

Perspectives on Disruptive Technologies and Forces



WORLD BANK GROUP

Klaus Tilmes
Naoto Kanehira
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Disruption and exponential change present unique opportunities – and new risks

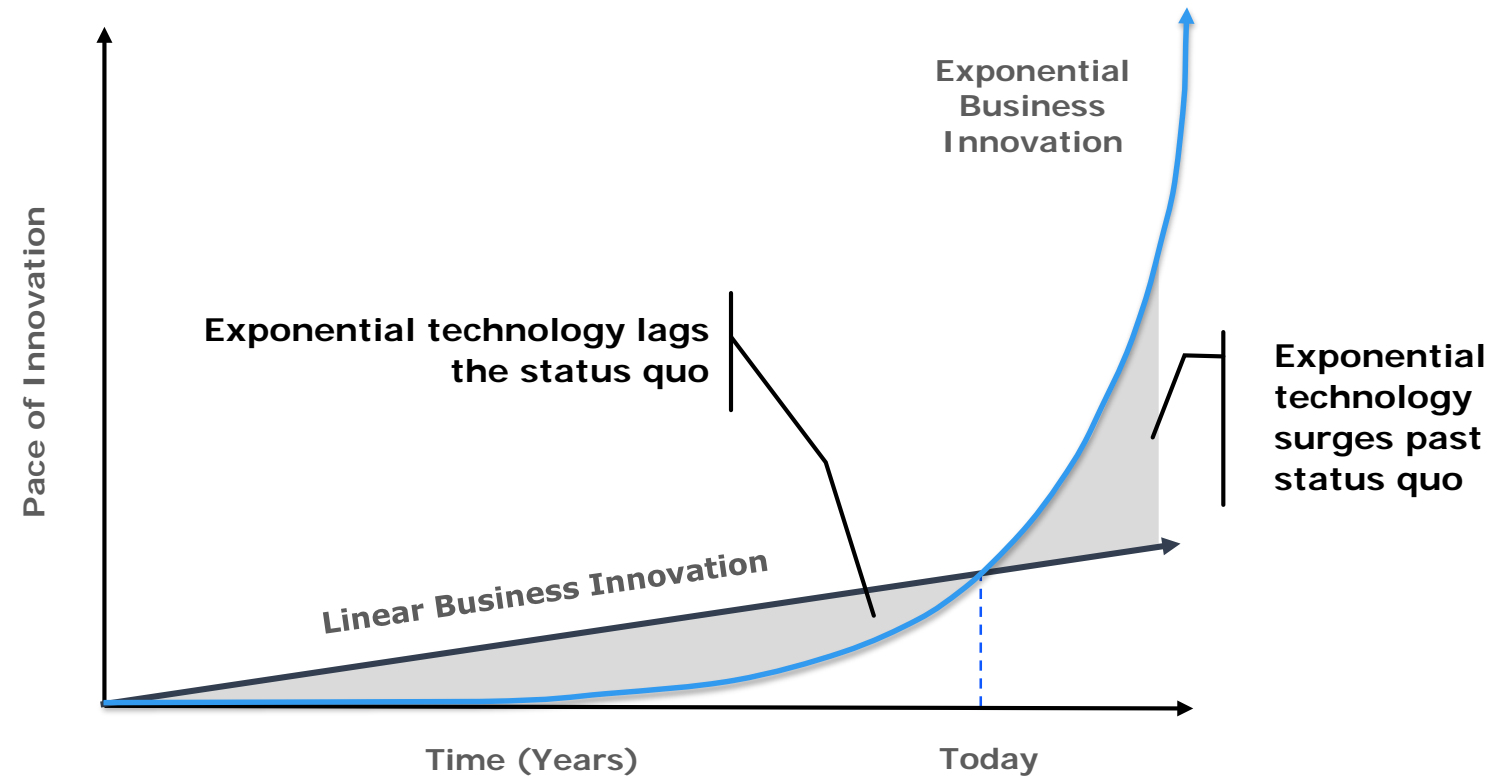
Situation:

- *Technologies are converging in new ways to change how we live, work, and organize*
- *This makes them incredibly disruptive, while their ability to scale makes them exponential*

Opportunity:

