



DEVELOPMENT COMMITTEE
(Joint Ministerial Committee
of the
Boards of Governors of the Bank and the Fund
on the
Transfer of Real Resources to Developing Countries)



DC2019-0002
March 20, 2019

**Mainstreaming the Approach to Disruptive and Transformative Technologies
at the World Bank Group**

Attached is the document entitled “Mainstreaming the Approach to Disruptive and Transformative Technologies at the World Bank Group” prepared by the World Bank Group for the April 13, 2019 Development Committee Meeting

Mainstreaming the Approach to Disruptive and Transformative Technologies at the World Bank Group

Development Committee Paper

Contents

| | |
|---|-----|
| Abbreviations | iii |
| Executive summary | iv |
| I. Mainstreaming disruptive technologies | 1 |
| II. Corporate priority one: Support country diagnostics to chart new drivers of growth..... | 2 |
| III. Corporate priority two: Support the formulation and implementation of agile regulations for the new economy | 5 |
| IV. Corporate priority three: Scale up universal, affordable digital connectivity | 8 |
| V. Corporate priority four: Support the provision of transparent, efficient, and accountable digital government services | 10 |
| VI. Corporate priority five: Support the development of skills and capabilities for the new economy .. | 11 |
| VII. Brokering sectoral and regional programs..... | 13 |
| VIII. Digital Economy for Africa Moonshot 2030: A regional flagship program | 14 |
| IX. Moving forward | 15 |
| Boxes | |
| Box 1 Standard indicators on key dimensions of the digital economy and microdata to monitor the distributional impacts of new technologies..... | 3 |
| Box 2 Recent and selected forthcoming flagship reports addressing disruptive technologies and their impact..... | 5 |
| Box 3 Cybersecurity | 7 |
| Box 4 Using disruptive technologies to improve the implementation of regulations..... | 7 |
| Box 5 Identification for Development Initiative | 10 |
| Box 6 Entrepreneurial and firm capacity in the new economy | 12 |
| Box 7 Brokering disruptive technology solutions to accelerate progress through sectoral programs .. | 13 |
| Box 8 DE4A Moonshot targets | 15 |
| Box 9 Upgrading internal capabilities and agility to support new programs | 16 |

Abbreviations

| | |
|----------|--|
| DE4A | Digital Economy for Africa |
| DFID | Department for International Development |
| DPO | Development Policy Operation |
| EAC | East African Community |
| EBRD | <i>European Bank for Reconstruction and Development</i> |
| ECA | Europe & Central Asia |
| ECOWAS | Economic Community of West African States |
| ENISA | European Union Agency for Network and Information Security |
| FCV | Fragility, Conflict, and Violence |
| FSAP | <i>Financial Sector Assessment Program</i> |
| G20 | Group of Twenty |
| ID4D | Identification for Development |
| IDA | <i>International Development Association</i> |
| IFC | International Finance Corporation |
| IMF | International Monetary Fund |
| InfraSAP | Infrastructure Sector Assessment Programme |
| ITU | <i>International Telecommunication Union</i> |
| MENA | Middle East and North Africa |
| MFD | Maximizing Finance for Development |
| MIGA | Multilateral Investment Guarantee Agency |
| OECD | Organisation for Economic Co-operation and Development |
| SDGs | Sustainable Development Goals |
| UN | United Nations |
| WDR | World Development Report |
| WEF | World Economic Forum |
| WTO | World Trade Organization |

Executive summary

1. The World Bank Group is mainstreaming the approach to disruptive technologies endorsed in the 2018 Development Committee Paper, “Disruptive Technologies and the World Bank Group: Creating Opportunities—Mitigating Risks.” Disruptive technologies result in a step change in the access to products and services, and dramatically alter how we gather information, make products, and interact. Disruptive technologies can often be transformative in accelerating progress toward the WBG twin goals and the SDGs, but they also pose risks such as rising inequality, job loss, exclusion, data privacy, security, and a loss of societal trust. This paper updates the WBG progress in mainstreaming the Build-Boost-Broker value proposition by *building* the infrastructure and regulatory foundations for technology-enabled economies; *boosting* the capacity of people, firms, and institutions to thrive in times of change; and *brokering* partnerships that harness disruptive technology, data, and expertise to solve development challenges.

2. To mainstream the approach, the WBG is pursuing the five corporate priorities identified using the Build-Boost-Broker framework and implementing sectoral and regional programs. The five corporate priorities—country diagnostics, agile regulations, connectivity, GovTech, and capabilities—will enable to WBG to *build*, *boost*, and *broker* by helping clients set a comprehensive agenda at the country level. Sectoral and regional programs, such as the Digital Economy for Africa Moonshot, enable the WBG to focus on interventions that draw on its comparative advantages, address binding constraints, and have the greatest impact on achieving the twin goals. A programmatic approach can also mobilize more effectively the private sector’s capital, resources, and innovations.

3. Corporate Priority One: The WBG is supporting *country diagnostics* to help countries maximize the opportunities and mitigate the risks posed by disruptive technologies. It is developing a new set of diagnostics to benchmark countries’ readiness to absorb disruptive technologies by assessing what foundational elements need to be *built*, what capacities need to be *boosted*, and what sectors offer opportunities for disruptive technology to be *brokered*. The WBG is developing new indicators to measure the digital economy and using disruptive technologies for improved data collection. These tools will inform the WBG’s regular high-level country assessments. In addition, global and regional flagship reports present evidence on how new sources of data, technology, and expertise can support inclusive growth strategies in specific country contexts.

4. Corporate Priority Two: The WBG is supporting the formulation and implementation of *agile regulations* that promote innovation and mobilize the private sector while addressing risks associated with technological disruptions of sectors and markets. To *build* regulatory foundations and *boost* capacity of firms, particularly local entrepreneurs, the WBG is scaling up technical assistance and analytical work in three areas: disruptions of traditional sectors, new business models and sources of market power, and risks related to privacy and data security. And it is participating in international fora and partnering with other international organizations to ensure that the experiences and concerns of developing countries are well represented in areas such as digital taxation and international data flows.

5. Corporate Priority Three: The WBG is prioritizing support for *universal and affordable digital connectivity*. To *build* digital infrastructure, it is working with public and private partners across the value chain of broadband networks, leveraging the Maximizing Finance for Development and Cascade approaches in addressing policy and institution reforms, implementing large regional projects, and developing new business models that mobilize private investment such as cross-sector infrastructure sharing. By promoting universal and affordable connectivity, it is ensuring that people in fragile, conflict-afflicted, rural, and remote areas are not left behind. And to prime demand for digital connectivity, it is providing underserved populations with online access to markets and services.

6. Corporate Priority Four: The WBG is supporting the provision of transparent, efficient, and accountable *digital government services* through a new GovTech global initiative. GovTech is a WBG whole-of-government approach that will develop new tools and interventions to help governments harness disruptive and transformative technology to *boost* capacity in core government functions, in public service delivery, particularly for the poor, and in technology-enabled citizen engagement. It will improve the functioning of the public sector and catalyze private sector engagement.

7. Corporate Priority Five: The WBG is supporting investment in human capital to *develop skills and capabilities for the new economy*. The 2019 WDR and the Human Capital Project highlighted how the changing nature of work is accelerating the need to *boost* the capacity of people by investing in human capital, especially in skills and capabilities. The WBG is engaging with public and private clients to promote investments in skill development over the lifecycle, from early childhood to adult learning. It is also working to *boost* the managerial capabilities of firms to absorb new technologies and create jobs.

8. The WBG is developing sectoral and regional programs that leverage the five corporate priorities. These programs allow the WBG to be selective, minimize duplication, explore synergies between projects and disruptive technologies, and leverage public and private partnerships to *build, boost, and broker*. Partnerships are essential to identify and scale up potential applications of disruptive technologies to solve development challenges.

9. The Digital Economy for Africa Moonshot is a flagship regional program to digitally enable every African person, business, and government by 2030 through coordinated action with the African Union and private partners. Ambitious targets for digital infrastructure, skills, platforms, financial services, and entrepreneurship show how the WBG is moving with resolve to maximize the potential benefits of technology and mitigate the risks.

10. To help client countries adapt to the rapid pace of technological change, the WBG is upgrading its internal capabilities and agility. The Bank, IFC, and MIGA are each adapting business models, upgrading skill sets, and improving processes. And they are expanding internal labs to pilot and analyze the costs and benefits of deploying new technologies in operations.

11. Shareholder support is needed to succeed in programs such as the Digital Economy for Africa Moonshot and the GovTech initiative. The WBG asks the Development Committee to encourage countries to prioritize investments to move forward on these initiatives, to leverage resources including IDA 19, and to support the WBG as a trusted broker of technology-enabled development solutions in multilateral fora.

Questions for the Development Committee:

Does the Development Committee agree with the corporate priorities and programmatic approach outlined in this paper?

I. Mainstreaming the approach to disruptive and transformative technologies

1. The WBG is mainstreaming the approach outlined in the 2018 Development Committee Paper, “Disruptive Technologies and the World Bank Group: Creating Opportunities—Mitigating Risks” (2018 DC Paper). This paper, “Mainstreaming Disruptive Technologies at the World Bank Group,” provides an update on the five corporate priorities identified in the earlier paper. It also details how the WBG is adopting a programmatic approach across regions and sectors and scaling up partnerships with the private sector as a key driver of innovation and disruption. This agenda requires both continuing WBG support to clients in core development priorities and developing a new approach given the impact of disruptive technology trends on economic development pathways. While disruptive technologies can be transformative in contributing to the WBG twin goals and the SDGs, there is also an urgent need to mitigate significant risks (e.g. rising inequality, job losses, exclusion), and to build societal trust through policies for managing the risks to privacy and data security and expanding citizen engagement. Given the rise of global platforms and the cross-border nature of data and technology flows, the WBG needs to deepen and expand its partnerships with transnational actors, both public and private.

2. The Build-Boost-Broker value proposition defined priorities for the WBG to scale up its activities. Disruptive technologies are emerging technologies that result in a step change in the cost or access to products or services, or that dramatically change how we gather information, make products, or interact. While disruptive and transformative technologies include areas such as renewable energy and materials science, this paper focuses on digital technologies, both in recognition of the rapid expansion of the role of data, and as technology underpinning innovations in other areas. To support countries, the WBG will operationalize the Build-Boost-Broker value proposition to engage governments and people, coordinate development partners, and mobilize the private sector. It will ramp up efforts to **Build** the digital and physical infrastructure and regulatory foundations for sustainable, inclusive technology-enabled economies. It will **Boost** the capacity of institutions, firms, and people to leverage technology-led disruption for socioeconomic dividends and greater resilience in times of change. It will **Broker** partnerships that harness disruptive technology, data, and expertise to solve development challenges and ensure that the poor share in the benefits. The 2018 DC Paper outlined areas for *brokering* technology solutions across all sectors of the WBG. Five corporate priorities are critical to not just the *build* and *boost* approaches, but also to achieving the overall BBB value proposition.

Table 1 Five corporate priorities and WBG activities

All of these corporate priorities will mobilize private and public sector partnerships, including South-South partnerships, using the MFD/Cascade approach to harness resources and innovation from the private sector

| Corporate priorities highlighted in 2018 DC Paper | WBG activities |
|--|---|
| <i>Corporate Priority One:</i> Support country diagnostics that help chart the new drivers of growth | Developing and implementing a new set of country diagnostic tools, frameworks, and evidence bases |
| <i>Corporate Priority Two:</i> Support formulation and implementation of agile regulations for the new economy | Providing technical assistance and analytical work on regulations in the new economy to maximize innovation, economic activity, and social benefits while mitigating risks |
| <i>Corporate Priority Three:</i> Scale up universal, affordable digital connectivity | Implementing a multi-pronged approach to universal, affordable connectivity in the context of Maximizing Finance for Development (support to policy reforms, large regional projects, and cross-sector public-private infrastructure) |

| | |
|--|---|
| | sharing projects) with a focus on FCV and rural areas |
| <i>Corporate Priority Four:</i> Support the provision of transparent, efficient, and accountable digital government services | Launching a new GovTech initiative to harness new technologies to boost government capacity for core functions, service delivery, and citizen engagement and feedback |
| <i>Corporate Priority Five:</i> Support the development of skills and capabilities for the new economy | Scaling up WBG operational support to boost skills and capabilities over a person’s lifecycle and support digital entrepreneurship and human capital development |

3. Scaling up capabilities for the five corporate priorities will enable the WBG to help clients set country agendas and address the supply and demand sides of the new economy. The focus on *country diagnostics* ensures that client countries and partners can be selective in deciding when, where, and how they intervene, while working to make access to new services and opportunities available to all. On the supply side, *agile regulations* support the diffusion of disruptive technology and inclusive growth in the new economy, while *universal, affordable connectivity* ensures access for all, including the poorest. A *digital government* can spur both supply and demand, providing transparent, accountable, and efficient services, while acting as a catalyst to spur new disruptive technology-driven sectors. Developing *skills and capabilities for the new economy* provides further demand and supports a digital entrepreneurship ecosystem.

4. Engaging the private sector is critical to harnessing the potential benefits of disruptive technology to achieve the WBG twin goals and the SDGs. Across all the corporate priorities, the private sector is a key enabler of innovation and disruption developing new business models and building new markets that create jobs, deliver better access to services, and generate the data that fuels the new economy. Many digital innovations in access to finance for the previously unbanked and access to markets for millions of micro and small businesses have come from the private sector. Digital entrepreneurs and global technology companies are creating new technologies and digital business models for online education, healthtech, agtech, distributed power generation, and more. The WBG will continue to emphasize the MFD/Cascade approach and seek public sector engagements with the private sector to develop innovative solutions and mobilize capital and knowledge.

5. The Digital Economy Moonshot for Africa, a continent-wide initiative, exemplifies how the WBG is partnering with regional organizations, development institutions, and the private sector to develop a regional program. Every sector and region is systematically developing programmatic approaches to enable the WBG to be selective within a sector or region. The Digital Economy Moonshot for Africa is an ambitious approach to ensure that every person, business, and government in that continent is digitally enabled by 2030. It has a near-term plan to rapidly introduce broadband connectivity and digital payment systems within a few years.

II. Corporate priority one: Support country diagnostics to chart new drivers of growth

6. The WBG offers diagnostic tools to help countries assess the foundational elements to be *built*, the capacities to be *boosted*, and the sectors offering opportunities for disruptive technologies to be *brokered*. These tools benchmark countries’ readiness to absorb disruptive technologies and prepare them for new opportunities and risks that these technologies pose. The WBG will identify and prioritize reforms and investments, and provide follow up support in technical assistance and financing. Having such advice be forward-looking and informed by the latest thinking and evidence is crucial in helping countries

look for ways to leapfrog or accelerate their pace of change. The WBG offers tools to help countries support a vibrant digital economy, as well as frameworks and evidence on how such technologies are likely to affect the growth, inclusivity, and sustainability of their development strategies.

