologies. The World Trade Organization (WTO) defines “electronic commerce” as “the production, distribution, marketing, sale or delivery of goods and services by electronic means” (WTO 1998). The extent to which this definition of e-commerce encompasses all aspects of digital trade needs to be clarified in the WTO, including how it interacts with international data traffic. G20 members should work together to hasten this process.

The digital transformation of trade and society has accelerated during the COVID-19 crisis, and public awareness of this is high. The G20 should take this opportunity to focus on steps to improve international governance in trade in digitally enabled e-services, in associated cross-border data flows, and in e-commerce, more generally.

Today, data flows are alongside or embedded in—one way or another—every trade transaction. Yet the WTO definition of trade does not explicitly include data flows. If and how to include them is debated<sup>2</sup>. To the extent that data flows are not yet universally understood or formally accepted as falling under the definition of services trade, and are hence governed by the GATS, a vital aspect of WTO reform is the development of a springboard for digital transactions that can be integrated into global trade governance. The draft UN Handbook on Measuring Digital Trade proposes including cross-border data flows that contribute to consumer welfare and can be measured as such (OECD/WTO/IMF 2020).

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2. One consideration is whether data flows fall under the definition of trade as a transaction between residents and non-residents. Another is that if transactions imply remuneration, non-remunerated data flows fall outside the scope of the statistical definition of trade. Yet non-remunerated data flows support and enable trade.

G20 members should confirm their understanding that cross-border data flows fall under the definition of trade. Data flows could then be integrated in the GATS framework relatively easily. We call on the G20 to play a leadership role on this aspect of WTO reform. Digital transactions must be streamlined urgently into global trade governance and need not be confined to the agreement on e-commerce.

## **2. Improve market access for e-services**

**Challenge:** Barriers to cross-border trade in digitally enabled services (mode 1) remain relatively high and, as evidence shows, are also intensifying. WTO members have made relatively fewer commitments to the liberalization of mode 1 when compared to the commitments they have made for other modes of service supply.

**Solution:** As a minimum, G20 members should come together to signal preparedness to initiate the first steps to increase transparency by voluntarily updating their GATS schedules to remove/replace references to mode 1 not being technically feasible and hence not applicable. One forum for this is the WTO, where plurilateral negotiations can be held toward arriving at an agreement on e-commerce.

In 2019, plurilateral negotiations were launched for a WTO agreement on trade-related aspects of e-commerce to “reduce the barriers around the world that threaten to undermine the growth of the digital economy” (WTO 2019a). The G20 needs to recognize the significance of these negotiations for developing solutions regarding e-services and lead a call for all WTO members to join as observers if not as full participants.

The Fourth Industrial Revolution is the world’s biggest and best opportunity for productivity gains, economic growth, and sustainable development. Maximizing opportunities requires connectivity for digitally enabled services. But evidence from the OECD Services Trade Restrictiveness Index shows that regulatory trends over the last three years constrained trade more than liberalizing it (Ferencz 2019), and the emerging digital economy is in danger of fragmentation rather than globalization. These trends need to be reversed.

The WTO negotiations on e-commerce offer an avenue for some potential solutions. All WTO members owe it to their own competitive futures to engage. It is important for WTO credibility that these negotiations include services market access. Data-intensive business services have been among the fastest growing components of world trade, delivering vital business inputs to all economic sectors. However, as illustrated in Figure 1, WTO members have made fewer services commitments under mode 1 (cross-border trade through digital networks) than for other modes, not only in the GATS and the Doha Round GATS offers, but also bilaterally in preferential trade agreements. Mode 1 (including electronic service delivery) is relatively more “unbound” across all groups of WTO members (Roy 2019).