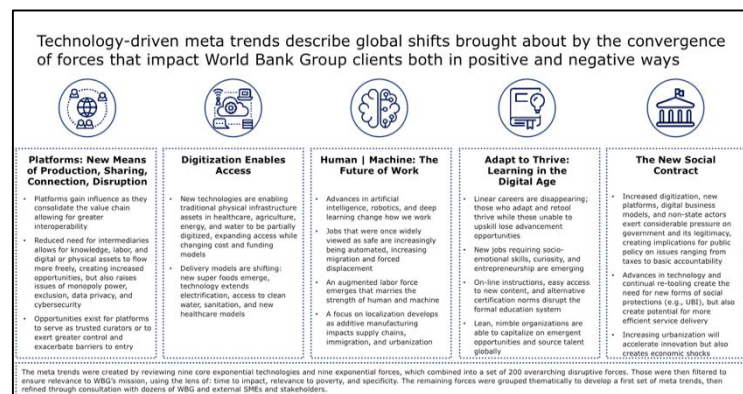
- *The WBG has a unique opportunity to harness this disruptive power for development*
- *We must help our clients manage this transition to make informed choices on their technology-enabled development path, mitigate risks of disruption, and lessen adverse impacts on the poor*

Exponential Technology Illustrated

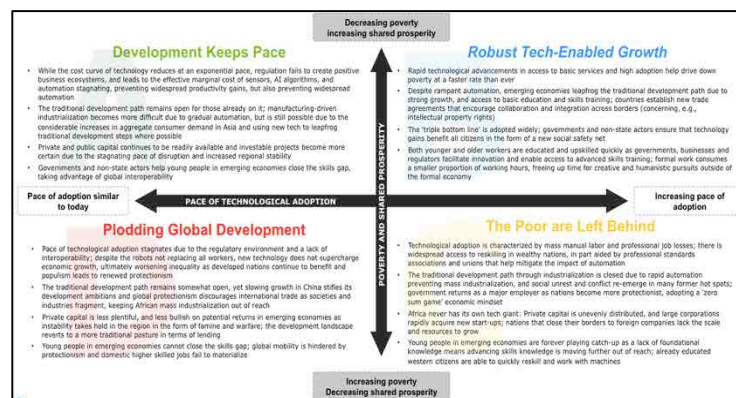


We used trends and scenarios to explore the unique role the World Bank Group can play in harnessing tech-enabled disruption and exponential change to shape the future

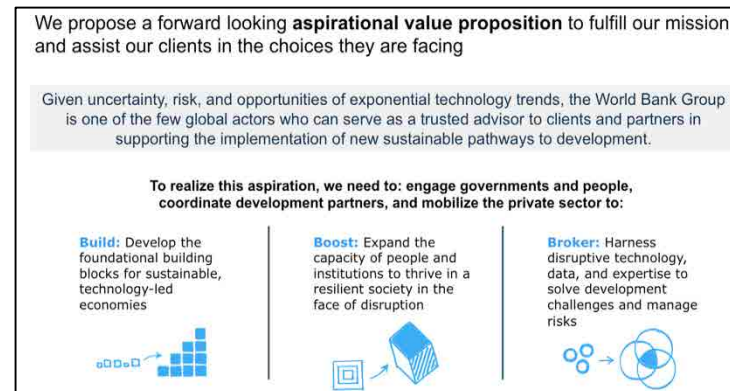
Meta Trends



Scenarios



Value Proposition



- Describe **global shifts** that are underway and accelerating rapidly
- Represent the **convergence of disruptive technologies and other driving forces**
- Are **known with some certainty**, they are going to happen (or are already occurring) and they **help paint a picture of the future**

- Scenarios acknowledge **critical uncertainties** and implications for the future
- They help us identify **alternative versions** of how the world may evolve

- The value proposition articulates the **role of the WBG** and the **actions** that need to be taken, regardless of which scenario we find ourselves in

Technology-driven meta trends describe global shifts brought about by the convergence of forces that impact World Bank Group clients both in positive and negative ways



Platforms: New Means of Production, Sharing, Connection, Disruption

- Platforms gain influence as they consolidate the value chain allowing for greater interoperability
- Reduced need for intermediaries allows for knowledge, labor, and digital or physical assets to flow more freely, creating increased opportunities, but also raises issues of monopoly power, exclusion, data privacy, and cybersecurity
- Opportunities exist for platforms to serve as trusted curators or to exert greater control and exacerbate barriers to entry