7. The WBG’s revamped Digital Economy for All diagnostic tool covers five foundational pillars – digital connectivity, digital financial payment systems, digital platforms, digital entrepreneurship, and digital skills. One or more pillars may be priorities, with dedicated tools for each pillar available for deeper dives, and new data sources, such as Digital Business Indicators (DBIs), expanding the indicators for benchmarking (box 1). Bringing these tools together provides a coherent approach to capture synergies and identify gaps. Regulations to ensure competition and protection of privacy and cybersecurity cut across the pillars, as do concerns that the access to each pillar be inclusive and that the whole system contributes to the twin goals. The tool recognizes that foundations also need complementary factors, such as energy and transportation. The Digital Economy for All diagnostic tool, piloted in Senegal and Pakistan, is being rolled out in more countries, with priority to the Digital Economy Moonshot for Africa and IDA countries.

Box 1 Standard indicators on key dimensions of the digital economy and microdata to monitor the distributional impacts of new technologies

The Digital Business Indicators is a pilot initiative to produce new indicators for the digital world following the Doing Business approach. The aim is to provide objective, cross-country comparable measures of laws and regulations supporting a thriving digital economy. The initiative also seeks to inform countries of policy and regulatory changes they can undertake to improve the enabling environment for digital business. Four themes were part of the pilot data collection: Internet Connectivity, Online Payment Systems, Regulatory Framework for Digital Markets, and Logistics for e-Commerce. The surveys and data collection have been rolled out in 21 countries, and data analysis is almost final. The resulting good practice information will be shared with regulators in a short report to inform specific regulatory measures, aiming to protect businesses and consumers active in the digital economy.

The Global Findex collects nationally representative surveys in 140+ economies to track how adults use formal financial services, including fintech-related applications such as mobile money accounts, transactions through the internet and mobile phones, and other types of digital payments. It also collects data on how many adults have access to the tools to access disruptive technologies—such as mobile phones and the internet. Most of this data is available by gender, income, age, and workforce participation. The Global Findex is updated every three years; the next one is due in spring 2021.

Rapidly evolving data technologies are transforming how we use data for country diagnostics and do development. The WBG data and poverty teams are updating their household surveys to better monitor distributional dimensions and expand evidence on the impacts of expanding disruptive technologies on the very poor and bottom 40 percent. The WBG is also supporting countries in state-of-the-art data collection, using drones, satellite imagery, and machine learning, and leveraging the private sector to get timely insights into a range of development outcomes. The new techniques must be grounded in high-quality data that is well managed, appropriately stored, responsibly shared, and innovatively used. As the world’s foremost source of high-quality development data, the World Bank is a leader in forward-thinking data governance. Launched in 2017, the WBG’s Development Data Hub provides access to more than 10,000 datasets and 16,000 indicators, including microdata, time series, and terabytes of geospatial data from countries, private organizations, and other public institutions. The WBG recently published the 2018 Atlas of Sustainable Development Goals, its first fully reproducible publication, with the underlying code and data open for anyone to inspect, use, and replicate.

8. Additional tools look at a broader set of disruptive technologies complementing the benchmarking of digital foundations or assessing disruption within a given sector. The new Technology Adoption Survey and the Science, Technology and Innovation Policy Effectiveness Review cover a wider set of disruptive technologies and are being implemented across all regions. The Systems Approach for Better Education Results looks at the broader preconditions and range of skills for people to absorb new

technologies. InfraSAPs delve more deeply into the constraints and opportunities in key enabling infrastructure sectors and consider the possibilities that for disruptive technologies such as battery storage could result in stranded assets, similar to the experience in telecommunications. FSAPs will continue to look at the financial integrity, stability, and inclusion of expanding digital financial services. IFC Sectoral Deep Dives are addressing how trends in technology affect investment opportunities in a sector. Sector-specific cases of digital technologies provide resources for teams and are included in the country diagnostic guidelines identifying what is needed to be able to implement e-health tools or advise farmers using remote learning or satellite imagery. New diagnostic tools are under development for renewable energy, desalination techniques, and new fertilizers.

9. These sector and deep dive diagnostics will inform the high-level WBG country assessments where applicable. They will provide the basis for a discussion of the impacts of technology and apply the analytical insights to inform country dialogues, technical assistance, and operations. The varying impacts of disruptive technologies—and their potential to expand markets, improve service delivery, facilitate transitions, and address new risks—requires customized advice and operational support. New Systematic Country Diagnostics, Country Economic Memoranda, and Country Private Sector Diagnostics will discuss, where appropriate, the effects of disruptive technologies, including potential impacts on growth, inclusion, and sustainability. Poland and Senegal have recently highlighted disruptive technologies in their SCDs, and Morocco has the first Country Partnership Framework to focus on disruptive technologies. Its Development Policy Financing approach combines digital finance, infrastructure, regulations, platforms, and entrepreneurship, providing a model for the multi-sectoral approach to reach the Moonshot goal of digitally enabling all individuals, businesses, and institutions.

10. WBG flagship reports have been focusing on understanding how disruptive technologies are shaping opportunities and risks. In addition to benchmarking indicators, flagships provide frameworks and deeper analysis for thinking about the impacts of different trends (box 2). The 2016 WDR looked at the agenda to leverage development dividends from the digital economy. The 2019 WDR looked at the impact on the changing nature of work and ways to redesign social contracts to provide flexibility, empowerment, and safeguards in the face of change. The 2020 WDR will look at how technologies are changing global value chains and what it takes to be competitive. Other global flagships analyze how disruptive technologies affect the productivity of agriculture, and export-led manufacturing can provide large-scale employment for lower-skilled workers. Flagships exploring digital strategies and applications show how data can improve development outcomes. They also disentangle how impacts can vary by type of technology across sectors and types of work. A gig economy that expands tele-working could provide a premium for skills in services that can now be sold to a wider audience, while AI could allow low-skilled workers to perform much more complex tasks. Regional flagships are examining the impact of platforms and the sharing economy on inclusive growth; the ways to spur innovation and technology adoption; and how to get the digital economy to deliver job-rich growth. IFC's research explores how disruptive technologies are reinventing business sectors critical to job creation and economic development.

Box 2 Recent and selected forthcoming flagship reports addressing disruptive technologies and their impact

World Development Reports

- 2016 Digital Dividends
- 2019 Changing Nature of Work
- 2020 Global Value Chains

Global Flagships

- Blockchain: Opportunities for Private Enterprises in Emerging Markets
- Data Driven Development
- Global Public Sector Performance Monitoring Report: Anti-corruption and Technology
- Innovative Business Models for Expanding Fiber-Optic Networks and Closing the Access Gaps
- Productivity Revisited: Shifting Paradigms in Analysis and Policy
- Reinventing Business through Disruptive Technologies: Sector Trends and Investment Opportunities for Firms in Emerging Markets (IFC)
- The Digital Acceleration of Agricultural Transformation
- The Innovation Paradox: Developing Country Capabilities and the Unrealized Promise of Technological Catch-Up
- Trouble in the Making? The Future of Manufacturing-Led Development

Regional Flagships

- A New Economy for Jobs and Growth in the Middle East and North Africa
- A Resurgent East Asia: Navigating a Changing World
- Continent-wide Digital Economy for Africa: Opportunities and Challenges for More Productive and Inclusive Growth
- Critical Connections: Promoting Economic Growth and Resilience in Europe and Central Asia
- The Digital Economy in Southeast Asia: Strengthening the Foundations for Future Growth
- The Future of Work in Africa
- The Jobs of Tomorrow: Technology, Productivity, and Prosperity in Latin America and the Caribbean
- Toward a New Social Contract: Taking on Distributional Tensions in Europe and Central Asia

III. Corporate priority two: Support the formulation and implementation of agile regulations for the new economy

11. Technological advances and evolving business models are rapidly changing the demands on the regulatory environment for competitiveness, innovation, and consumer protection. Disruptive technologies expand the production and uses of data creating new monopolies and sources of market power, such as network effects on “digital-enabled platforms.” They also blur the boundaries of sectors traditionally regulated separately, which now require coordinated regulatory approaches, and create new types of working relationships in the gig economy. And they raise new challenges in digital taxation and digital trade—and new security and privacy risks. Regulatory challenges also come with the expanding use of artificial intelligence, autonomous vehicles, drones, bioengineering, and other new technologies. Prescriptive, command-and-control approaches to regulation are increasingly outdated. Yet countries are still sorting out what is effective—and even desirable. Firms and markets are not waiting for regulatory frameworks to catch up; progress requires an agile approach that enables the private sector to innovate and create new markets, while building societal trust.

12. To *build* regulatory foundations and *boost* the capacity of firms, particularly local entrepreneurs, the WBG is scaling up technical assistance and analytical work in three major areas.

- **Disruption of traditional sectors: Balancing the removal of barriers to new business models and products while meeting basic public interests means many traditional regulations still shape the extent of disruption.** Regulations that determine what counts as a hotel, the rules an e-money issuer has to comply with, or whether a ride-sharing service has to meet the regulatory standards of a taxi—all areas affected by disruptive technologies—can determine whether new players can enter and how disruptive they can be while still meeting basic public interests. How new categories of work are treated also affects the ability to attract gig workers and expand the sharing economy. The WBG is working in key sectors such as tourism and agribusiness to inform regulatory design and private sector platform creation, expansion, and adoption. The agenda dovetails with the IFC’s Creating Markets approach.
- **Disruption of market forces and new sources of market power: Regulations need to be updated to preserve well-functioning markets in the data economy, ensuring that opportunities are available for entry, innovation, and competition.** The WBG is working with countries to update their approaches to competition policy in light of features of the data economy and new business models not well suited to traditional market analyses. Network effects associated with online search engines and digital-enabled platforms can benefit consumers and producers, but also confer considerable power to the platform itself in controlling large amounts of data. Lower prices, the traditional benchmark for competition authorities, is not sufficient to understand the new sources of market power. Network effects can serve as a barrier to entry, with longer run costs to innovation. Control over data can also be used to gain market power in other markets. And within platforms, asymmetric pricing, targeting, switching costs, and other business strategies can further reduce competition and limit consumer choice. The WBG is working with multiple countries across all regions to address features of new business models and weighing when interoperability and open access should be mandated. It is also working with regulatory authorities to address changing economies of scope that enable firms to leverage their position in one sector to also work in another sector (such as internet providers that provide mobile finance). As digital-enabled platforms continue to proliferate, the WBG is looking at the drivers of online platforms in multiple sectors to contribute to regional flagships in MENA and ECA and to inform policy advice on making such platforms efficient and inclusive. It is also analyzing the distributional impact of approaches to ownership rights in data and how user-generated content and data are valued.
- **Mitigation of risks: New regulations are needed to realize social benefits, addressing risks to privacy and data security.** Data protections include the right to fair treatment of data (consent, use for specified purposes, and so on), the right to be forgotten, privacy by design, restrictions on access to and use of sensitive data, safe data storage, safeguards for data filtering, use of AI in data applications, and discrimination in algorithms. There are also new governance concerns of surveillance and manipulation and questions of “who is watching the watchers.” Countries need to build capacity to ensure cybersecurity, especially for the financial system and such critical infrastructure as energy and transport. They also need to design taxation of the digital economy to safeguard against base erosion and profit shifting. And they need to revise intellectual property protections of digital assets to reward innovation. As technology continues to evolve, new risks—and ethical choices—will need to be addressed. For all this, the WBG’s convening role can help shape standards across countries, as it has with the Bali FinTech Principles.

13. The WBG is also providing technical assistance and operational support to innovative approaches to developing and implementing regulations, while monitoring risks. Making regulations and the rule-making process more agile can realize efficiency gains and welfare benefits, but experimentation introduces risks that need monitoring. Rather than rigid rules that are only infrequently

reviewed, agile regulations can provide sufficient flexibility to maintain the public interests without becoming outdated. The aim is to provide citizen-centered regulation with clear welfare benefits, reduced costs, and open access. Many countries use regulatory pilots (sandboxes), self-regulation, co-regulation, and risk-based regulation to navigate this space. Brazil is using regulatory sandboxes to pilot environmental policies, Mexico, Rwanda, India, and Sri Lanka are using sandboxes in FinTech, and Vietnam is using risk-based customs procedures. IFC has supported the Asia Financial Innovation Network, an industry sandbox that will encourage regional solutions to technology, market, and regulatory challenges. Early adopters of regulatory sandboxes illustrate the benefits, as well as the need to focus on sub-sectors with clear time limits and outcomes, avoiding regulatory fragmentation. WBG teams are also working with country clients to help them understand and mitigate the risks associated with legal uncertainty.

Box 3 Cybersecurity

The World Bank is one of the first development institutions to acknowledge cybersecurity risks as major constraints for digital development. In 2018, it released the Global Crisis Risk Platform, systematically addressing cybersecurity risks and mitigation measures. As a member of the Global Forum for Cyber Expertise, it works within a jointly formulated Framework for Cyber Security for UN organizations and entities. It is also collaborating with leading global institutions—such as the ITU, WEF, OECD, ENISA, and Council of Europe—and bilateral partners with strong expertise in the field. Global knowledge pieces include Cybersecurity and IOT Guide, Combating Cybercrime: Tools and Capacity Building for Developing Economies, Cyber Security National Strategy Development Guide. Regional flagships include the ECOWAS Cyber Security Capacity Program, Cyber Balkans, Commonwealth Cyber Security Capacity Program. And regional training programs include the EAC and ECOWAS Cybersecurity Clinics.

14. As approaches evolve even in high-income countries, the WBG is sharing lessons with clients. It is mapping 50 regulatory practice case studies, focused on digital platforms, to identify the tradeoffs of excessive risk aversion in limiting innovation—and the implications of overly permissive approaches for social welfare. To manage potentially large unintended consequences, countries are taking different approaches, mixing regulations on tech companies with traditional sector regulations to address features of disruption. For example, China has shifted liability to ride-sharing platforms to ensure safety and protect consumers’ rights. Mexico has a new automatic tax payment system allowing ride-sharing companies to collect taxes on behalf of drivers on a monthly basis.

15. The WBG is actively participating in international fora and with other international organizations to ensure the experience and concerns of developing countries are well represented. With the G20, IMF, WTO, and OECD, the WBG is expanding the evidence base of policy approaches and contributing to the ongoing discussions of principles for international cooperation in the digital economy—from cross-border data flows to digital taxation to uses of AI. Concerns about market power, and of social and political control of data (particularly sensitive in FCV contexts), coupled with more limited enforcement capacity, are pressing in many developing countries. As more developing countries have new tech or tech-enabled start-ups, the interest in balancing regulatory safeguards with incentives to innovate is growing.