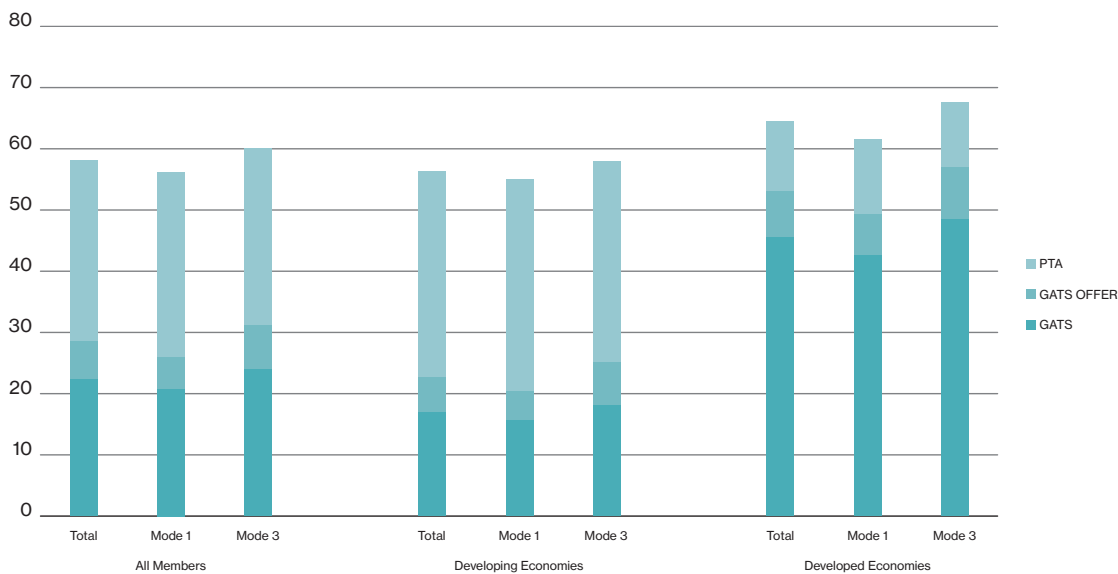


Figure 1: WTO Members' Services Liberalization Commitments

Source: Redrawn from data provided by the WTO Secretariat, Geneva (Fig 5, Roy 2011).



Irrespective of whether G20 members participate in the plurilateral WTO e-commerce negotiations, they can jointly grasp the low-hanging fruit and together signal a preparedness to initiate first steps to increase transparency with respect to mode 1. One approach would involve voluntarily updating the GATS schedules to remove and replace all references in the schedules to mode 1 not being technically feasible and hence not applicable.

### 3. Uphold the WTO moratorium on customs duties on e-transmissions

**Challenge:** The WTO moratorium has evidently contributed to digital trade growth. Efforts to raise revenue or promote domestic digital transformation by levying tariffs on electronic transmissions will likely be fraught with practical difficulties and major economic inefficiencies.

**Solution:** Value-added (VAT) or sales taxes offer alternative ways of raising revenue that may be vastly more efficient, practical, and equitable. The G20 should commission a joint study of options.

For 20 years, the global trading system has witnessed the widespread benefits of the absence of tariffs on e-transmissions. The soft law device, the WTO Moratorium on Customs Duties on Electronic Transmissions, has facilitated innovation everywhere, including the adoption of digital business tools by SMEs, which have enabled a major drop in trade costs, as well as the participation in global services value chains and take-off in business services exports (Makiyama and Narayanan 2019; Andrenelli and Lopez-Gonzalez 2019).

G20 members should confirm that levying of tariffs on electronic transmissions is likely to be fraught with practical difficulties and inefficiencies for the following reasons:

1. Taxes are best levied on a broad base and on goods and services with low demand elasticities. E-transmissions and online services are a small fraction of trade, and e-commerce tends to be price sensitive.
2. The technical difficulties (if not near impossibility) of tracking and taxing cross-border e-transmissions will render such revenue generation extremely cost-ineffective.
3. E-transmitted digitizable goods have very high services intensity and are increasingly different from their physical counterparts. For instance, while software (such as operating systems) used to be purchased bundled on CD-ROMs, operating systems nowadays resemble an interactive process with frequent updates and may reside entirely in the cloud. This is before considering the treatment of related services or applications that are notionally provided for free.