Digitization Enables Access

- New technologies are enabling traditional physical infrastructure assets in healthcare, agriculture, energy, and water to be partially digitized, expanding access while changing cost and funding models
- Delivery models are shifting: new super foods emerge, technology extends electrification, access to clean water, sanitation, and new healthcare models



Human | Machine: The Future of Work

- Advances in artificial intelligence, robotics, and deep learning change how we work
- Jobs that were once widely viewed as safe are increasingly being automated, increasing migration and forced displacement
- An augmented labor force emerges that marries the strength of human and machine
- A focus on localization develops as additive manufacturing impacts supply chains, immigration, and urbanization



Adapt to Thrive: Learning in the Digital Age

- Linear careers are disappearing; those who adapt and retool thrive while those unable to upskill lose advancement opportunities
- New jobs requiring socio-emotional skills, curiosity, and entrepreneurship are emerging
- On-line instructions, easy access to new content, and alternative certification norms disrupt the formal education system
- Lean, nimble organizations are able to capitalize on emergent opportunities and source talent globally



The New Social Contract

- Increased digitization, new platforms, digital business models, and non-state actors exert considerable pressure on government and its legitimacy, creating implications for public policy on issues ranging from taxes to basic accountability
- Advances in technology and continual re-tooling create the need for new forms of social protections (e.g., UBI), but also create potential for more efficient service delivery
- Increasing urbanization will accelerate innovation but also creates economic shocks

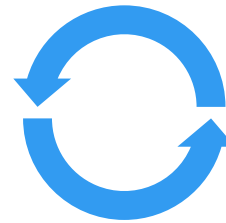
The meta trends were created by reviewing nine core exponential technologies and nine exponential forces, which combined into a set of 200 overarching disruptive forces. Those were then filtered to ensure relevance to WBG's mission, using the lens of: time to impact, relevance to poverty, and specificity. The remaining forces were grouped thematically to develop a first set of meta trends, then refined through consultation with dozens of WBG and external SMEs and stakeholders.

The development paths of our clients are being disrupted by a complex set of global forces and technology-driven meta trends that create both new solutions and challenges/risks which have a direct impact on our role

Global Development Issues

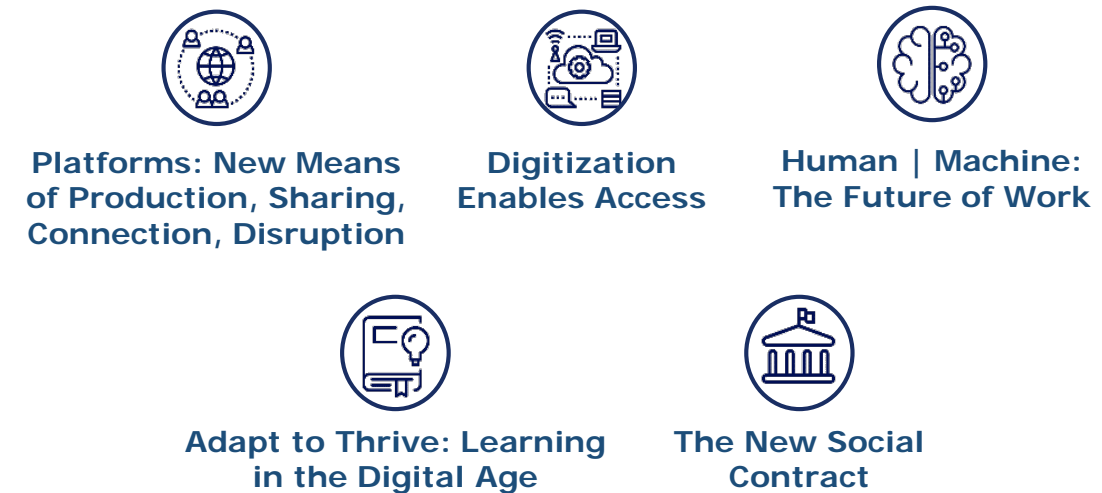


Solutions



Challenges/Risks

Meta Trends Impacting these Issues



Key Emerging Challenges/Risks for the WBG:

- New client demands for advice and implementation know-how related to these meta-trends are challenging our traditional value proposition, understanding of technology trends, and conventional ways of operating
- Increasing risk of stranded assets due to technological obsolescence/ emerging new business models
- New clients and partners are seeking collaboration with trusted global actors around shared mission, complementary capabilities, and for achieving impact at scale