Box 4 Using disruptive and transformative technologies to improve the implementation of regulations

Data-driven technologies can improve regulatory design and efficiency, reinforcing the transformation to an integrated and client-centric service delivery program. The WBG is helping Vietnam and Brazil use AI to shift to risk-based enforcement in customs and other inspections. AI-enabled chat-bots are providing more interactive and tailored approaches to granting business licenses and permits in Serbia, Moldova, Croatia, and Greece. Blockchain is improving traceability and regulatory compliance in global value chains in Haiti and Vietnam. It is also tracking land registries in Georgia, Russia, and Brazil. While disruptive technologies offer solutions, new technologies on their own will not solve development challenges. For example, land registries which make records immutable will not solve underlying problems related to poor data and governance. The WBG will continue to build the evidence base on

regulatory approaches and their impacts on efficiency, competition, innovation, and inclusion—to inform clients seeking agile regulatory responses as technology continues to disrupt markets.

IV. Corporate priority three: Scale up universal, affordable digital connectivity

16. Since digital connectivity provides the foundational “data, networks, and artificial intelligence,” or simply DNA, to *build* a modern economy, and half of the world is yet to have broadband, the WBG has prioritized supporting universal and affordable digital connectivity. Digital connectivity gets people, businesses, and governments online, to link with local and global digital services—and thus to the global digital economy. As broadband is the first step for digital connectivity, the WBG is systematically working across the broadband value chain—from undersea internet cable to fiber optic backbone networks to last-mile broadband internet services reaching people, homes, and offices. Developing countries have to support high-performing data centers and clouds, paving the way for a data economy and innovations from artificial intelligence. Greater digital connectivity also requires robust safeguards for cybersecurity and privacy. Today, about 4 billion people remain offline, 90 percent of them in developing countries, particularly in Asia and Africa. The digital dividends from greater digital connectivity thus remain unrealized.

17. To close the connectivity gap will require new approaches to building connectivity infrastructure with regulatory frameworks that promote competition, affordability and new models of infrastructure sharing to reach rural and remote populations. Given the considerable capital and resources needed to achieve universal, affordable connectivity, mobilizing private sector investment will be critical. The WBG will leverage the Maximizing Finance for Development framework and the Cascade Approach with the World Bank and IDA supporting needed regulatory reform to open markets and promote competition, and IFC mobilizing the private sector and the private capital markets, including with new innovative financing tools such as the IDA-Private Sector Window. The WBG is supporting policy reforms to lower barriers to entry, open markets, and promote competition with next-generation electronic communications policies and regulations. It is also promoting new private sector business models and agile forms of investment that address capital market constraints. In this context, the WBG Digital Infrastructure Initiative is creating favorable regulatory conditions that drive creation of projects and help bring in private sector investment in digital infrastructure models. Given the cross-border dimensions of digital connectivity, the WBG is redesigning its knowledge, advice, and financing for supra-national levels—simplifying its internal funding, processing, and implementation of supra-national knowledge and advisory work, as well as its policy and investment lending. This would include using the Regional IDA window for multi-country operations in support of the digital economy.

18. Through the MFD framework and the Cascade, the WBG is pursuing a multi-prong approach to support digital connectivity that is universal in both reach and affordability.

- ***Policy and institutional reforms:*** To help iron out even stubborn reforms, promote private sector investment, and provide much-needed capital to client governments, the WBG will work at the national and regional level on policy and institutional reforms to lower barriers to entry in the telecoms sector, promote competition, encourage investment by network operators and service operators, leverage untapped fiber optic and “dig once” policies, support cybersecurity and privacy, and advance agile regulations. In Morocco, Senegal, and Ethiopia, the WBG is supporting institutional and policy reforms for digital connectivity using DPOs at the national level. In Western Africa, it is preparing policy reforms to create a regional digital market by removing barriers to regional digital infrastructure and foster regional digital platforms to promote access to services. It is also supporting policy and regulatory interventions for broadband service

providers to share passive infrastructure (such as ducts, towers, antennas) and active infrastructure (such as connectivity equipment). In the Western Balkans, the WBG is working with transmission grid operators to use spare fiber optic capacity to strengthen interconnectivity.

- **Large regional projects:** For scale and speed, the WBG is pursuing large regional projects to build digital connectivity across countries. It is providing technical assistance, investment project financing, and reimbursable advisory services, using the MFD approach with IFC investments. In Africa, the Digital Economy Moonshot is developing digital infrastructure and stimulating demand for services of the broader digital economy. In Uganda, Ghana, and Liberia, IFC is working with Google through C-Squared—a partnership of Google, Mitsui, and Convergence Partners—to build wholesale carrier-neutral fiber networks to improve digital connectivity.
- **Cross-sector infrastructure sharing:** To lower the cost and increase the efficiency of infrastructure development, the WBG is supporting infrastructure sharing across sectors and among broadband service providers to build digital connectivity and leverage unused fiber optics. Across sectors, the WBG is supporting public and private partnerships for roads, railways, pipelines, and electricity transmission lines to achieve rapid and lower-cost development of long-haul fiber links for broadband. An example of an MFD approach to promote infrastructure sharing is Red Compartida in Mexico as an innovative approach to develop a \$7 billion nationwide wholesale 4G network. The shared network enables mobile network operators, internet service providers, and new forms of service providers to offer high-quality and affordable broadband connectivity.
- **Fragility, conflict, and violence:** The WBG is ensuring that countries facing fragility, conflict, and violence (FCV) are not left behind. The WBG is applying IDA resources to address challenges due to digital connectivity including in Liberia, Sierra Leone, and Afghanistan. MIGA will also increase investor comfort to enter challenging environments.
- **Rural connectivity:** The WBG is employing a “bundle approach” to address digital connectivity in rural and remote areas, leveraging the increasing number of standalone solar electricity businesses. Market failure often creates a service delivery gap in rural and remote locations, spanning broadband, energy, and financial services. To address this gap, the WBG is using incentive-based private sector models, more affordable taxation, licenses and rights of way, and encouraging continued innovation by establishing a level playing field for existing and new technologies. In Tanzania, it is subsidizing bundled rural services involving broadband, energy solutions, and payments offered by the private sector. In Myanmar, MIGA guarantees have supported foreign investors in building a 4,500km country-wide fiber-optic network.

19. In addition to promoting universal and affordable connectivity, the WBG is supporting local content and applications that provide underserved populations with online access to markets and services and that in turn drives demand for connectivity. For example, IFC is working to strengthen use-cases of digital platforms, e-mobility, logistics, and fintech startups. In Africa, it is supporting Twiga to transform agricultural value chains and Kobo to develop digitally-enabled supply chains for mass-market goods. In Latin America, it is collaborating with Liftit to develop urban e-logistics networks and Contabilizei to automate company registration and tax filing processes for small enterprises. In Thailand, it is working with Roojai to leverage technology for motor insurance. And it is working with Demica to develop a global platform to scale up working capital financing to suppliers and distributors, including small and medium enterprises, in national and cross-border value chains. To develop these use-case applications and business models with local content requires broader support to the entrepreneurial ecosystem—as well as supporting and promoting digital literacy and skills, change management processes, and complementary infrastructure and services.

20. Moving forward, the WBG will continue to broker new partnerships to support innovations in broadband. The WBG has established a Working Group (WG) in the UN Broadband Commission to

convene relevant public and private stakeholders and execute an action-oriented plan for universal broadband connectivity. The work focuses on Sub-Saharan Africa and Northern Africa using sector reforms, investments, and demand stimulation for local content.

V. Corporate priority four: Support the provision of transparent, efficient, and accountable digital government services

21. The WBG’s new GovTech initiative will harness disruptive and transformative technology to boost government capacity. It will implement a whole-of-government approach to digital transformation by developing a new set of tools and interventions to enhance efficiency gains in government administration, public service delivery, and citizen engagement. It will also promote supervisory and regulatory oversight capacity that is agile and able to keep pace with technological developments and disruptions. And it will convene public and private stakeholders to broker new technology solutions. Governments, technology firms, technology experts, civil society organizations, donors, and other partners will contribute to analytical work, country dialogues, and affordable, scalable, and interoperable technology solutions (such as open source). The Partnership will contribute to analytical work on areas such as data privacy and security, e-government strategy, e-readiness assessment, IT skills in the public sector.

22. Disruptive technologies have the potential to transform the efficiency and transparency of core government functions, including financial management, procurement, human resource management, domestic resource mobilization, and monitoring and evaluation. Important aspects of GovTech are analog complements including legislation, regulation, capacity, and coordination across government. In Bangladesh, the WBG has supported the electronic government procurement system which has reduced procurement delays with a 13–20 percent savings in transaction costs. In 2018, 53 percent of the country’s public procurement was processed through this system.

Box 5 Identification for Development Initiative

One billion people globally are still unable to prove their identity, and millions more have forms of ID that cannot be reliably verified or authenticated. Over the last few months, demand from client countries for ID4D support has grown substantially, and the Initiative’s knowledge base is being applied in two of the most populous countries (Nigeria and the Philippines) and in fragile countries (Somalia and Afghanistan). The ID4D Initiative launched a Global Competition Platform—The Mission Billion Challenge—to crowdsource the most innovative solutions in identification. The platform strengthens data privacy in identification systems and gives users greater control over their personal data. In addition to the technical solutions that will surface, the Initiative has developed and published an ID Enabling Environment Assessment tool to assist governments in developing legal frameworks that promote trust in the design, implementation, and use of ID systems, with a focus on privacy, data protection, and non-discrimination.

23. Disruptive technologies can improve government service delivery in sectors such as health, education, and social protection, aligned with the goals of the Human Capital Project. The Bank is preparing a global flagship product on the use of big data and digital technology in the health sector, and developing courses on disruptive technology for government health officials from 52 countries. Disruptive technologies are enabling distance learning, online school registration, and the validation of degrees and educational certificates. In India, the WBG is exploring a partnership with EkStep Foundation to create open digital infrastructure that enables governments, not-for-profits, and market players to build platforms, programs, and contextual solutions to improve teaching and learning. In social protection, projects implementing disruptive technology are targeting payments and other benefits, providing timely delivery, and reducing opportunities for fraud. Public platforms that support interoperability and data

exchange can reduce the administrative burden and the time to deliver services to poor, vulnerable, and marginalized groups, promoting social and economic inclusion.

24. Disruptive technology can promote citizen engagement and feedback to increase government accountability. Geo-tagging and artificial intelligence provide new opportunities for governments to engage with citizens to find and implement solutions. The WBG is committed to supporting governments' direct engagement with people. MajiVoice, developed with the WBG and the Water Services Regulatory Board of Kenya, enables users to submit complaints through texts, over a hotline, or in person. At Nairobi City Water and Sewerage Company, the first to adopt MajiVoice, the number of complaints recorded rose almost tenfold, complaint resolution rates rose from 51 percent to 96 percent, and resolution time fell from more than 100 days to less than 20.

25. GovTech can improve the functioning of the public sector and have positive spillover effects for the larger economy. It provides local firms with public access to data and digital resources, streamlined regulatory processes, and new business opportunities. It can be a key enabler that crowds in private sector investment and innovation. To measure its impact, potential indicators include the number of regulations and laws passed to enable GovTech implementation and the number of open source solutions and prototypes sponsored by GovTech (including potential data commons to enable AI development). Project level indicators may include improved efficiency, reductions in petty corruption, and increased access to services, especially for women and marginalized groups.

VI. Corporate priority five: Support the development of skills and capabilities for the new economy

26. The WDR 2019 and the WBG's Human Capital Project highlighted how the changing nature of work is accelerating the need for investment in human capital to *boost* skills and capabilities. Jobs increasingly involve non-routine tasks that require a mix of cognitive, technical, and interpersonal skills. Cognitive skills include foundational literacy and numeracy and higher-order problem solving and creative thinking, and socio-emotional skills include self-control, grit, empathy, and curiosity.

27. The WBG is engaging with public and private clients to promote cost-effective and timely investments in skill development over the lifecycle. In partnership with DFID and others, the WBG is applying a Discover-Diffuse-Deploy (3D) approach to incorporating disruptive technology solutions in education. It is discovering and analyzing the evidence for promising technology solutions. It is diffusing knowledge about these solutions to policymakers. And it is deploying these solutions as pilots and at scale. The 3D approach to lifelong learning includes:

- **Early childhood education:** The WBG is scaling up its investments in ECE to provide the foundation of skills for the changing nature of work. It is synthesizing the multidisciplinary evidence base on ECEs and measuring ECE investments to provide quality assurance, improve efficiency, and promote cross-country learning and synergies.
- **Primary and secondary education:** Given the potential of technology-aided instruction to improve learning, the WBG is supporting innovative solutions to reduce the learning gap. In the Dominican Republic, a pilot program uses adaptive learning technology to evaluate students' initial learning level and then walk them through math exercises in a dynamic, personalized way, based on artificial intelligence and what the student is ready to learn.
- **Tertiary education:** The WBG is supporting innovative approaches to higher education and technical and vocational training. Regional initiatives, such as the African Centers of Excellence and Partnership for Applied Sciences, Engineering, and Technology, are improving higher-

education opportunities in Africa, including for girls. In Ecuador, a pilot program incorporates augmented reality and virtual reality to develop the skills of vocational students through simulations. In Bangladesh, support for university-based Fab Labs (digital fabrication laboratories that harness the power of 3D printing) provides a platform to implement research and incubate prototypes. Fab Labs are creating products that can rapidly move up the value chain and strengthen university-industry partnerships. IFC university clients, like Anima in Brazil, are starting to pilot artificial intelligence solutions to increase efficiency.

- **Lifelong learning:** The WBG is ramping up efforts to develop cost-effective adult literacy programs that incorporate the latest science on adult learning. The WBG also supports efforts to create markets for lifelong education and training services, including reforms to ensure that course offerings, curricula, and pedagogy meet the demand for modular competencies and are appropriate to the diverse age and experience profiles of workers. IFC has supported SoloLearn and Coursera, which provide lifelong learning solutions through an online platform in partnership with leading global universities. It is also working with companies such as Byju to expand access to distance learning and Andela to offer advanced programming skills in IDA countries.

28. To inform policy, the WBG is generating key data on skills demand and supply, including through the Human Capital Project. Understanding how the demand for skills is shifting is critical for advising on types of skills that can enable workers to pursue new opportunities. In addition to firm surveys and sector analyses, partnerships with technology companies are expanding ways to identify key skills gaps. For example, a data dashboard co-produced with LinkedIn offers new analytics on labor market, skills, and industry trends at the city and country level. The WBG is filling data gaps on the skill supply side through an ambitious agenda to improve the measurement of learning outcomes.

Box 6 Entrepreneurial and firm capacity in the new economy

For firms and entrepreneurs to raise their productivity, adjust to changing market opportunities, and to provide the jobs of the future, they must strengthen their capabilities to absorb and use new technologies and enhance worker skills. Differences in managerial quality explain as much one-third of cross-country differences in productivity. In Colombia, India, Indonesia, Mexico, Togo, and Uganda, improving managerial practices and strengthening personal initiative can raise profitability, growth, and hiring for large and small firms.