4. The value of 3DP computer-aided design files is hard to ascertain as it depends on the subsequent number of printings in the destination country.
5. Customs duties on e-transmissions would not address concerns about various forms of digital divides or tackle the problem of the lack of digital competitiveness among firms in developing countries. On the contrary, imports of “digitizable products” like software help current and prospective developing country exporters improve production processes and enhance quality and competitiveness of their export goods and services.

In the digital age, VAT or sales tax may also be more practical revenue-raising alternatives to customs duties (WTO 2020a and 2020b). The G20 should commission a joint study of the above factors.

#### **4. Adopt principles for domestic regulation of services**

**Challenge:** Regulatory differences arise as governments pursue their legitimate right to regulate for public policy purposes, but differences often involve inefficiencies that raise trade costs for service providers, more so for SMEs.

**Solution:** All G20 members should adopt regulatory principles that facilitate trade in services, including for SMEs, while protecting consumers and privacy. Looking beyond the anticipated adoption of the outcome of the WTO Joint Initiative on Services Domestic Regulation by WTO Ministers, the natural starting point is to revisit the WTO Reference Paper on Telecommunications.

Significant services trade costs result from compliance with regulatory differences in export jurisdictions. These costs are often independent of export value and hurt SMEs more than large enterprises. Even reasonable, necessary regulation may constitute insurmountable trade costs for SMEs merely because they differ from equivalent domestic regulation. These costs can be eased through regulatory cooperation and mutual recognition agreements on standards and compliance assessments. G20 members should agree to establish regular mechanisms for regulatory cooperation aimed at reducing trade costs for services providers and facilitating trade in services. Efficient, non-discriminatory service regulation can drive technology diffusion, and can help local firms participate in the Fourth Industrial Revolution.

Notable recent progress has been made in developing regulatory principles for the services sector. At the regional level, the Asia-Pacific Economic Cooperation (APEC 2018) established a voluntary set of Non-Binding Principles for Domestic Regulation of the Services Sector in 2019. In the WTO, the 2017 Joint Initiative on Services Domestic Regulation (WTO 2019c) has resulted in outcomes including a reference paper and a set of indicative schedules that await adoption by WTO Ministers. All G20 members should signal support for these outcomes and willingness to bind the associated commitments in their GATS schedules.

G20 members could also acknowledge that recent progress enables wider collaboration on regulatory principles that protect consumers and privacy while seizing opportunities for increased trade in digitally enabled knowledge-intensive services. Therefore, the WTO Reference Paper on Telecommunications should be revisited against the backdrop of the technological revolution experienced since it came into force in 1998.

We also call on the G20 to adopt a variety of best-practice regulatory principles that maximize opportunities for the digital economy via e-commerce. SMEs typically account for the majority of services businesses in any economy and a substantial share of services employment. Digitalization and global services value chains offer important new avenues for SMEs to thrive (ERIA 2018).

This is partly because digital content and associated services, once created, can be exported at virtually zero additional cost. For this channel to work most efficiently, structural imbalances between powerful platforms and smaller firms need to be addressed by competition policy to prevent market power abuse. Efforts should also be made, while safeguarding customer privacy and security, to ease compliance costs for SMEs. Regulatory flexibility in registering intellectual property (IP), for both local and foreign entities, will also be particularly helpful for smaller businesses. Many digital offerings incorporate intangible assets, so IP protection assumes special significance for facilitating e-services trade.

## **5. Introduce trade disciplines on cross-border data flows**

**Challenge:** At the heart of different approaches to regulating data and digital flows lies the policy challenge of striking an optimal balance between supporting an innovative competitive digital economy while protecting consumer privacy and security. Restrictions on cross-border data flows, for whatever public policy reason, can adversely affect trade in e-services.