Illustrative examples from Agriculture, Energy, Urban, and Finance-Competitiveness-Innovation Practices



Platforms: New Means of Production, Sharing, Connection, Disruption

- Engage data and tech firms to explore new frontiers in data generation and collection for firms and financial sector
- Test new models for innovation and entrepreneurship finance
- Apply blockchains to new types of economic value, making them sharable and tradable
- Develop end-to-end input and distribution platforms for small farmers
- Set up “I-Techpreneurship” facilities to accelerate testing & incubating of disruptive technologies



Digitization Enables Access

- Explore convergence of exponential technologies to inform choices for centralized vs decentralized access
- Assess impact of distributed generation and software integration for electric vehicles
- Explore new agricultural technologies for future food systems (growing meat, salt water rice cultivation, CRISPR)



Human | Machine: The Future of Work

- Advise industries and government on convergence of machine learning, artificial intelligence, future manufacturing
- Train and integrate technologists into government agencies and projects
- Scale up agriculture observatory with private sector for geo-tagging, big data decision support
- Assess impact of future job trends on energy supply shifts



Adapt to Thrive: Learning in the Digital Age

- Develop the agenda for digital learning and skills development, modeled after data engineer training initiative in Singapore
- Stand up DIY-teaching platforms (YouTube for young African farmers)
- Proactive learning on AML/CFT implications of crypto-assets



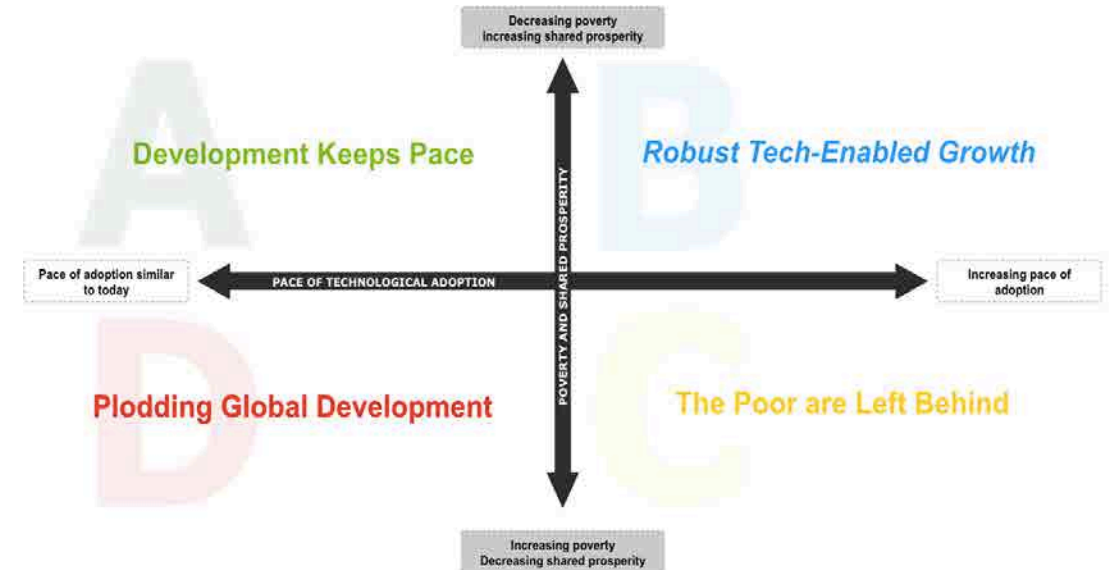
The New Social Contract

- Expand advice on new ways of creating smart contracts via blockchain
- Combine national ‘technology stacks’ with innovative govt and private services
- Shift countries/cities from a government agency-centric model to citizen-centric model

Scenarios are a useful tool in times of disruption where the future is uncertain

Scenarios...