The WBG is collaborating with stakeholders in a range of countries to raise awareness of the importance of managerial practices, collect new evidence on managerial quality within and across firms, and provide practical guidance on policy instruments to improve managerial and entrepreneurial skills. In ECA, it is leading data collection efforts in partnership with the EBRD, and in Mexico it has partnered with the National Statistics Institute to include a managerial practices module into the national firm-level survey. In Brazil, India, Senegal, and Vietnam, it will pilot a new survey that will explicitly test for linkages between the quality of managerial practices and technology adoption at the firm level.

29. The WBG will continue to increase the scale and scope of its interventions using the 3D approach to lifelong learning. By the end of FY2021, it will support and expand the Harmonized Learning Outcomes database and the STEP Skills Measurement Program in collaboration with the OECD and academic experts to measure and analyze the impact of cognitive, technical, and socio-emotional skills of the working-age population. A multi-year partnership of the WBG, Gates Foundation, and DFID will provide countries with an integrated system for tracking how well education is delivered and how well countries are progressing toward their policy goals on a multidimensional Global Education Policy Dashboard, soon to be tested in 13 countries and then expanded further.

VII. Brokering sectoral and regional programs

30. The WBG is developing sectoral and regional programs that leverage the five corporate priorities. It has found that continuous, sustained engagement—addressing different parts of a system through parallel or sequential interventions—were more conducive to achieving transformational results than one-off interventions.¹ Sectoral and regional programs allow the WBG to be selective, minimize duplication, explore synergies between projects and disruptive technologies, and leverage public and private sector partnerships at scale (box 7). Regional programs are especially critical for cross-border projects such as supporting regional entrepreneurial hubs and developing consistent cross-border regulatory or technology approaches (such as regional digital IDs to deal with migration issues).

Box 7 Brokering disruptive and transformative technology solutions to accelerate progress through sectoral programs

Fintech: The Development Committee endorsed the Bali FinTech Principles (jointly produced with the IMF) at the Annual Meetings in 2018. A separate update paper is being prepared on that agenda to provide more details. The WBG engages policymakers and regulators to increase their fintech-related capacity and awareness by providing comprehensive sector assessments and assistance with fintech policy design—to ultimately maximize the promise of fintech innovation while increasing awareness of the significant risks. Country engagements in Colombia, Peru, Kenya, Tanzania, Uganda, South Africa, and Indonesia provide support on statutory and regulatory implications of crowdfunding, cybersecurity, regulatory sandboxes, blockchain-based applications in capital markets, Regtech and Suptech. In Jordan, Madagascar, and Mexico, the WBG is supporting legal/regulatory frameworks and critical financial and ICT infrastructure to foster innovation and encourage the safe application of technologies to expand financial inclusion. The WBG is also working on a blockchain based remittance corridor solution to ease the de-risking of money transfer operators.

Gender: The WBG recently published *Women Wavemakers: Recruiting and Retaining Women in Coding Bootcamps*, which shares insights on recruiting and retaining women in rapid tech skills training programs. Data from this report are being tested in the Kenya Industry and Entrepreneurship Project, which aims to close gaps between women and men in business with a focus on the innovation and entrepreneurship ecosystem. IFC recently launched the Digital2Equal initiative, bringing together leading technology companies operating in the online marketplace to boost opportunities for women in emerging markets.

Fragility, conflict, and violence: The WBG recently launched the Geo-Enabling initiative for Monitoring and Supervision (GEMS) to build the capacity of local stakeholders in FCV environments to leverage field-appropriate digital technology for enhanced planning, programming, monitoring, evaluation and supervision of projects in areas with limited access. GEMS has implemented around 185 projects in 14 FCV countries, building ICT capacity for more than 725 staff from client governments, Bank teams and partners. GEMS has contributed to better project implementation, coordination, and monitoring of environmental and social safeguards. Through a partnership with the European Space Agency (ESA), the WBG also works on streamlining satellite-based remote sensing to support operations and analytics in contexts of conflict and large-scale violence. A WBG partnership with Amazon Web Services, Google, and Microsoft on the Famine Action Mechanism (a joint UN-WBG effort) will launch the world's first artificial intelligence tool this year to support early interventions. The WBG is exploring working with Techfugees and Mercy Corps, which emphasize the role of technology in supporting refugees and mitigating the risks and challenges faced by the forcibly displaced.

Climate change: The WBG recently launched Accelerating Battery Storage for Development, a global program to accelerate investments in battery storage for electric power systems. The program is intended to increase developing countries' use of wind and solar power, and improve grid reliability, stability, and quality, while reducing carbon emissions. The program includes \$1 billion from the WBG and will mobilize an additional \$1 billion of concessional climate finance and \$3 billion from the private sector. IFC is also investing in emerging storage technology for vehicles and assessing opportunities to deploy grid-scale storage technology thus avoiding the cost of building additional expensive transmission infrastructure or building additional traditional generating capacity.

31. The WBG has enhanced its ability to broker global public and private partnerships to support sector and regional programs. Strategic global partnerships are essential for the WBG to identify and scale up potential applications of disruptive technologies to solve development challenges. The WBG is working with other multilateral partners, including the multilateral development banks, the EU AU Digital Economy task force, the OECD on Digital Taxation, and the UN High Level Panel on Digital Cooperation, UN Broadband Commission, and the UN Inter-Agency Task Team on STI for SDGs and the ID4D initiative. The WBG is also fostering South-South knowledge sharing and capacity building partnerships. Under Japan's Presidency of the G20, the WBG is supporting initiatives such as science, technology, and innovation for SDGs. And it is selectively partnering with global and local technology firms to harness data, support the dissemination and adoption disruptive technology, and encourage inclusive business models. It structures every partnership to mitigate potential risks, including issues of monopoly power, exclusion, data privacy, and cybersecurity.






VIII. Digital Economy for Africa Moonshot 2030: A regional flagship program

32. The Digital Economy for Africa (DE4A) Moonshot is an integrated regional programmatic approach, aligned with the five corporate priorities, that also engages external partnerships. The Moonshot objective is to digitally enable every African individual, business, and government by 2030, while targeting intermediate priority results by 2021. In 2016, the global digital economy was worth \$11.5 trillion, or 15.5 percent of global GDP, and it is expected to reach 25 percent in less than a decade, outpacing the traditional economy. Yet, Africa faces significant challenges in connectivity (22 percent of Africans have access to the internet) and many still lack digital IDs or transaction accounts. The Digital Economy for Africa Moonshot sets an ambitious, long-term vision for harnessing technology and innovation to transform Africa's economies, societies, and governments.

33. Coordinated action will build key foundations of a digital economy in continental Africa. To foster dynamic, inclusive, and safe digital economies, the DE4A Moonshot will follow a holistic approach to building strong foundations and key use-cases of the digital economy across sectors, as in e-agriculture, e-health, and e-government/GovTech applications. Identified as critical foundations for the Moonshot are digital infrastructure, digital platforms, digital financial services, digital entrepreneurship, and digital skills (box 8). And given the potential of disruptive technologies to reduce the gender divide, as with digitized social transfers, all five foundations will address gender gaps. Digital Development Policy Operations (Digital DPOs), such as Morocco's multi-pillar approach, exemplify this new approach.

34. The DE4A Moonshot will support the African Union initiative for Digital Transformation in Africa. As one of the key partners in the DE4A Moonshot, the WBG provides thought leadership, technical expertise, and financial resources for digital economy projects and reform programs. It is also playing a lead role in donor coordination and wider resource mobilization, along with the UN Broadband Commission *Working Group on Broadband for All*. The DE4A Moonshot will take into account regional initiatives and give special attention to FCV environments and lagging areas.

Box 8 DE4A Moonshot targets

|  DIGITAL INFRASTRUCTURE |  DIGITAL SKILLS |  DIGITAL PLATFORMS |  DIGITAL FINANCIAL SERVICES |  DIGITAL ENTREPRENEURSHIP |
|--|---|--|--|--|
| Universal Internet network coverage Affordable Internet for All at less than 2% of GNI per capita Interim Milestone Doubling broadband connectivity by 2021 | All 15 year old students with basic 'digital skills' competencies 100,000 graduates in advanced digital skills programs annually | Doubling of Online Services Index rating for all Governments All individuals are able to prove their identity digitally At least 50% of the population regularly uses the Internet to access Government or Commercial services | Universal Access to Digital Financial Services Africa-wide payments infrastructure/platform in place | Tripling the number of new digitally-enabled businesses created annually Financing for Venture Capital to reach .25% of GDP |

35. The MENA region has also expanded its strategy to launch a regional program, the MENA Technology Initiative. The digital economy in MENA is still in its infancy. Many of MENA's youth face significant challenges in putting their technology skills to productive use. To keep pace in a rapidly changing world, MENA countries will need to overhaul their regulatory systems to catalyze innovation and encourage competition to allow new firms to enter the market and disrupt connected incumbents and state-owned enterprises that have failed to provide quality services or decent jobs. Along with the five foundations of the DE4A, the MENA Technology Initiative will support client governments to accelerate the development of a dynamic digital economy—spurring broadband internet penetration and spreading digital payments, and more broadly, digital financial services. The initiative will also support a digital ecosystem, focusing on GovTech, safety nets, and digital and entrepreneurial skill development. Working with client governments, the private sector, key development partners and global tech companies, the WBG will also identify key technological disruptions that could be adopted in some countries, including through World Bank operations to address water scarcity, reconstruction, transport congestion, irrigation, or governance.

IX. Moving forward

36. Moving forward, the WBG is mainstreaming the approach to disruptive and transformative technologies through upgrading capabilities in key areas and adopting a programmatic approach in sectors and regions. The Bank, IFC, and MIGA are each taking steps to adapt business models, upgrade skill sets, and improve agility (box 9). To support synergies between projects and exploit different disruptive technologies, the WBG's internal labs—including the Innovation Lab, GeoSpatial Operations Support, Big Data team, and IFC's Innovation Center and Data Collaboratives—continue to expand and support operational teams incorporate the use of data and pilot technologies. These labs examine both the benefits and costs of individual technologies in developing countries, such as the environmental impact of blockchain. The WBG is also building capacity to analyze regional pipeline portfolios to identify common entry points for disruptive technology diffusion in each sector, harness disruptive technology to maximize the development impact of projects, and ensure that projects are appropriately designed to meet national goals in the context of the changing nature of work and economic paths.

Box 9 Upgrading internal capabilities and agility to support new programs

Strategic workforce: WBG management are systematically using the annual business planning process to plan for the impact of disruptive technologies on the emerging skills it will need. The WBG is also scaling up its internal talent marketplace, training, President's award for innovation, and secondee programs to ensure appropriate talent is sourced and developed. The WBG is building and strengthening its staff and its clients' capabilities around emerging technologies through training programs that provide practical learning opportunities around Blockchain, AI, and IoT.

More efficient operations: The WBG is committed to accelerate the internal WBG transformation efforts with both mature and emerging technologies. For example, the development of a new Client Connection program automates data exchange with borrowers' own systems on Bank funded projects. Machine learning is being tested to review audit reports to find problems more quickly, including potential corruption. A blockchain enabled system to report real time results is being piloted for trust fund donors. The WBG has also recently finalized a Data Privacy Policy and Directive that makes clear the institution's approach and commitment to safeguarding data privacy in its projects.

Flexible procurement: The Bank's Procurement Framework includes a flexible suite of tools and approaches to help projects access market innovation. Procurement can play a strategic role in enabling innovation and mainstreaming disruptive technology into Bank operations. The WBG is leveraging the Agile Bank to harness the potential of disruptive technology to improve the way it does business. For example, to model new approaches, the WBG recently developed new toolkits in the medical equipment and water sectors with the support of IFC's TechEmerge and the Agile Bank. Disruptive technologies are also being harnessed to enhance efficiency, transparency, and risk management in procurement. For example, digital construction technology tools enable designs and solutions to be evaluated and appraised in real time.

Private sector engagement tools: IFC is scaling up engagements with private sector innovators and disruptors by mainstreaming innovation and early stage investments in education, health, financial services, connectivity, logistics, power generation and distribution, and agribusiness. It is working with traditional banks to assess their readiness and prepare for digital banking. By scaling up the TechEmerge program, it is connecting disruptive technology solutions from around the world with businesses, including in traditional legacy industries, in developing countries to implement pilot projects and build new partnerships that address development priorities. IFC is also developing concessional financing products that address capital market constraints, such as IDA-Private Sector Window financing in countries where purely commercial sources of financing are not available for early-stage investments.

37. Shareholder support is needed to succeed in programs such as the Digital Economy for Africa Moonshot and the GovTech initiative. The WBG asks the Development Committee to: i) encourage countries to prioritize the investments needed to move forward in these initiatives; ii) support the WBG's role in multilateral fora in advancing on these initiatives; and iii) support the WBG in leveraging resources for these initiatives, including through IDA 19's Jobs and Economic Transformation theme.

Questions for the Development Committee

Does the Development Committee agree with the corporate priorities and programmatic approach outlined in this paper?