**Solution:** G20 members should signal recognition of the need to strengthen global governance of cross-border data flows.

The lack of internationally comparable statistics challenges evidence-based policymaking. Yet the need for policies to deal with cross-border services and data flows is greater than ever as barriers to these international transactions are being erected without a clear understanding of their costs and long-run impacts.

Whether motivated by cybersecurity or privacy considerations, consumer rights, regulatory oversight or digital industrial policy, restrictions on cross-border data flows impact productivity and trade in services negatively. Data localization requirements have an especially adverse effect (Ferracane and van der Marel 2018; Ferracane et al. 2020). Current GATS disciplines are helpful in that they secure the right of governments to regulate while encouraging that regulations should not unnecessarily restrict trade (GATS Article IV). A coherent common framework on data flows would be better, including to secure the abovementioned public policy objectives. Many measures currently applied appear to contradict the Internet's underlying logic by transforming a borderless cyberspace into "balkanized" units in which information and knowledge are obstructed, adversely affecting the growth of the digital economy.

Obligations on cross-border data flows, including disciplines on data localization requirements, applied horizontally across all services sectors, would considerably strengthen global governance. Governments would retain access to exceptions such as national security in trade agreements to justify actions to restrict data flows unless legitimate domestic policy needs are met.

Development of international rules on cross-border data flows and Internet-based activities is becoming critical to firm-level competitiveness, including for SMEs. Services suppliers sometimes need to comply with multiple overlapping or conflicting domestic regulations and seek multiple regulatory approvals for routine cross-border transfers, all of which impede trade flows and raise costs. Regulatory heterogeneity across OECD economies affects the value of services trade; specifically, a reduction in regulatory heterogeneity by 0.05 points leads, on average, to 2.5% higher services exports (Kyvik-Nordås 2016). Addressing the "regulatory jungle" pertaining to data flow governance may entail a similar trade-enhancing effect.

## 6. Promote interoperability in privacy regulation

**Challenge:** Rapid technological change requires urgent governance solutions but building global data governance is especially challenging, given the varying approaches to data privacy.

**Solution:** The G20 should signal the recognition of the idea that solutions may lie in the interoperability of data privacy approaches. This begins with domestic policymakers ensuring that their legal frameworks clarify that firms with a legal nexus in their jurisdiction are responsible for managing data in a certain manner, wherever the data are transferred and stored. A country's data-protection rules thus travel with the data. Potential models of how to proceed include the OECD Privacy Principles and the APEC Cross-Border Privacy Regime.

Facilitating e-commerce, including cross-border data flows, can enable businesses to realize economies of scale and scope. Meanwhile, strong consumer privacy rules are likely to create the trusted online environment that is arguably a precondition for demand-driven growth. We call on the G20 to renew efforts toward finding a consensus with regard to these trade-offs, as a set of widely accepted policies would benefit firms and economies worldwide.

The urgency of finding common rules is driven by rapid technological advances that, for example, turn watches into activity-recognition systems that detect, record, and recognize human activity in real time. The G20 should recognize that such developments present unprecedented new challenges for regulating trade.

It is a simple fact that international trade involving consumers cannot occur without collecting and sending personal data, such as names, addresses, and billing information, across borders. For services suppliers, complex data privacy regimes reduce flexibility, increase compliance costs, and inhibit managing operations efficiently (Chen et al. 2019). The increasing burden of diverse local privacy rules also impacts the price of consumer goods and services. This is an emerging problem as companies collect and analyze personal data to better understand customers' preferences and willingness to pay and adapt offerings accordingly.

The discussion around global data governance and privacy concerns has been building for some time, most recently with Japan's initiative for "data free flow with trust" at the 2019 G20 meeting. This initiative, and related discussions within trade agreements in the Asia-Pacific region and elsewhere, show that a growing number of countries recognize the need for greater coordination and new norms and agreements to manage data privacy.