- Embrace **uncertainty** to create plausible stories of how the world might unfold
- Describe a **range of heterogeneous outcomes**, meaning that each scenario may emerge at the same time in different regions
- Overcome the tendency to predict, allowing us to see **multiple possibilities for the future**
- Allow different countries to **assess their own starting point**, and help identify leapfrogging opportunities



Detailed Scenario Narratives

Development Keeps Pace

- While the cost curve of technology reduces at an exponential pace, regulation fails to create positive business ecosystems, and leads to the effective marginal cost of sensors, AI algorithms, and automation stagnating, preventing widespread productivity gains, but also preventing widespread automation
- The traditional development path remains open for those already on it; manufacturing-driven industrialization becomes more difficult due to gradual automation, but is still possible due to the considerable increases in aggregate consumer demand in Asia and using new tech to leapfrog traditional development steps where possible
- Private and public capital continues to be readily available and investable projects become more certain due to the stagnating pace of disruption and increased regional stability
- Governments and non-state actors help young people in emerging economies close the skills gap, taking advantage of global interoperability

Pace of adoption similar to today

PACE OF TECHNOLOGICAL ADOPTION

Plodding Global Development

- Pace of technological adoption stagnates due to the regulatory environment and a lack of interoperability; despite the robots not replacing all workers, new technology does not supercharge economic growth, ultimately worsening inequality as developed nations continue to benefit and populism leads to renewed protectionism
- The traditional development path remains somewhat open, yet slowing growth in China stifles its development ambitions and global protectionism discourages international trade as societies and industries fragment, keeping African mass industrialization out of reach
- Private capital is less plentiful, and less bullish on potential returns in emerging economies as instability takes hold in the region in the form of famine and warfare; the development landscape reverts to a more traditional posture in terms of lending
- Young people in emerging economies cannot close the skills gap; global mobility is hindered by protectionism and domestic higher skilled jobs fail to materialize

Decreasing poverty
increasing shared prosperity

POVERTY AND SHARED PROSPERITY

Increasing poverty
Decreasing shared prosperity

Robust Tech-Enabled Growth

- Rapid technological advancements in access to basic services and high adoption help drive down poverty at a faster rate than ever
- Despite rampant automation, emerging economies leapfrog the traditional development path due to strong growth, and access to basic education and skills training; countries establish new trade agreements that encourage collaboration and integration across borders (concerning, e.g., intellectual property rights)
- The 'triple bottom line' is adopted widely; governments and non-state actors ensure that technology gains benefit all citizens in the form of a new social safety net
- Both younger and older workers are educated and upskilled quickly as governments, businesses and regulators facilitate innovation and enable access to advanced skills training; formal work consumes a smaller proportion of working hours, freeing up time for creative and humanistic pursuits outside of the formal economy

Increasing pace of adoption

The Poor are Left Behind

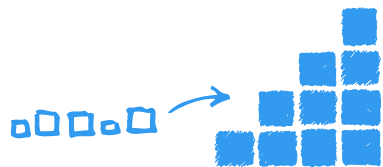
- Technological adoption is characterized by mass manual labor and professional job losses; there is widespread access to reskilling in wealthy nations, in part aided by professional standards associations and unions that help mitigate the impact of automation
- The traditional development path through industrialization is closed due to rapid automation preventing mass industrialization, and social unrest and conflict re-emerge in many former hot spots; government returns as a major employer as nations become more protectionist, adopting a 'zero sum game' economic mindset
- Africa never has its own tech giant: Private capital is unevenly distributed, and large corporations rapidly acquire new start-ups; nations that close their borders to foreign companies lack the scale and resources to grow
- Young people in emerging economies are forever playing catch-up as a lack of foundational knowledge means advancing skills knowledge is moving further out of reach; already educated western citizens are able to quickly reskill and work with machines

We propose a forward looking **aspirational value proposition** to fulfill our mission and assist our clients in the choices they are facing

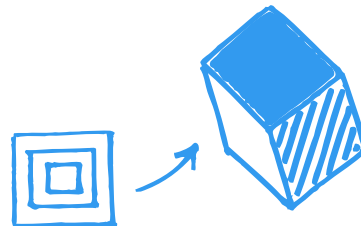
Given uncertainty, risk, and opportunities of exponential technology trends, the World Bank Group is one of the few global actors who can serve as a trusted advisor to clients and partners in supporting the implementation of new sustainable pathways to development.