¹ Supporting Transformational Change for Poverty Reduction and Shared Prosperity, IEG 2016

Annex: “Disruptive Technologies and the World Bank Group” 2018 Annual Meetings
Development Committee Paper

Disruptive Technologies and the World Bank Group

Creating Opportunities—Mitigating Risks

Development Committee Paper

Abbreviations

| | |
|------|--|
| DE4A | Digital Economy for Africa |
| G20 | Group of Twenty |
| GHG | Greenhouse Gas |
| GSMA | GSM Association |
| HR | Human Resources |
| IBRD | International Bank for Reconstruction and Development |
| ID4D | Identification for Development |
| IDA | International Development Association |
| IFC | International Finance Corporation |
| IMF | International Monetary Fund |
| MIGA | Multilateral Investment Guarantee Agency |
| SDGs | Sustainable Development Goals |
| STEM | Science, Technology, Engineering, and Mathematics |
| UN | United Nations |
| WBG | World Bank Group |
| WURI | West Africa Unique ID for Regional Integration and Inclusion |

Executive Summary

- 1. Traditional pathways to overcome critical development challenges are increasingly subject to technology-based disruptions, creating new opportunities and new risks.** Over the last 200 years, three industrial revolutions fundamentally altered the structure of economies and societies, and we are now in the midst of the fourth industrial revolution. The accelerating pace of technology diffusion, the convergence of multiple technologies, and the emergence of global platforms are disrupting traditional development models. Disruptive technologies can be defined as emerging technologies that result in a step change in the cost or access to products or services, or that dramatically change how we gather information, make products, or interact. Disruptive technologies are expanding access to global markets and changing business models. Automation and artificial intelligence are delivering enormous productivity gains. Digitization is expanding access to basic needs and services by extending finance to the unbanked. And distributed renewable energy technology is bringing affordable power to off-grid rural populations.
- 2. Disruptive technologies also pose new risks—to economic and societal inclusion, and to environmental and systemic sustainability.** Technologies are reshaping the nature of work and increasing the risk of growing inequality. Shifts in the demand for labor and the types of skills that complement technology risk polarization between those with the means to access new technologies and acquire skills for the new economy—and those without. If the enabling environment to be competitive does not adapt, firms will not be able to pursue new opportunities, widening productivity differences, giving first mover advantages, and fostering growth accelerations only in certain sectors and locations. And as technology embeds itself in human and organizational relationships, it could diminish societal trust, disrupt traditional workplace dynamics, and challenge the role of governments as an intermediary.
- 3. Despite the risks, failing to take advantage of the opportunities that disruptive technologies offer could be even more costly.** The economic and societal transformations brought about by disruptive technologies can dramatically accelerate progress toward the SDGs and the twin goals. But if countries cannot compete in the future global economy, they will be left behind. To harness the potential of new business models, new ways of delivering services, and shifting sources of competitiveness, countries require multisectoral and multipronged approaches to expand the opportunities and mitigate the risks.
- 4. The WBG will support countries to create the opportunities and mitigate the risks associated with disruptive technologies by operationalizing the Build-Boost-Broker value proposition.** Disruptive technologies and their applications for development are increasingly being mainstreamed within existing WBG approaches. But urgent action is needed for the WBG—with its knowledge, financing, and convening power—to support countries as they transition to new pathways of sustainable, inclusive growth. Its global experience and multisectoral portfolio provide insights into the ways disruptive technologies can be applied holistically to achieve the twin goals. As a trusted advisor, it will engage governments and people, coordinate development partners, and mobilize the private sector along three pillars. To Build, it will develop the digital and physical infrastructure and regulatory foundations for sustainable, inclusive technology-enabled economies. To Boost, it will expand the capacity of institutions, communities, firms, and individuals to leverage technology-led disruption for socioeconomic dividends and greater resilience in times of change. To Broker, it will harness disruptive technology, data, expertise, and partnerships to solve development challenges and ensure that the poor share in the benefits. This approach builds on the findings in the forthcoming 2019 World Development Report: *The Changing Nature of Work*, and complements the other Development Committee papers on *Human Capital: A Project for the World* and the Bali Fintech Agenda.

5. **Build—the WBG will ensure that countries can take advantage of the new pathways of growth by having the digital and physical infrastructure and enabling environment to compete across all sectors of tomorrow’s economy and the digital foundations to expand access to new opportunities.** WBG thought leadership on what is changing, why it matters, and where the new opportunities lie will help clients identify new pathways to support tech-enabled sustainable development. Such research and analysis, complemented by toolkits, can be readily applied to a range of countries or tailored to a given thematic issue. Taking policy to practice, the requisite infrastructure and regulatory frameworks for affordable broadband connectivity can help bridge the digital divide. New advances in sustainable power sources and new modes of providing transportation services offer inclusive solutions in themselves and provide important inputs to realizing the potential of the digital economy. And, bringing people online goes beyond broadband access to require digital platforms and services, such as secure identification platforms and financial services. It also requires updating regulatory frameworks to address new business models, new concerns about data privacy and cybersecurity, new forms of competition, and new roles for intangible assets.

6. **In building the foundations for sustainable, inclusive technology-enabled economies, the WBG will scale up efforts toward universal, affordable digital connectivity.**

7. **Boost—the WBG will support the concerted efforts of governments, firms, and workers to adapt to technology-enabled disruptions and to thrive in the new economy.** Providing thought leadership on how economies should respond to tech-enabled disruption can boost the capacity of individuals, firms, and institutions to form resilient societies. Investments in digital skills can empower individuals to take advantage of new opportunities, just as the Human Capital Project’s emphasis on foundational cognitive and socioemotional skills can better equip them for the changing nature of work. Firms can adapt to new market opportunities by improving their capabilities to absorb disruptive technologies. And to ease the adjustment of communities to tech-enabled disruption, governments can improve the speed, reach, quality, and efficiency of public services, through digitally-enabled service delivery, and progressively move toward universal social protection.

8. **To boost the capacity of institutions, individuals, societies, governments, and businesses to leverage technology-led disruption for socioeconomic dividends, the WBG will scale up efforts to support the development of skills and capabilities for the new economy and the provision of transparent, efficient, and accountable digital government services.**

9. **Broker—the WBG will provide “disruptive” leadership in the global search for technology-enabled solutions to intractable development challenges.** Through both pilots and early-stage investment and advisory programs, the WBG will adapt emerging technologies in cross-sectoral contexts, with an eye toward scalability, sustainability, and measurable impact. It is applying new technologies to accelerate meeting existing goals—such as Universal Financial Access, Universal Health Coverage, and clean energy initiatives. It is harnessing technology to address data gaps, underscoring its role as provider and facilitator of development data through partnerships with the private and public sectors. It is also promoting policy coherence in the disruptive technology space by participating in multilateral dialogues, enhancing synergies between public and private institutions, supporting global industry standards, and addressing regulatory gaps. In seeking to be the partner of choice for governments, technology firms, and other public and private stakeholders, the WBG will ensure that it harnesses disruptive technology, data, expertise, and global coalitions to accelerate progress toward the SDGs and the twin goals.

10. **To operationalize the Build-Boost-Broker value proposition outlined here, the WBG will scale up its efforts under each of the 3 pillars and upgrade internal capabilities.** The WBG will also engage in activities that cut across the Build-Boost-Broker pillars, including supporting country diagnostics that help chart the new drivers of growth and the formulation and implementation of agile regulations for the new

economy. The WBG will also upgrade its internal capabilities agenda—improving the coordination, institutional agility, and skill mix of staff.

11. Shareholders can support the pursuit of the priorities proposed here by increasing their advocacy for the Build-Boost-Broker value proposition in their countries and regions and by supporting the WBG’s role in multilateral dialogues and in leveraging resources in the disruptive technology space.

First, the WBG asks the Development Committee to emphasize the need for countries to prioritize investments across the Build-Boost-Broker pillars and to be partners in creating an enabling environment to harness disruptive technologies as drivers of growth. Second, harnessing disruptive technologies to find new development pathways can be accelerated by supporting the WBG’s role to engage in multilateral fora, convene coalitions with the private and public sectors, and contribute to global standards and address regulatory gaps. Third, the transition to sustainable development pathways will benefit from leveraging resources for the disruptive technologies agenda—including through the IBRD and IFC capital increases, the ongoing IDA18 replenishment, and the financing windows to be explored during the IDA19 replenishment.

Questions to the Development Committee

Does the committee agree with the proposed Build-Boost-Broker approach to support countries in exploiting opportunities and managing risks associated with disruptive technologies?

Does the committee agree with the proposed areas of engagement for the WBG?

I. Build, Boost, and Broker to embrace technology-enabled disruption

1. **Fast-diffusing technologies are converging to disrupt traditional development pathways.** Over the last 200 years, three industrial revolutions have fundamentally altered the structure of economies and societies, and we are now in the midst of the fourth. All technology causes change in some way, replacing the old with the new—the Blackberry replaced the 2G cellphone and the iPhone replaced the Blackberry. These were important advances, but incremental. This approach defines disruptive technologies as having an impact not just incremental, but typically characterized by a step change in the cost or access to products or services with potential to disrupt traditional pathways of economic development. The advent of widely available and affordable mobile telephony was truly disruptive because it changed the way people interact and launched a series of subsequent technological innovations. Digital payments and digital financial services are fundamentally disrupting access to finance. But this is not only about digital technologies. For example, a similar transformation is disrupting energy markets. The increasing efficiency of solar panels has made solar commercially viable to provide energy in remote locations where access to the grid is limited
2. **The economic and societal transformations brought about by the disruptive technology trends described in this paper are creating a new paradigm for development that can accelerate progress toward the twin goals and SDGs.** The World Bank Group, the development community more broadly, and governments everywhere must recognize these disruptive trends and take steps to harness them. Most countries need to build digital economies as critical for many other changes. These trends also bring risks, but for developing countries they also create tremendous opportunities. Given the potential productivity and welfare gains from disruptive technologies, the opportunity cost of not engaging is rising—and if countries cannot compete in the future global economy, they will be left behind.
3. **The World Bank Group—with its global knowledge, financing, and convening power—is uniquely positioned to help client countries harness the disruptive technologies and to help address the downside risks and impacts of disruption.** With changing business models, new ways of delivering services, and shifting sources of competitiveness, the multisectoral agenda requires a multipronged strategy. That is why the WBG proposes multisectoral cross-institutional approaches to support countries by implementing the Build-Boost-Broker value proposition. Together with the private sector and development partners, the WBG will help:
 - **Build** the infrastructure and regulatory foundations to expand the diffusion of and access to new technologies.
 - **Boost** the capacity of individuals, institutions, businesses, and governments to pursue new opportunities and to thrive in the face of change.
 - **Broker** the use of technologies to address specific development challenges and to shape the global dialogue and standard setting associated with disruptive technologies.
4. **Building the physical infrastructure, digital infrastructure, and regulatory foundations to expand access to new technologies is essential to take advantage of the changing pathways of growth that disruptive technologies bring.** This agenda will require tough forward-looking choices, such as planning long-term infrastructure investments, as technological change makes legacy systems redundant. The digital economy will be a cornerstone for most disruptive technologies, with both physical and digital infrastructure development and regulatory reform underpinning the transition. New financial markets and services can make possible new types of transactions and business models. In the face of rapid change, more adaptive regulatory approaches will be needed to support innovation and competition and address new issues in consumer protection and privacy. Thought leadership and continuing evaluation of approaches will thus be essential to identify new pathways to support inclusive and sustainable growth.

5. **Boosting the capacity of individuals, firms, and governments to adapt to technology-led disruption will enable countries to reap social and economic dividends.** Complementing a stronger enabling environment that expands access to technologies is the growing capacity of the actors to adopt and use them to pursue new opportunities. New technologies are already changing the demand for workers and the types of skills needed across a growing set of sectors and occupations. The demand for digital skills that complement these technologies is also rising, but so too is the need for cognitive and socioemotional skills that enable people to adapt whatever the jobs of the future might be. Similarly, as individuals and firms adapt to the changing nature of work and business, governments also need to adapt social protection for inclusiveness and manage the costs. In the gig economy, for example, people are not tied to “standard” long-term contracts with a single employer. They work freelance—from grocery delivery and driving services to more sophisticated tasks like accounting or teaching—on a more flexible basis.

6. **Brokering partnerships to harness disruptive technologies, data, and expertise will enable countries to solve development’s challenges.** The WBG, given its convening power, is well placed to develop broad-based partnerships with technology providers and to broker new development solutions. For example, the WBG has partnered with data providers, such as LinkedIn, to provide information on skills likely be in demand in the future. Fintech and blockchain hold the potential to bank the unbanked faster than ever before. Computer-assisted instruction, by enhancing the effectiveness of teachers, and digital platforms, by expanding access to state-of-the-art knowledge, can be game-changers for education outcomes. Mobile applications, satellite-based tools, and the use of drones, for example, are eyes on the ground in fragile and conflict settings. These technology solutions typically require shared expertise, data, and capital and will therefore benefit from partnerships between the public and private sectors. And global coalitions will pave the way for shaping global norms on fintech, data privacy, and cybersecurity.

7. **The WBG will thus support countries as they expand the opportunities and mitigate the risks associated with disruptive technologies—with the potential to do even more.** The WBG’s analytical, technical, and financial offerings and its global experience and multisectoral portfolio give it unique understanding of how disruptive technologies can be applied holistically to achieve sustainable, inclusive growth. To realize the Build-Boost-Broker value proposition, the WBG will need to engage governments and people, coordinate development partners, and mobilize the private sector along the three pillars. This approach builds on the findings in the forthcoming 2019 World Development Report: *The Changing Nature of Work*, and complements the other Development Committee papers on *Human Capital: A Project for the World* and the Bali Fintech Agenda.

II. Because disruptive technologies are transforming development pathways, the WBG proposes an updated approach

The world is facing critical development challenges

8. **Despite decades of progress in boosting prosperity and reducing poverty,² important development challenges persist.** First, inequality of opportunity continues to be high. Around 50 percent of the world’s people cannot access essential health services, and 250 million children under the age of five are stunted. Two hundred and sixty million youth are out of school, while nearly 60 percent of those in primary school fail to achieve minimum learning proficiency. These quality and coverage gaps in the building blocks of the next generation’s human capital undermine future productivity. Second, crucial services are denied to many. Four of five poor people are not covered by a social safety net in the poorest

countries; around 1.7 billion adults do not have a bank account; and 3.8 billion of 7.5 billion people do not have access to the internet.

9. **At the same time, new development challenges—requiring new solution paradigms—are on the horizon.** Demographic dynamics related to shifts in the working-age population, migration, and urbanization are changing economic fundamentals and skewing the benefits of economic growth. Environmental concerns over climate change, pollution, water scarcity, and deforestation are becoming more pressing. There is also a humanitarian crisis brewing with forced displacement almost doubling over the past two decades, rising to a record-high 68 million people in 2017. Finding bold solutions to both old and new challenges is key to achieving the Sustainable Development Goals (SDGs) and the WBG’s twin goals.

Traditional pathways to overcoming development challenges are increasingly subject to technology-based disruptions

10. **Overcoming these challenges will require progress across several traditional development imperatives, but technological advances will create new opportunities and risks.** Traditional development imperatives comprise a range of factors such as political and macroeconomic stability, governance structures, institutional quality, social cohesion, human capital development, connectivity, productivity, and competitiveness. The provision of global public goods—to deal with forced displacement, climate change, and major disease outbreaks—also need to be addressed. Technological change provides new opportunities to leapfrog traditional development imperative challenges, just as the rapid spread of mobile phones reduced the need for landline connectivity. But it can also introduce new risks, which necessitate greater urgency for catching up in each of these dimensions. With skill-biased technological change, for example, people lacking human capital risk being left behind.

11. **Technologically-driven disruption is not new.** The First Industrial Revolution in the early 1800s, with widespread adoption of the steam engine, established the machine as one of the main means of production, in agriculture, in transport, and in manufacturing. The Second Industrial Revolution began in the late 1800s and lasted until the 1920s as electricity transmitted the production and consumption of energy over great distances, increasing productive efficiency and enabling long distance communication. The Third Industrial Revolution, the Digital Revolution, began with the invention of the computer, replacing analog electronic and mechanical devices with digital technology, unleashing technological innovation, mobile telephony, and the internet.

12. **Driving the Fourth Industrial Revolution are emerging and disruptive technologies, starting with widespread access to the internet and mobile communications and unprecedented increases in the processing power of computers.** The exponential increase in data arising from the internet and widespread connectivity—and the expanding capacity of computers to process that data—are accelerating breakthroughs in artificial intelligence, robotics, autonomous vehicles, 3D printing, biotechnology, materials science, and energy storage.