While national laws often share many of the same core principles, such as the OECD Privacy Principles, there is no single harmonized approach to privacy (OECD 2013). This is why interoperability has become a defining goal for much of the world, such as at the OECD and in many trade agreements, as globally interoperable privacy frameworks ensure effective privacy protection while maintaining the flow of personal information. A strong global network of privacy enforcement authorities is needed to complement efforts to build interoperability, and domestic regulators will need these resources and mechanisms to collaborate effectively.

Interoperable privacy regulations (as compared to harmonized regulations) are a better and more realistic goal; although legal, cultural, and political differences mean countries often approach privacy differently, these can be based on common principles (such as from the OECD Privacy Principles). The Swiss-US Privacy Shield, and the APEC Cross-Border Privacy Rules are examples of formal mechanisms to build interoperability. These mechanisms provide greater certainty that a country's data protection travels with the data.

## **7. Adjust development strategies for digitization and boost digital aid-for-trade**

**Challenge:** A key message from the 2017 Global Review of Aid-for-Trade (OECD/WTO 2017) was that since digital networks are integral to global trade, developing countries need far more assistance to maximize digital technologies' benefits.

**Solution:** Improved information and communications technology (ICT) infrastructure, accessible and affordable Internet connectivity, digital skills and literacy, and a supportive regulatory framework should be priority G20 goals for digital development strategies and digital aid-for-trade (AfT).

The application of ICT technologies, deepening of Internet penetration, and uptake of smartphones is well underway. Indeed, digital connectivity development is often faster than physical connectivity, providing remote and rural areas with enhanced access to job opportunities and exchange of goods and services. However, to achieve its potential as a vehicle for more inclusive growth, development of digitally enabled services should also be incorporated explicitly into development strategies of newly developed and developing countries. In manufacturing, automation, advanced robotics, and 3DP are beginning to compensate for wage differentials as factors determining companies' production locations and investment decisions. Conversely, for services industries, while some require talent that remains scarce in developing countries, a growing variety of services are performed and delivered remotely. Developing country wage differentials will continue to attract this work. Indeed, the increase in demand for offshore e-services from developing countries is expected to intensify (Baldwin 2019).

Over the last decade, donor countries and regional and multilateral development agencies have focused more on helping developing countries use digital technologies for trade and development. These plans remain limited in size and scope and are supported by few donors and private sector partners. Less than 5% of donor support under the WTO AfT umbrella is directed to services. Of the USD 525 billion provided by multilateral development banks to low- and middle-income countries from 2012-2016, less than 1.5% went to ICT projects, with only 5% of this amount going to digital policy development (World Wide Web Foundation and the Alliance for Affordable Internet 2018). Donors need to provide more resources for digital development and establish digital AfT guidelines. Building an enabling policy environment, focusing on cross-border digital transactions, will be key to success.

We propose five key principles to ensure productive AfT. First, digital project assessments should be holistic within a broad country- or sector-specific analysis and digital development strategy. Second, they should have clear governance structures with local leadership, including public and private participation, and be coordinated and targeted at key bottlenecks. Third, projects should embrace digital trade by using existing digital goods and services rather than focusing on high-risk project-specific innovations (UNCTAD 2018). Fourth, development agencies should collaborate to develop digital development templates for different sectors to help expedite assessments and strategy formulation. Finally, projects should focus on building infrastructure for digital connectivity, both physical and institutional.

Physical infrastructure for digital connectivity centers on providing access to stable, high-speed, and affordable Internet connection. Unlike traditional physical infrastructure, much of this investment can be implemented by the private market, including inward direct investment. Some government involvement will be required, as well as international collaboration, to deliver universal services and ensure access for remote communities and SMEs. Institutional infrastructure is equally important. All countries must focus on preparing a best-practice policy and regulatory environment for utilizing digital technologies. AfT should help establish policy frameworks governing dataflows and data-related businesses ranging from consumer protection and competition policy to privacy, cybersecurity, and digital taxation. Developed countries should ensure that legitimate concerns about privacy, security, money laundering, and piracy do not erect insurmountable barriers for companies in developing countries to sell offerings over digital platforms.