To realize this aspiration, we need to: engage governments and people, coordinate development partners, and mobilize the private sector to:

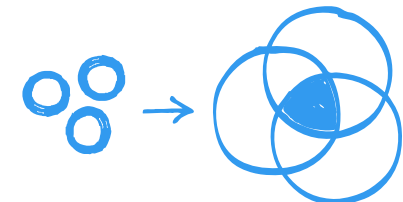
Build: Develop the foundational building blocks for sustainable, technology-led economies



Boost: Expand the capacity of people and institutions to thrive in a resilient society in the face of disruption



Broker: Harness disruptive technology, data, and expertise to solve development challenges and manage risks



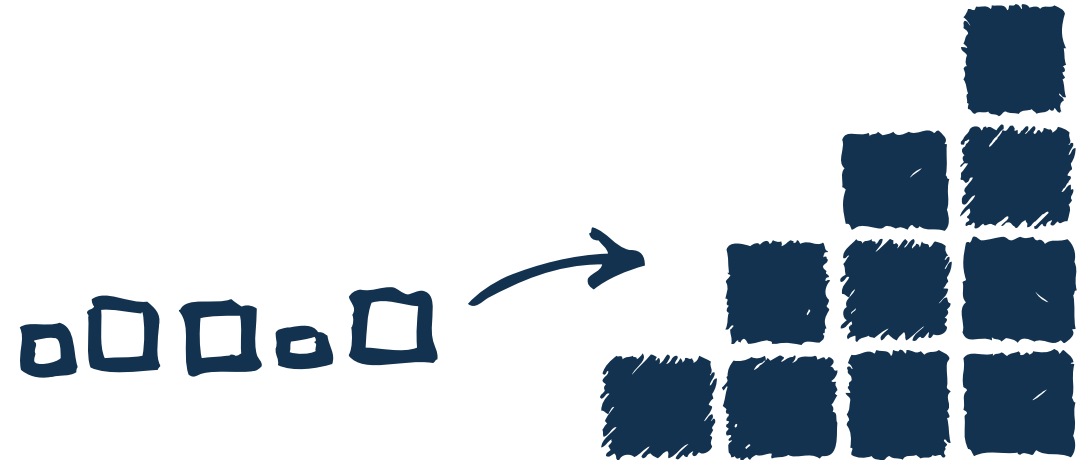
Build: Develop the foundational building blocks for sustainable, technology-enabled economies

Context:

Unless countries put into place foundational building blocks, they will not be able to compete in the future global economy and take advantage of new pathways of growth. Technology can expand access at scale and offer new capabilities for economies. Extending digital on-ramps to development to the poor will support inclusive and sustainable growth. These building blocks will enable the advancement of new technologies and business models that will shape basic necessities (e.g., food through CRISPR in agriculture) and physical assets (e.g., bridges through smart materials).

Leveraging WBG Role to Support Scale-Up:

- Work with clients to identify new pathways for development and new instruments to support inclusive and sustainable growth
- Build the enabling environment for technology adoption and innovation; foster entrepreneurial ecosystems
- Support the elaboration of legal and regulatory frameworks and the capacity of institutions to manage exponential trends (e.g., policy/tax frameworks)
- Facilitate the creation of core digital elements and services (e.g., broadband, digital identity, digital finance) that connect and enable the poor to adapt and create jobs
- Support foundational infrastructure that is future-oriented to mitigate the risk of stranded assets in a rapidly evolving world
- Adapt these initiatives to reflect the unique contexts of client economies, and that they may be at different starting levels



Sample WBG Approaches: Africa Digital Economy Initiative, WDR Digital Dividends, ID4D, Universal Financial Access 2020, CGAP, EFI reports (e.g., Future of Manufacturing, Innovation Paradox), IFC Catalyst Fund, Infodev's Digital Entrepreneurship Program

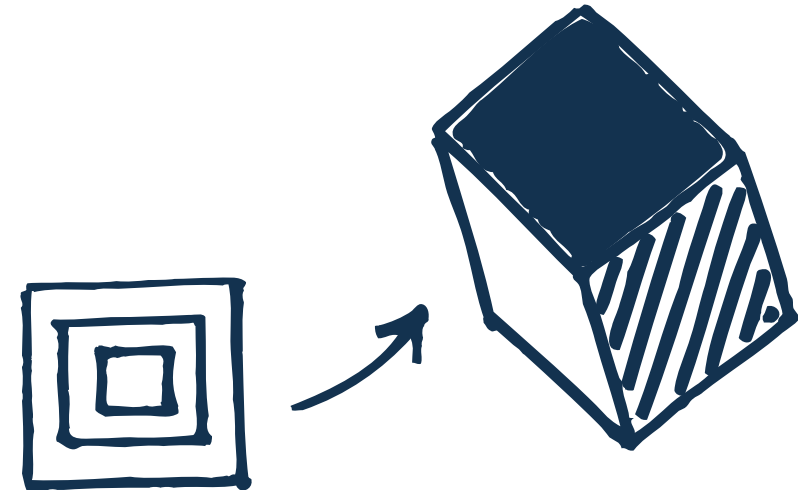
Boost: Expand the capacity of people and institutions to thrive in a resilient society in the face of disruption