13. **While disruptive technologies are based on different technologies, the digital economy accelerates their impact.** Data and affordable connectivity supercharge mobile finance and payments and accelerate progress toward universal financial access. Data are also driving artificial intelligence and augmented reality, which are in turn driving mechanized manufacturing, autonomous vehicles, health treatments, and gene splicing.

14. **Distinguishing the current wave of technological change are the intensity of knowledge, the accelerating pace of diffusion, and the convergence of multiple technologies.** Past technological advances creating new goods and services and transforming production processes generated enormous development impacts. But today’s technological change differs in three ways. First, there is a sharp

increase in the knowledge-intensity of technology-enabled products and processes and often a decline in their labor intensity. Second, although many technologies are not new, falling costs, evolving business formats, and changing consumer preferences are fueling their adoption at a faster pace than before. Third, multiple converging technologies can be rolled out at scale, a “compound effect.” While often based on digital technologies and products, they go far beyond connectivity and the potential of the internet. These include modern production methods as robotics, artificial intelligence, and the Internet of Things. They also include advances in nanotechnology and biotechnology—and such new product lines as batteries, drones, solar panels, self-driving vehicles, and exotic materials.

15. **As a result, traditional development pathways are increasingly subject to technology-based disruptions.** Disruptive technologies can be defined by those that typically result in a step change in the cost or access to products or services for individuals, companies, and governments, especially as they converge with one another, compounding their transformational impact. Five metatrends stand out as disrupting development pathways (box 1). Disruptive technologies can also be defined by emerging technologies that dramatically change how we gather information, make products, or interact.

Box 1 Technology metatrends disrupting traditional development pathways

Filtering 200 disruptive technologies for their specificity, speed of impact, and relevance to poverty reveals five meta trends that are particularly relevant for development:

Global digital platforms emerge as new means of production. Global digital platforms will consolidate value chains and allow greater interoperability. This will reduce the need for intermediaries, as knowledge, labor, and digital and physical assets flow more freely and create more opportunities. But these platforms, with their concentrated data ownership, also raise the potential for monopoly power, exclusion, privacy invasions, and cyberattacks.

Expanding access to basic needs and services. New technologies are enabling physical assets in healthcare, agriculture, energy, and water to be partially digitized, expanding potential access to basic services by changing cost and funding models. Service delivery models are also shifting, at times moving away from network solutions to distributed solutions that target specific areas or populations.

The nature of work changes and the augmented labor force emerges. Advances in machine learning, artificial intelligence, and robotics will change how we work. Routine jobs will increasingly be automated, while non-routine jobs, where human skills complement technology will increase. An augmented labor force will marry the strengths of humans and machines, and employee-employer relationships will continue to shift. Localization may develop as additive manufacturing changes supply chains, immigration, and urbanization.

New skills and learning mechanisms requirements. Demand will increase for skills that complement new technologies, including advanced cognitive skills (such as complex reasoning), socioemotional skills (such as team work), and skill combinations predictive of adaptability (such as problem solving, self-efficacy, and entrepreneurship). Individuals will need multiple opportunities to upskill and reskill themselves throughout life. To provide these opportunities, education and training systems will need to become more flexible, nimble, and responsive.

New social contracts. Digitization, new platforms, and collaborative digital business models put pressure on organizational hierarchies and change the nature of elected and appointed leadership. Non-state actors will exert considerable pressure on government, its legitimacy, and its role as a trusted intermediary with the advent of transactions on distributed ledgers. Distributed ledger technologies will have to work with governments if they need legal enforcement to function properly. The decoupling of employment status and social protection—with workers being part-time in the gig economy and changing jobs more frequently—is likely to require more universal forms of social protections.

Disruptive technologies offer new opportunities to accelerate progress toward the SDGs and the twin goals

16. **Disruptive technologies can increase the reach and inclusiveness of service delivery at lower cost with faster diffusion.** Mobile connectivity and new data-driven models of financing can “bank” the unbanked faster than ever before. Big data and artificial intelligence can reshape high-quality education and learning through precisely targeted and individually customized human capital investments. Battery storage technology holds the promise of bringing affordable and sustainable power to off-grid populations. The shared economy and e-logistics are redefining transport infrastructure and services, which will be further transformed by autonomous vehicles and drones. Mobile applications, GPS satellite systems, and unmanned aerial vehicles can monitor areas affected by conflict or natural disaster.

17. **Technology-enabled disruptions also present new productive opportunities for individuals, firms, and governments.** For individuals, new technologies transform old jobs, generate new jobs, and enhance productivity. Online platforms, for example, can expand access to income-earning opportunities for a wide range of skills by bringing buyers and sellers together. Digital technologies enable flexible work schedules, with the potential to mitigate constraints on women’s economic participation related to care responsibilities, mobility limitations, and social restrictions. For firms, the rise of global online platforms can reduce search and transaction costs, enabling productivity gains thanks to competition, scale economies, and technology diffusion. For governments, technology can improve the efficiency, transparency, and accountability of public service delivery—and dramatically reduce corruption. It can also broaden the inclusiveness of social protection and help tailor programs to the precise needs of recipients, including those in the most fragile contexts.

Disruptive technologies also introduce new risks

18. **Disruptive technologies pose new societal and environmental risks.** As technology embeds itself in human and organizational relationships, trust will become more fluid, dependent on context. Technologies such as blockchain can enhance trust and even remove the need for “trusted” intermediaries. But trust might diminish because digital media can invade privacy, artificial intelligence can embed societal biases in code, and most disruptive technologies have dual-use (civilian and military) applications. Technologies may also pose new environmental risks, since distributed ledgers require more energy and the raw materials for components of new technologies have to be sourced and discarded.

19. **Disruptive technologies are reshaping the nature of work and increasing the risk of growing inequality.** With more routine tasks now automated, most jobs will require a basic threshold of human capital. With advances in machine learning and artificial intelligence, even highly-skilled routine tasks are likely to be disrupted. There will thus be a premium on skills that complement technology—not only technical skills but also socioemotional and creative skills for greater adaptability and lifelong learning. The polarization of jobs between those with the means to acquire skills for the new economy and those without may fundamentally change labor markets, reducing social cohesion.³ With the Internet of Things, advanced robotics, 3D printing, and the like reducing the importance of labor costs in determining competitiveness, the traditional development model of labor-intensive export-led manufacturing may be less feasible. Differential access to new technologies and the capabilities to use them risks increased inequality between and within countries.

20. **The shifting basis for the competitiveness of firms has implications for job creation and productivity growth.** Digital platforms will disrupt analog business models. Some firms risk getting left behind due to the digital divide, lack of scale, paucity of know-how, stranded assets, and inadequate management.

21. **Governments could be less able to protect the poor, vulnerable, and those excluded by rapidly changing market conditions.** Increased digitization, distributed trust technologies, and new platforms will exert considerable pressure on the concept of sovereignty and the role of government as a trusted intermediary. The disruption of traditional workplace relationships, including the gig economy, will require new forms of social protection. And the ability to service markets without a physical presence and the transferability of intangible assets across jurisdictions can erode the tax base. Privacy invasions, cyber threats, illicit financial flows, and bioengineering also need to be tackled.

Urgent action is needed to create the opportunities and mitigate the risks associated with technology-led disruption

22. **Governments must step up efforts to create opportunities and mitigate risks.** The public sector has a critical role to play in helping correct market failures, ensuring a level playing field, and reducing information asymmetry. Governments can also use: i) push instruments that promote the development and supply of technologies; ii) pull instruments that create and/or expand demand for disruptive technologies; and iii) policies that provide a sound regulatory framework that encourage innovation, enhance inclusivity, and protect consumers.

23. **The WBG is mainstreaming new approaches to disruptive technologies and their applications to achieve the twin goals.** The *Forward Look* lays out a multifaceted plan for the WBG to support client countries in advancing technologies and transforming their economies. For example, by supporting regulatory reform, the WBG has been at the forefront of creating renewable energy markets. *Maximizing Finance for Development* is leveraging the private sector to address the financing gap and making innovative use of technology to help close the investment gap of US\$2.5 trillion every year until 2030. The IFC's *Creating Markets Strategy* and MIGA's *2020 Strategy* are creating new market opportunities, including technology solutions that reduce search and transaction costs. The WBG will continue to produce evidence of what works through pilots and early stage investments and advisory services. WBG partnerships between IFC's early-stage investment operations in infrastructure, e-logistics, manufacturing, and financial services have enabled the diffusion of renewable energy, fintech, and electric vehicle batteries in emerging markets.

24. **The WBG's Cascade approach is harnessing the power of disruptive technology for inclusive development.** It creates opportunities for the private sector to develop original and country-tailored technology solutions to solve local problems, recognizing that technology skills and market knowledge lie primarily with firms. It focuses on building the regulatory and policy conditions that can allow disruptive businesses to thrive—by supporting smart and agile regulatory frameworks, by fostering international regulations that foster certainty and protection, and by ensuring that inclusive business models can diffuse innovations to the bottom of the pyramid.

25. **Much more is needed for the WBG to lead in supporting countries as they transition to new pathways of sustainable, inclusive growth.** The WBG's engagements will be tailored to each country's level of development (FCV, LIC, small states), screening for client commitment and capabilities. Understanding what is disruptive about particular technologies helps identify which problems they are well-suited to address, what complementary factors need to be bolstered to enable them to be effective, and what new challenges they may introduce. They are most valuable when they help people at scale with incentives and resources to produce substantial development impacts.

26. **The WBG's technical expertise, financial and advisory offerings and convening power position it as a trusted partner of choice to harness disruptive technologies for development.** The WBG's public and private sector clients have asked for support in addressing disruptive technologies and the WBG is well positioned to respond. Given the opportunities, risks, and uncertainties, the value of

WBG support for new, sustainable pathways of development lies in its ability to work at the confluence of global and local issues. It complements knowledge creation with operational financing across sectors and regions and forges partnerships with both the public and private sectors. Its public and private financing instruments are also designed to respond to changing environments and implement relevant policies. And with its convening power, neutrality in policy advice, and previous engagements to provide global public goods, it is in a unique position to leverage partnerships that use disruptive technologies to solve development challenges.

III. Building the foundations for sustainable and inclusive technology-enabled economies

27. With the right foundations, countries will be able to take advantage of the changing pathways of growth that new technologies can bring. The WBG's support to scale up opportunities and minimize potential risks can be leveraged in the following ways.

- New research, analytical work, and thought leadership will help clients identify new pathways to inclusive and sustainable growth—and understand the impact of new technologies and programs to harness them for development.
- Financing instruments and regulatory frameworks will facilitate the creation, expansion, and protection of core digital infrastructure, including connectivity, digital identification, and digital financial systems. And they will leverage new ways disruptive technologies are reshaping other physical infrastructure such as in power and transportation.
- Adapting smart and agile regulatory frameworks will promote innovation, competition, and inclusive access to new opportunities disruptive technologies bring.

28. **Providing thought leadership on what is changing and where new opportunities lie will help build the foundations for tech-enabled sustainable development.** The WBG's Global Practices are producing flagship reports, policy notes, and innovative research to disseminate lessons on approaches that work. Some are global, such as the 2016 World Development Report on *Digital Dividends*, and others are country-specific. The WBG also has frameworks to help client countries think through how to deal with the future of manufacturing and how to leverage technology and national innovation systems to drive growth, as in *Trouble in the Making? The Future of Manufacturing-Led Development* and *The Innovation Paradox*. New WBG research is quantifying the impact of automation on trade patterns and labor market outcomes as well as taxation models robust to disruption. Tech-enabled disruption has also featured prominently in identifying new sources of growth, as in *China New Drivers of Growth* and *Rwanda Drivers of Growth*. Indeed, the tech-enabled agenda drives a wide range of economies (box 2).

Box 2 Addressing “disruption” in new WBG country engagements

Each of the last three industrial revolutions gave birth to new development paths for countries to escape poverty and middle-income traps.

In this fourth industrial revolution, the diffusion and adoption of new disruptive technologies offer new growth opportunities for many WBG clients. As before, adapting quickly to new technology can allow latecomers to catch up, break out of traditional pathways, bypass development stages, and overtake established leaders. Key ingredients for disrupting traditional development trajectories include:

§ A compelling vision by country authorities, who should have a keen understanding of global disruptive trends and a scenario of a desired future.

§ Transformative leadership and accountable public institutions, which can mobilize the national elite and

interest groups and inspire societal activism.

§ Sustained high growth rates and distributions of benefits, thanks to structural reforms to support sectors essential to accelerated development.

§ Catch-up policy regimes, which accelerate sectoral change, ensure low-cost entry, and nurture local firms.

§ A vibrant private sector and entrepreneurial ecosystem, with strategic partnerships for R&D, and digital capabilities to accelerate the transfer and adaptation of technology.

§ Forward-looking system diagnostics, to identify a country's binding constraints, sources of growth, and pathways for leapfrogging.

§ Sustained science, technology, and innovation initiatives, linked to the SDGs.

§ Investments in foundational infrastructure, regulation, human capital—and in providing services and new technology to a large part of the population.

§ Financing instruments, including budget support, development impact bonds, and contingent financing instruments.

§ Regional and South-South cooperation and partnerships.

29. **WBG research and analysis, complemented by toolkits and diagnostics, will be readily applied to a range of countries and tailored to thematic issues.** Diagnostics and tools for the digital economy include a common set of indicators for connectivity, platforms, skills, financial services, and entrepreneurship and innovation.⁴ To be piloted in Africa, these assessments will be scaled up to meet growing demand. Other diagnostics include toolkits for broadband strategies, digital identity, and ICT regulation. The new Public Expenditure Review for Science, Technology, and Innovation will help governments formulate policies, adopt good practices, and coordinate national innovation systems.

30. **Affordable broadband connectivity bridges the digital divide and creates the enabling environment for disruptive technologies.** Broadband access for all requires digital infrastructure in terms of connectivity and regulatory frameworks that promote investment and competition in telecoms. The WBG's *Digital Infrastructure Initiative* is coordinating telecom interventions in 11 Sub-Saharan countries by providing capital, structuring financially sustainable projects, mobilizing investors, and advising public stakeholders on relevant regulatory reforms. The *Smart Village Initiative in Niger* combines the deployment of essential infrastructure with regulatory reforms in spectrum management to bridge the urban-rural digital divide. *Digital Central Asia and South Asia* improves broadband internet connectivity among landlocked countries by catalyzing private investment in infrastructure and modernizing regulatory frameworks to promote innovation and expand affordable coverage. It also requires complementary infrastructure investments in transportation and reliable power—sectors where disruptive technologies are also contributing to lower costs and greater accessibility.