## **8. Upskill the workforce and stimulate digital innovation**

### **Education:**

**Challenge:** In the digital economy, workers need IT skills but also social skills like communication and management. New jobs are being created, but these generally involve re-skilling.

**Solution:** G20 members should urgently prioritize improving human capital formation through education reform, including greater openness to trade and investment in education services.

### **Innovation:**

**Challenge:** National-level innovation systems must become more entrepreneurial and collaborative.

**Solution:** The G20 should promote greater collaboration among national innovation ecosystems and establish guiding principles for associated knowledge exchanges. Value co-creation between national innovation ecosystems could strengthen digital job creation and help economies catch up with opportunities specific to the Fourth Industrial Revolution.

Services activities have already become major global sources of growth for employment; and access to talent has become key to the competitiveness of services firms. Various policy actions can enhance the outcomes for the digital economy by building the required human capital assets. These include openness to mode 4 (movement of natural persons), education reforms both for re-skilling and future jobs, openness to trade and investment in education services, and sharing of best practices.



The public associates digital transformation with automation of many activities that has led to a shift in the demand toward high-skilled workers and growing income inequality in the past. As services are increasingly drawn into the digital realm, however, new jobs are emerging that present opportunities for middle-skilled workers. While jobs that create digital tools tend to be technical and cognitive skills-intensive, many complementary jobs are intensive in interdisciplinary and interpersonal skills, and empathy (Börner et al. 2018). The digital economy will offer new opportunities in these areas, not least for women.

A country's level of income reflects the outcome of its education system. Upskilling requires an education system designed both for skilling the future workforce and for upgrading the skills of those in the current workforce. While these policies are mostly domestic, international cooperation allows sharing of experience and best practices. The application of digital technologies and cross-border flows of education services is likely to become substantially more important both for educating the future workforce and upgrading current workforce skills.

Positive growth in digital jobs would be strengthened if at the national level, innovation ecosystems become more entrepreneurial, focused on global value creation, and responsive to global digital trade opportunities. We also see the chance for G20 members to initiate new approaches for collaboration between their individual innovation ecosystems, both to mitigate the current pandemic's impact and to build a strong platform for rapid post-crisis global trade recovery. By establishing guiding principles and standards, including IP protection, for collaborative innovation in state-of-the-art technology, G20 members could set the stage for innovative solutions to current and future global challenges.

Such action would signal a global reminder that innovative solutions lie in international collaboration rather than in inward-looking policies. G20 members can lead by example, creating mechanisms to bring the global community of creative thinkers, entrepreneurs, investors, public officials, academics, and research organizations closer. This would facilitate the information and resource flow that is needed for continuous learning and collective problem-solving. The envisaged collaborative ecosystems must link to global value creation, contributing domestically and internationally to trade and investment growth. This will have a global impact, creating a widespread enabling environment for the Fourth Industrial Revolution.

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**Disclaimer**

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## APPENDIX

The COVID-19 pandemic response is intensifying the digitalization push, as goods producers work to lower their vulnerabilities, and services firms learn by doing. The pandemic has significantly impacted both goods and services global value chains and has resulted in a strong shift toward digital services delivery, which is likely to prove irreversible.

One immediate concern for policymakers in developing countries has been the serious downturn of not-yet-fully-digitalized services like transportation, tourism, and wholesale/retail services. Even in these sectors, partial mitigation has been provided by the digitalization push. Travel restrictions and related halts to air travel require information flows and networks to be built digitally, leading to various changes in demand for associated digital business services.