Context:

Accelerating disruption in the nature of work requires concerted efforts at the level of societies, firms, and individuals to adapt and thrive. These include empowering individuals to adopt and adapt to uncertainty and new technologies, as well as redefining what social protection means for nation states. Technology is redefining the government-to-citizen interface. Given rapid changes in employment, social cohesion, trust, and digitization of government services, governments will have to redefine their roles.

Leveraging WBG Role to Smooth the Transition:

- Support new capability paradigms that embrace lifelong learning and build skills relevant to jobs in the new technology-led economy; foster intellectual curiosity and creativity
- Support citizen-centric government services through civic tech, “government as a platform” and other solutions that promote effectiveness, trust and transparency
- Adapt social protection to a world of massive disruption in employment and social mobilization, where traditional modes of financial empowerment (i.e., full time employment) are less applicable
- Support social cohesion and trust through social development programs and appropriate policies (e.g., data privacy)
- Foster trust through “user-centric” data and security policies



Sample WBG Approaches: Human Capital Project, WDR Future of Work, IFC Andela partnership

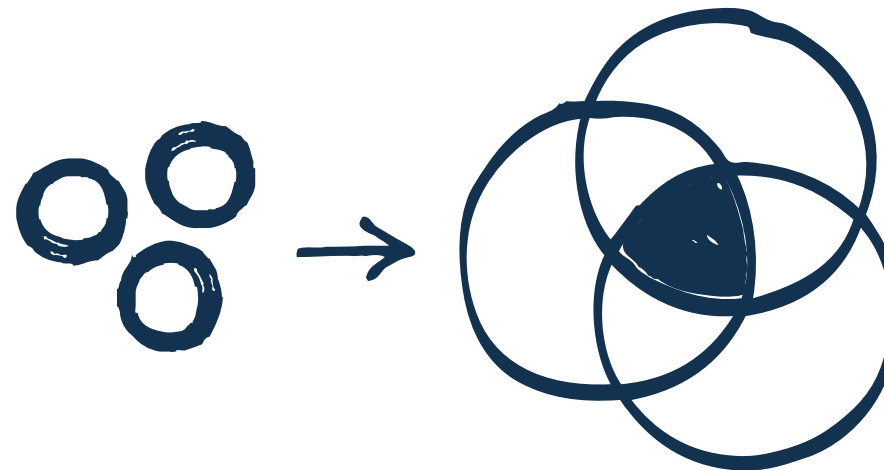
Broker: Harness disruptive technology, data, and expertise to solve development challenges and manage risks

Context:

Amid an unprecedented pace of disruption, there is a global search for new solutions for intractable development challenges. To catalyze robust technology-enabled growth that also protects data, infrastructure, and services, the rate of technological adoption and diffusion must increase in developing countries, along with associated enabling environments. This requires shared and disseminated knowledge, partnerships that develop ecosystems, connections between innovators and data holders, and a secure “trust” environment.

Leveraging WBG Role for Concerted Action:

- Facilitate appropriate technology adoption by our clients at scale, cognizant of timeframes, uncertainty, and risk of stranded assets
- Drive new public and private sector coalitions to provide new global public goods (e.g., data, cybersecurity) and find new solutions
- Shape emerging global norms and adaptable regulatory approaches and standards that address policy gaps brought about by disruptive technology
- Invest in, create markets for, and incentivize new disruptive technology-driven sectors that address urgent global challenges
- Facilitate global knowledge flows, including an evidence base to guide action



Sample WBG Approaches: Maximizing Finance for Development, Forward Look, IFC Creating Markets, Credit Suisse Disruptive Technology for Development Trust Fund, Big Data/GOST, G20, technology partnerships, TechEmerge

A photograph of a dirt path in a forest. The path starts from the bottom center and splits into two paths that curve away from each other towards the left and right sides of the frame. The forest is dense with tall, thin trees and a thick canopy of green leaves. The ground is covered in dirt and fallen leaves.