31. **Bringing unconnected people online goes beyond broadband access to include digital platforms and financial services to enable transactions to take place.** Secure digital identification platforms with appropriate data protection will likely be necessary for digital transactions. The WBG's *Identification for Development (ID4D)* initiative offers governments technical assistance to support the design of identification systems (box 4). The *West Africa Unique ID for Regional Integration and Inclusion (WURI)* is a 10-year multiphase programmatic approach operation with the ECOWAS Commission to build ID platforms that are interoperable across Benin, Burkina Faso, Côte d'Ivoire, Guinea, and Niger. This project is a good example of regional approaches to the connectivity agenda. Providing the infrastructure for digital financial services is also essential for digital exchange—to make payments and transfer money electronically, for e-commerce and e-government. As outlined in the Bali Fintech Agenda, prepared jointly with the IMF, the WBG's initial focus will be on facilitating foundational infrastructures, enabling reforms and capacity building for fintech solutions to deepen financial markets, enhance responsible access to financial services, and improve cross-border payment and remittance transfer systems. It will draw on IFC's and MIGA's growing experience in this space. The WBG's *Digital Economy for Africa (DE4A) initiative*,

in partnership with African governments and the private sector, combines all these elements of the digital connectivity ecosystem (box 3).

32. **Building the foundations for tech-enabled sustainable development also requires regulations conducive to leveraging new opportunities and managing risks.** Regulatory frameworks have to address new business models, data privacy and cybersecurity, changing employer-employee relationships, new forms of competition, and a new class of intangible digital assets. Fewer than 30 percent of countries have regulations on data relating to privacy, trust, ethics, or cyber security—even fewer have the capacity to enforce them. The WBG will support countries in understanding and mitigating legal risks associated with privacy, cybersecurity, data protection, data governance, and access to information. It will also develop a framework for addressing digital privacy and security for developing countries, building on its decade of experience in fintech. The IFC is currently developing a code of conduct for ethical use of information, especially for AI applications.

Box 3 Digital Economy for Africa—A cross-GP and cross-WBG initiative

Technological advances can drive inclusive economic growth and offer the potential to leapfrog traditional stages of development. To address those left behind, the WBG launched the Digital Economy for Africa (DE4A) initiative at the 2018 spring meetings, partnering with African governments and the private sector to realize the full benefits of digital technologies. Mobilizing a wide range of Bank Group instruments and expertise, the initiative focuses on:

- The physical infrastructure that is the backbone of a digital economy, universal in coverage and universally affordable.
- The foundational digital platforms of digital payments and transactions and digital identification that allow individuals, businesses, and governments to interact and transact with one another.
- Digital platforms such as e-commerce, digital finance, and e-government that drive usage and foster economic activity.
- Digital skills and literacy to create a digitally savvy workforce and foster competitive markets.

Currently piloted in Senegal, the initiative will be extended to other countries in East and West Africa and then to the rest of the continent.

Box 4 The World Bank Group’s Identification for Development initiative

An estimated one billion people lack official proof of identity with the vast majority (81 percent) in South Asia and Sub-Saharan Africa. The international community has recognized the transformational potential of identification for a wide range of SDGs, such as those related to legal identity for all, financial inclusion, women’s economic empowerment, safe and orderly migration, and effective social safety nets. Digital identification has to be coupled with comprehensive legal and regulatory frameworks that address privacy, data protection, cybersecurity, and nondiscrimination.

ID4D collaborates with other WBG initiatives (*Digital Economy for Africa*, and the IDA sub-window for refugees and host communities), the private sector, and development partners from inside and outside the United Nations system. Working across thought leadership, country and regional engagement, and convening global partnerships, ID4D has supported more than 30 countries since 2014. The *Principles on Identification*, fundamental to maximizing the benefits, have been endorsed by more than 20 public and private sector organizations.

Corporate priorities to “Build”

33. **To do more to support building the foundations of the digital economy, the WBG will:**

- **Expand universal, affordable digital connectivity.** Four hundred million people live in zones not served by a digital signal, 2.2 billion do not have a personal ICT device, 6 billion do not have access to broadband internet, and more than 1 billion do not have digital proof of identity. Extending the coverage of cellular networks and voucher programs for rural access is likely to cost US\$300 per

person or US\$120 billion in total for the 400 million digitally unserved. And an estimated US\$12 billion is required to achieve digital identification for all. The digital connectivity agenda will require the WBG's Global Practices to join forces, with a coordinating framework that facilitates governance, ownership, expertise, and accountability. The Cascade approach will ensure that private investment is maximized, while thought leadership informs approaches to regulation.

IV. Boosting the capacities of individuals, firms, and institutions to thrive in the face of disruption

34. **To ensure that more people, firms, and institutions take advantage of new opportunities, the capacity to adopt and use technologies must be strengthened, and approaches to supporting resilience revamped.**

- For individuals, the development of digital skills and strong foundational cognitive and socioemotional skills will equip them for the changing nature of work, as technology makes investments in human capital more effective.
- For firms, technology adoption and innovation can be enhanced by fostering local entrepreneurial ecosystems, including early-stage financing instruments, start-up accelerators, and other programs that support the development of firm capabilities.
- For governments, rapid changes in traditional workplace relationships, social cohesion, and trust are redefining the state-citizen interface. Governments will thus have to change their approaches, enhance their capabilities, and support the transition to the new economy by supporting people-centered services through digitization and a new social contract that adapts social protection programs.

35. **Providing thought leadership on how economies can respond to tech-enabled disruption is the first prerequisite to boost the capacity of individuals, firms, and institutions to form resilient societies.** The 2019 World Development Report on *The Changing Nature of Work* emphasizes a new social contract centered around larger human capital investments and progressively universal social protection to boost the capacity of individuals to adapt to tech-enabled disruption (box 5). For technology skills training, the WBG has a toolkit for practitioners outlining the human, financial, organizational, and communication resources to plan, implement, monitor, and evaluate coding bootcamps. It is also piloting data initiatives to measure technology diffusion to firms to understand the drivers and constraints and the impacts on firm productivity and employment. And it will pursue further research on incentives for the adoption and use of new technologies by firms and workers.

Box 5 WDR 2019 on *The Changing Nature of Work*

Technology is changing the nature of work in two ways. First, it is changing the skills demanded in labor markets. The demand for advanced cognitive and socioemotional skills is increasing, while that for less advanced skills that can be readily automated is decreasing. Second, technology is changing production patterns. With the rise of platform marketplaces, the boundaries of a firm are blurring. There is a perceptible concentration of activities in a few large firms, which can expand at virtually no marginal cost.

Despite these two big changes, large shares of workers in developing countries remain in low-productivity employment, often in the informal sector with little access to technology or protection. Many developing countries continue to have inadequate tax bases, weak governance and administrative capacity, and high poverty rates. For such contexts, technology provides opportunities to create new jobs in old and new sectors, increase productivity in the informal economy, and deliver effective public services. Significant gains can also come from reducing tax avoidance by global corporations, especially the new platform companies.

Governments can seize the benefits of technological change through more and better investments in human capital, basic infrastructure, and social protection. Strong human capital foundations, created in early childhood and predictive of lifelong learning, are more important than ever. The Human Capital Index highlights the link between health and education investments and the productivity of future workers. Investments in human and physical capital need to be complemented by stronger social protection systems. Governments should protect people independent of how and where they work through progressive universalism, which expands coverage and emphasizes adequate support to those most in need.

36. **Investing in digital skills can empower individuals to take advantage of new opportunities.** Digital literacy is a stepping stone for more advanced technology-related skills as well as science, technology, engineering, and math (STEM) education. The WBG's lending operations have supported Bangladesh, Ghana, Mexico, and Nigeria to promote digital skills, innovation, and IT industry development. And through its *Coding Bootcamps*, the WBG has been piloting rapid technology skills training as a tool for addressing youth unemployment in emerging markets.

37. **The human capital agenda to equip individuals for the changing nature of work rests on strong cognitive and socioemotional skills.** General cognitive skills for functional literacy and numeracy are the foundation for acquiring subject knowledge. Socioemotional skills comprise beliefs, attitudes, and behaviors that allow individuals to manage emotions, set goals and plans to accomplish tasks, overcome setbacks, and deal with uncertainty. Both cognitive and socioemotional skills are essential for lifelong learning. The IFC has invested in Andela to help large companies and startups in Sub-Saharan Africa meet their demand for comprehensive 21st century skills, recruiting and retaining women in its coding bootcamps and talent pipelines.

38. **Technology-enabled solutions are facilitating more effective human capital investments.** Geo-social big data and mobile technologies can reach underserved populations. AI and digital technologies can target more precisely and customize investments to individual needs. And computer-assisted instruction and pedagogical support can greatly improve the quality of service delivery. The WBG is providing support to innovations and pilots that use technology to improve learning outcomes. The READ project in The Gambia supports the creation of digital STEM content to support low-capacity STEM teachers in classrooms and trains them in the use of interactive whiteboards with students.

39. **Firms can adapt to new market opportunities by improving their capabilities to absorb disruptive technologies.** Local entrepreneurial ecosystems can help firms identify market opportunities, develop and test new products and services, and access mentors and finance. The *Kenya Industry and Entrepreneurship Project* will improve the quality of services provided to startups through incubator and accelerator programs, boosting technology-related skills and strengthening linkages with larger firms to facilitate technology diffusion. The project also leverages the IFC's venture capital funding. *Innovate in India for Inclusiveness* facilitates innovation in biopharmaceutical products and medical devices, unlocking the capabilities of firms to create new markets for a new range of affordable yet high-quality products. These products can treat diseases that disproportionately affect the poor in India and elsewhere in the developing world.

40. **By improving the speed, reach, quality, and efficiency of public service delivery through digitization, governments can ease the adjustment of individuals and firms to tech-enabled disruptions and reduce the transition costs.** The WBG's *eTransform Ghana* project has supported the government through a series of projects to transform public service delivery through the digitization of taxation, business registration, and financial management. To digitize the citizen-state interface, the *Smart Cities Initiative* is supporting the institutional capacity of mayors and city agencies across the world, from Medellin (Colombia), to Karachi (Pakistan), and to Ho Chi Minh city (Vietnam). These initiatives are part

of the larger GovTech agenda to provide digitally enabled public services (box 6). MIGA also supported private investors providing high-tech port inspection services across 10 countries in Sub-Saharan Africa.

Box 6 GovTech—A global agenda for public sector and civic engagement transformation

GovTech has the potential to transform public sector efficiency, transparency, and performance. Citizens increasingly expect governments to deliver public services digitally, with a customer focus. Public mobilization in the age of social media platforms creates new avenues for citizen engagement. The growth of digital data—through sensors, smartphones, social media, and satellites—represents a new asset class for more efficient decision making and public sector responsiveness. Successful GovTech initiatives will need to integrate these new sources of information with core public sector management systems data, such as financial management and procurement.

Some governments have embraced the GovTech challenge and are adjusting their policies, capabilities, and service delivery models, while others are being left behind. The WBG will assist client countries in harnessing the potential of GovTech and in managing the risks of digital transformation. Partnerships between development partners, tech companies, and clients can identify good practices in digital transformation. They would build on the WBG’s ability to connect a deep understanding of public sector development challenges with cutting-edge cost-effective technology solutions. The partnerships could be launched at the April 2019 spring meetings in Washington DC.

41. **Digitization can help design flexible and adaptive social protection systems to respond to shocks and crises in fragile contexts.** With the growing displacement and complexity of crises—economic shocks, natural disasters, conflict, and violence—governments can leverage technology to respond. In Zambia, 75,000 girls and women in remote areas can receive their cash transfers through a mobile wallet account or a pre-paid card. In the Caribbean small island states, new broadband solutions such as balloons and satellites could provide connectivity during times of natural disasters, enabling first responders to target people most affected.

42. **Governments can use digitized delivery systems to make social protection more universal, delinked from traditional employer-employee relationships.** Informal markets leave large portions of the population without social protection, and even in more formal markets, traditional benefits are being decoupled through reduced employer contributions and the rise of the gig economy. WBG support to social registry platforms (across a wide range of countries) connects people to public health services, social protection, and pro bono legal services. These platforms are part of Integrated Social Protection Delivery Systems to address fragmentation, poor coordination, and inefficiency.

Corporate priorities to “Boost”

43. **The WBG will focus on increasing its capabilities and the scale of its activities to:**

- **Support the development of skills and capabilities for the new economy.** Effective early childhood development and basic schooling investments that translate into learning can build strong human capital foundations. These strong foundations are highly predictive of the skills required by the changing nature of work, such as advanced cognitive and socioemotional skills. Further, education and training systems need to be flexible, adaptive, and responsive to the rapidly evolving nature of work, including skills needed by entrepreneurs in the new economy. But if solutions to upskilling and reskilling are internet-based, extensive digital connectivity, including remote or isolated communities, will be necessary to ensure access.
- **Support efficient, transparent, accountable, and inclusive government services.** Social media and sharing economy platforms create new avenues for citizen engagement, and governments are increasingly expected to deliver public services transparently, accountably, and responsively. Tech-enabled services to citizens and businesses through GovTech can help fill the gap. Digitization can also enable delivery systems for portable social protection benefits to support informal and gig economy workers, irrespective of the employer. Innovation in expanding access

to social protection is also critical to ensuring inclusion. But new taxation models will be needed to replace payroll contributions in financing social protection. And while technology platforms make it possible to reach the excluded, the lack of digital connectivity can leave behind the poor and those in remote or isolated areas.

V. Brokering disruptive technology, data, and partnerships to solve development challenges and mitigate risks

44. **The WBG can provide “disruptive” leadership in the global search for technology-enabled solutions to intractable development challenges.** Its leadership can be furthered by:

- Supporting technology-enabled solutions to address development challenges and uncover crucial data gaps, including partnerships with the public sector, private sector, and other stakeholders.
- Driving policy coherence in the disruptive technology space by building coalitions to provide new global public goods, contributing to multilateral dialogue, and shaping global industry standards and norms to address regulatory gaps.

45. **The WBG is adapting technology to solve development challenges.** Technological innovation is coming from all parts of the world. The WBG seeks to adapt this technological innovation by undertaking informed pilots to evaluate and scale up what works. For example, the WBG will work with technology partners to facilitate experimental “action labs” and test new ways to bring drinking water to communities with limited sanitation. The TechEmerge program has matched 17 global innovators with 15 healthcare systems, and more than 10 new commercial agreements were signed for wider deployment of new technologies across the healthcare market in India. Scaling up new efficient, cost-effective technology solutions in WBG operations will also support the MFD agenda through better use of scarce public resources. Given the important role of trust funds in helping the WBG support the successful adaptation of innovation, the WBG will leverage the current trust fund reform process to strengthen partnerships with current and emerging donors.