The pandemic immediately intensified the demand for ICT services, some of which proved especially critical to the global effort to combat COVID-19. These include: remote exchanges among research teams to fight the virus and look for medicines and vaccines; e-health services to provide rapid relief to alleviate local healthcare provision bottlenecks; e-learning services to allow teachers to continue educating millions of students; teleworking facilities to allow workers to stay at home while sustaining economic activity; digital payment and other financial services to enable e-commerce and online services; and connectivity and audio-visual entertainment services that minimize the adverse effects of social distancing (Lodefalk 2020).

International cooperation to facilitate the free flow of anonymous medical/health data among trusted partners and the temporary movement of healthcare professionals has often proved vital. There has, however, been a marked lack of international government coordination in enabling the ongoing provision of essential services during extended lockdown periods (Global Services Coalition 2020). This has unquestionably had a negative impact on services value chains and on the IT/business-process outsourcing sector particularly.

In several developing countries with strong digitally enabled services export performance, for example call centers, the policy stance has not recognized the ICT sector as essential, leading to complete closure of call centers for social distancing purposes. This has forced some immediate reshoring in many services sectors, from telecommunications to banking and insurance. This reshoring may prove temporary with respect to digitally enabled cross-border trade in services, but it may lead to a more prolonged downturn in investment sentiment regarding offshore commercial presence.

In the manufacturing sector, digital technologies and digitally enabled services are heavily used in supply chain-intensive industries and advanced manufacturing, including electronics, motor vehicles, and machinery. While this is not yet apparent in East Asia, business commentators remain wary that supply chain risk mitigation may lead to sustained reshoring in these industry sectors, if with a longer time lag. These pressures can be alleviated by applying blockchain technology to ensure privacy and incentivize suppliers to share their data in the supply chain. This would contribute to the anticipated medium-to-longer-term increase in services traded internationally.

Moreover, given current travel restrictions and halts to international air transport, which complicate airfreight, additional advances in digitally enabled services are likely. Personal mobility not only encompasses the travel services themselves but also covers information flows, contacts, and network-building between countries that trade and invest with each other. While travel restrictions remain in place, the crisis will affect services trade and investment generally, as the recent WTO numbers predict (WTO 2020c and 2020d). However, the crisis is also altering client demand to replace these knowledge network flows through digital technologies, increasing demand for e-services and their associated data flows.

In sum, in both goods and services sectors, supply chain disruption inevitably leads to some corporate reassessment of production models and an effort to develop more resilience, including by diversifying, and bringing closer to home, essential suppliers' geographic locations and substituting business mobility for digitally enabled services. Therefore, the current positive impact on demand for e-services is likely to sustain in the long-term.

Against the backdrop of the severe pandemic-related trade disruptions, the G20 needs to send very strong messages that its members will not use the public health crisis as a cover for inward-turning protectionist trade and industry policies. G20 responses will critically affect how the global trade system weathers potential anti-globalization backlash and secures the reforms that are urgently necessary for digital trade to flourish.





## AUTHORS

**Jane Drake-Brockman**

Institute for International Trade, University of Adelaide

**Ingo Borchert**

Sussex University

**Nigel Cory**

Information Technology and Innovation Foundation

**Ziyang Fan**

World Economic Forum

**Christopher Findlay**

Institute for International Trade, University of Adelaide

**Fukunari Kimura**

Keio University, ERIA

**Hildegunn Kyvik-Nordås**

Orebro University, Norwegian Institute of International Affairs

**Magnus Lodefalk**

Orebro University

**Shin-Yi Peng**

National Tsing Hua University

**Hein Roelfsema**

Utrecht University

**Yose Rizal Damuri**

Centre for Strategic and International Studies

**Sherry Stephenson**

PECC Taskforce on Services

## AUTHORS

### **Tu Xinquan**

University of International Business and Economics

### **Erik Van der Marel**

European Centre for International Political Economy

### **Mustafa Yagci**

Islamic Development Bank