46. **The WBG is forming private sector partnerships to discover new solutions to development’s challenges.** The Digital2Equal initiative will convene 15 global regional, and local platform companies to produce and define best practices for ensuring that women have equal access to benefits of the digital economy. The Famine Early Action Mechanism, a joint WBG-UN initiative, is engaging global technology firms such as Amazon, Google, and Microsoft, as well as such data providers as VanderSat, to build a coalition of the leading technology experts that will support the first AI-driven model of predicting food insecurity. All partnerships are guided by principles to ensure progress toward the WBG’s twin goals, while safeguarding the WBG’s reputation and respecting data privacy.

47. **The WBG is building public and private coalitions to bring technologies to scale.** The *Scaling Solar* initiative helps governments mobilize privately funded grid-connected solar projects that can be operational within two years at competitive tariffs. It has implemented auctions in Zambia and Senegal, and is engaged in five other countries. *Scaling Solar* is seeking to replicate similar initiatives to scale up other technologies such as wind and storage, as well as new business models such as minigrids for rural electrification. To support fisheries, the WBG is mainstreaming innovative technologies to improve the tracking and management of vessels at sea in Comoros, Ghana, Liberia, and Madagascar.

48. **The WBG is also harnessing technology to address data gaps, underscoring its role as provider and facilitator of development data.** It is piloting several initiatives that use technology to close data gaps (box 7). To impute poverty data in South Sudan and Liberia, satellite-based information is being used to overcome the problem of limited field access in areas facing conflict, insecurity, and logistical constraints.

For disaster risk management, unmanned aerial vehicles and drones support and validate damage needs assessments in Haiti, Sierra Leone, and the Solomon Islands. Mobile applications are collecting reliable high-frequency data cost-effectively. In Indonesia, crowdsourcing data through a mobile app generates information on a range of topics, including through non-standard forms of data—such as text, sound recordings, and videos—that can then be processed automatically using machine learning.

Box 7 Unlocking the value of new and existing data assets

With the rapid evolution in the use and capabilities of data and technology, governments are evolving into sophisticated data management organizations, and the WBG must evolve with them, making the strategic use of traditional and new data central to its operational portfolio.

The WBG has deep expertise in and privileged access to survey and administrative data worldwide. These remain the foundation for calibrating and validating new methods to improve the cost, timeliness, or granularity of data. For example, machine learning and artificial intelligence algorithms can be used in applications ranging from generating high-resolution maps of populations and simulations of economic activity to predicting the need for healthcare interventions in community health centers. But these algorithms cannot be trained or validated without access to, and deep familiarity with, “ground-truth” data from surveys and traditional sources.

But traditional data often are not well suited to being integrated with newer data sources, and privacy requirements mean they cannot be widely shared. The WBG will invest in making these existing data assets more integrable, by supporting initiatives to combine new and traditional data sources at scale, including partnering with firms to provide services to validate artificial intelligence and machine learning models against datasets they could not otherwise obtain. For example, in operational and policymaking settings, nongovernmental and commercial firms are increasingly partnering with governments to bring new approaches to the design of policy and delivery of services.

Similarly, the next generation of digital public goods, such as data for monitoring the SDGs, is expected to “Leave No One Behind” by including underrepresented populations, taking an open approach to code, methods, and data, and being widely accessible and usable in a timely manner. These expectations cannot be met unless the Bank partners with different actors and brings data from new sources into its work.

The WBG will invest in taking an integrated, multisector approach to data policy and implementation work. It will develop talent and attract staff with skills in both traditional and new approaches to the use of data and technology. And it will use its convening role and independence from political and business interests to pursue partnerships with new commercial and noncommercial actors that have pro-poor priorities at their core.

49. **Data partnerships are also driving the technology-enabled agenda.** To facilitate the use of private sector data in projects, the WBG recently established an internal data collaboratives platform to connect WBG project teams to data from partners like Mobike and the GSMA. It is also playing a leading role in mobilizing international agencies as well as donors around a data agenda. For example, the *SE4All Knowledge Hub* has created a data platform to measure progress against relevant targets for the Sustainable Development Goal for Energy. The WBG’s *Ag Observatory*, in partnership with public and private sector agencies, combines big data and machine learning techniques to provide near real-time data on drought, climate shocks, and pest incidence, with pilots in Ethiopia, India, Kenya, and Pakistan.

50. **The WBG is participating in multilateral dialogue and supporting synergies between different institutions to promote policy coherence in the disruptive technology space.** The Digital Economy Task Force, established under the German G20 Presidency in 2017, is focused on the Future of Work under Argentina’s G20 presidency in 2018. Digitization will likely be discussed under Japan’s G20 presidency in 2019, and the WBG stands ready to support their efforts. In partnership with the UN and Japan, the WBG plans to learn from other stakeholders and bring emerging best practices to countries by helping formulate science, technology, and innovation action plans and providing the technical and financial capacity to support their implementation.⁵ It will also arrange periodic South-South exchanges of

practitioners and policymakers to showcase country experiences, such as ID4D study tours from Morocco to India and from Côte d'Ivoire to Peru. The WBG will contribute to global advocacy campaigns to support the responsible and ethical deployment of technologies.

51. **The WBG is also supporting the development of global industry standards and norms to address regulatory gaps that emerge with disruptive technologies.** In digital finance, the IFC led the creation of the first global “Guidelines for Investing in Responsible Digital Finance” to implement evolving standards of the Global High-Level Principles for Digital Financial Inclusion. And it is a core member of the Financial Stability Board, which monitors the global financial system, including developing guidelines to guard against systemic threats resulting from attacks. Data-related regulations are another area where the WBG plans to partner with the G20, IMF, Partnership for AI, and various other international organizations, standards bodies, and leading governments to develop principles for the responsible, legal, and ethical use of artificial intelligence in the public sector.

Corporate priorities to “Broker”

52. **In seeking to be the partner of choice for governments, technology firms, foundations, and other public and private sector stakeholders, the WBG will ensure that it harnesses disruptive technology to accelerate progress toward existing WBG goals in the following areas.**

- **Promote universal financial access.** Innovative and low-cost financial products have given 1.2 billion people access to financial services since 2011. Going forward, mobile financial services enabled by fintech are central to the WBG’s commitment to reach the Universal Financial Access by 2020 goal.
- **Improve gender equality and create inclusive markets for women.** Disruptive technologies could facilitate new access and opportunities for women in multiple domains, including information, networks, finance, and services. Online platforms provide more flexible hours, e-government requires less time and travel to secure services, and new crypto-assets could expand women’s ability to access and control capital. Yet, harnessing technology to reduce gender gaps will require overcoming lower mobile phone ownership, entrenched social mores, and gender-sorting patterns across occupations and sectors differentially affected by disruptive technologies.
- **Increase the adoption of clean renewable energy, energy efficiency, smart grid technology, electric vehicles, and storage to achieve universal energy access and GHG emission reduction goals.** Collaborating with governments, the private sector, academia, and civil society to better understand how emerging technology trends can support both the design and function of new climate markets from the bottom-up. Investment services, knowledge services, capacity building and advocacy services will be important in connecting pre- and post-2020 climate markets. Pilots will demonstrate the use of disruptive technologies in driving down costs and creating climate markets.
- **Address development challenges in fragile and conflict contexts.** New technologies can generate data, implement advanced analytics, and establish monitoring and supervision mechanisms that would either be logistically difficult or too costly in inaccessible and high-risk areas. These initiatives can improve crisis response, risk mitigation, and the identification of new opportunities. Innovative solutions that use disruptive technologies to bypass traditional development imperatives might also provide opportunities for leapfrogging. Products such as MIGA’s political risk insurance, or the IDA18 IFC-MIGA Private Sector Window, can improve the risk appetite for private investors looking at bringing such technology to these contexts.
- **Assume data stewardship.** The WBG will support new practices for data generation, acquisition, management, and dissemination. Scaling up the use of satellite imagery and global information system (GIS) mapping technology, the Internet of Things, detailed call records, and machine

learning/artificial intelligence to generate new data can better measure poverty and variables that matter for poverty reduction. Such big data can also be acquired from governments and the private sector. Establishing a digital platform that combines big data with traditional data could deliver a global public good and contribute to the adoption of disruptive technologies not only in WBG operations but also by partners and clients.

- **Implement the Human Capital Project.** The project will explore the use of cost-effective, context-relevant, scalable technology solutions to make service delivery more effective and responsive—and to better target and tailor human capital investments to the precise needs of the population, especially in remote, fragile, and conflict contexts. New disruptive technologies can accelerate performance on key measures tracked in the project (such as stunting, survival indicators, and learning outcomes).
- **Expand universal health coverage.** Disruptive technologies—comprising an array of innovative solutions in the health sector or applicable to the health sector value chain—hold the potential for low- and middle-income countries to leapfrog some of the most pressing health system challenges and move closer to universal coverage.
- **Improve the efficiency of environmental and social safeguards.** Adopting disruptive technology can dramatically reduce the cost and improve the efficiency of implementing the WBG’s environmental and social safeguards.

VI. Working across the Build-Boost-Broker approach

Corporate priorities that support Building, Boosting, and Brokering

53. **Supporting country level diagnostics and the development of agile regulations are critical for building, boosting, and brokering.** The WBG will scale up its activities to:

- **Include tech-enabled disruption in country diagnostics.** It will leverage existing diagnostic tools and develop new tools, including the Country Private Sector Diagnostics, to emphasize linkages to disruptive technology in discussions of the micro foundations of growth and the appropriate role of public and private sector interventions to create competitive and well-functioning markets. This suite of tools will enable a flexible approach to decide country-by-country how to raise awareness and do targeted experiments. The WBG will also increase the use of benchmarking exercises, such as Digital Business Indicators, to assess the readiness of the country regulatory environment for the digital economy.
- **Support the formulation and implementation of agile regulations for the new economy.** Given the accelerating pace of technology diffusion, the formulation, adoption and revision of regulations must be accelerated to keep up. Amid the rising concentration across industries and increasing profit margins, in large part due to data ownership, governments need to ensure a level playing field for companies and individuals. In addition, governments must quickly adapt to encourage the growth of new sectors created by technologies in an inclusive manner. Regulatory sandboxes and similar approaches can be scaled up.

VII. A WBG mandate to support disruptive technologies for development

54. **The WBG will operationalize the Build-Boost-Broker value proposition.** Given the pace of technological disruption, the WBG must scale up the corporate priorities outlined above. It will also upgrade internal capabilities to accelerate the WBG’s ability to support clients (box 8).

Box 8 Upgrading WBG internal capabilities: Coordination, agility, and skills

The WBG can strengthen its implementation of the Build-Boost-Broker value proposition by upgrading its internal capabilities. To support countries in mitigating the risks of disruptive technologies and maximizing their potential for the poor, it must upgrade its internal capabilities agenda—improving the coordination, institutional agility, and skill mix of staff.

The WBG will ensure a coordinated, group-wide approach on internal and external messaging, alignment of unit-level approaches, strategic management of key private and public sector partners, support for knowledge sharing and collaboration, and the incubation of new initiatives or products.

The WBG will leverage the Agile Bank initiative and accelerate the modernization of existing processes to ensure that it can deliver agile solutions at speed and scale. This includes employing a disruptive lens in our country engagement model through more flexible project design and implementation, including the development of new instruments, strategic use of data in WBG projects, increased use of joint teams that cross the WBG, continued innovation in WBG and country procurement, and upgraded internal information technology capabilities.

The WBG will support group-wide training and human resource policies to ensure that staff have the skill sets to achieve the value proposition. These efforts will seek to infuse talent with the requisite skills and capabilities, build capabilities and skills within the organization, and create a culture of innovation. This will include implementing a comprehensive set of hiring decisions at mid-level, senior level, and entry roles to bring in the appropriate skills. HR learning programs will focus on developing greater adaptability and agility that enable staff to embrace change and adapt quickly as markets and technologies shift. A culture of creativity and innovation will be supported through systematic introduction of new practices, such as the President’s Award for Innovation, to provide incentives and rewards for staff.

55. Achieving goals in each Build-Boost-Broker pillar will require the support of our shareholders in the following ways:

- **Advocate for harnessing disruptive technology to work for the poor and find new development pathways.** The WBG asks the Development Committee to encourage countries to prioritize investments to build the foundations of technology-led economies, boost the capacity of people, firms, and institutions to leverage technology-led disruption for socioeconomic dividends, and harness disruptive technology solutions to solve development challenges at scale.
- **Support the WBG’s role in multilateral fora to harness disruptive technologies for development.** The national and regional plans of the WBG’s shareholders around connectivity, entrepreneurship, fintech, digital skills, GovTech, and science, technology, and innovation can be accelerated through the WBG’s engagement in dialogue and discussion at multilateral fora, such as the G20 and the United Nations. The WBG can convene coalitions with the private sector and other multilateral development banks and international organizations to contribute to global standards on a range of issues such as digital finance and data privacy.
- **Support the WBG in leveraging resources for this agenda.** Because significant resources will be needed to create the opportunities and mitigate the risks of technological disruption, the development resources made possible through the IBRD and IFC capital increase—in addition to continued partner support to sustain IDA at the scale of the ongoing IDA18 replenishment—will support the transition to sustainable growth paths. The WBG will also continue to innovate methods to mobilize resources at scale by extending opportunities to use existing platforms. This will include financial innovations, such as the Famine Early Action Mechanism, Creating Markets Advisory Window, and IDA18 IFC-MIGA Private Sector Window—and better leveraging existing financial WBG instruments, including IFC, IBRD, IDA financing tools, and MIGA’s guarantees through Maximizing Finance for Development and other priorities.

56. **The coming IDA19 replenishment presents an opportunity for IDA to support its members to harness the opportunities and mitigate the risks that disruptive technologies present.** IDA countries are inherently more prone to the risks of disruptive technologies for economic growth and stability. However, these technologies, if properly harnessed, also hold promise for IDA countries to leapfrog in their development. In the context of the ongoing efforts by the World Bank Group and the implementation of the IMF-World Bank digital finance agenda, IDA seeks to support the adoption of disruptive technologies for development and capacity building for its member countries in line with the Build-Boost-Broker approach. Specific options to provide support will be explored during the replenishment discussions.

Questions to the Development Committee

Does the committee agree with the proposed Build-Boost-Broker approach to support countries in exploiting opportunities and managing risks associated with disruptive technologies?

Does the committee agree with the proposed areas of engagement for the WBG?

² Between 1990 and 2013, the year of the latest comprehensive data on global poverty, the number of people living below the international poverty line of US\$1.90 per person per day more than halved, to around 767 million.

³ The emphasis on tech skills may exacerbate the gender divide as evidence suggests that men are almost eight times as likely as women to work in ICT jobs in 30 emerging markets (WDR 2016).

⁴ This assessment takes a holistic approach and thus has a large focus on the foundational building blocks, but also includes dimensions of the “boost” pillar such as skills and digital entrepreneurship.

⁵ The UN has set up a Technology Facilitation Mechanism to facilitate the development, transfer, and dissemination of technologies relevant for achieving the SDGs.