Where to from here?

We will take corporate actions over the next 6 months to build momentum

Build:



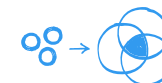
- **Digital Economy 4 Africa-** Begin in 5 priority countries
- **Broadband:** We will explore setting up WBG joint team (also explore collaboration on other foundational elements)
- **Develop suite of country foresight diagnostic tools**
 - Senegal - Pilot first WBG DPO and foresight workshop
 - Extend drivers of growth studies (e.g. Rwanda, China)
 - Include in SCD/CPF process

Boost:



- **Human Capital Project:** Incorporate technology lens
- **Digital Skills:** Explore deeper collaboration through WBG joint teams
- **WDR Future of Work:** Incorporate jobs and skills evidence base into foresight diagnostic tools
- **Gov-Tech:** Support capabilities to leverage technology; 'government as a platform'

Broker:



- **Harnessing data:** Create WBG data collaboratives for high value data clients
- **Strategic partnerships:** Sign MoUs with global tech players
- **Technology coalitions:** Create partnerships around cross-cutting technologies (e.g. IoT, Artificial Intelligence).


Cross-pillar actions:

- **Research agenda:** Roll out Doing Digital pilot.
- **Global coalitions:** Engage with G20 (Japan 2019 Presidency) and UN Science, Technology and Innovation Forum
- **Resources:** Re-direct existing trust funds and explore new sources
- **Knowledge & Learning:** Launch intranet and internal collaboration tool to raise awareness and change mindsets

Prioritizing Digital Development and Taking Action in Africa


In priority countries catalyze Africa’s progress by focusing joint effort to advance on the next **foundational element** of a Digital Economy, complemented by selected regional engagements.

1




Digital Infrastructure

2




Digital Skills

3




Digital Government shared platforms [e.g., Digital ID]

4



Transaction/ Payment Accounts


5




Entrepreneurship

Opportunities	WBG Interventions
<ul style="list-style-type: none"> Expand broadband access Close urban-rural divide Improve quality 2G to 3G+ Improve Regional connectivity 	<ul style="list-style-type: none"> Digital Infrastructure Initiative Address regulatory issues IFC broadband investments Key partnerships Promotion of PPPs
<ul style="list-style-type: none"> An African pool of world-class developers Digitally enabled youth 	<ul style="list-style-type: none"> Integrating digital skills into education, TVET IFC investment (Andela) Private sector partnerships Government instruments to scale-up skills initiatives
<ul style="list-style-type: none"> Develop shared government platforms that are leveraged for improved service delivery across sectors 	<ul style="list-style-type: none"> Advisory, lending for digital gov’t platforms Regulatory work, including privacy, security Expand ID4D engagements in Africa Investment in companies that use ID for value added services
<ul style="list-style-type: none"> Close massive access to finance gaps through digital finance and e-payments 	<ul style="list-style-type: none"> Policy/regulatory reform and capacity building Invest in e-payment platforms IFC investment/Advisory for fintechs, telcos, banks
<ul style="list-style-type: none"> Support Africa entrepreneurial talent with ecosystems that allow use cases to emerge 	<ul style="list-style-type: none"> Regulatory framework Increased direct investments in startups IFC VC funds, Startup Catalyst Tech Emerge infoDev Launch Pad


Mobile Penetration




Digital ID Penetration



Digital Financial Access



Active Tech Hubs / 100



Potential Pipeline

WAEMU

- Cote D’ivoire
- Senegal
- Niger

ECOWAS


- Ghana
- Nigeria

SADC

- South Africa
- Mozambique
- Zambia

EAC

- Tanzania
- Kenya
- Burundi



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15

Illustrative Blue Sky Ideas

Convene global stakeholders through a Digital Stability Board to evolve data protection and safeguard against global market failures

Catalogue models for Smart Regulation and Smart Policy as a **“Wikipedia” for Digital Government**

Become an aggregated platform for development, connecting people, financing, organizations, technology implementation, and resources to development challenges

Emerge as the global standard setter, encouraging interoperability for the developing world

Create an open data platform for development data, integrating data from many sources and validating its accuracy

Create a repository of evidence (“Siri of development”) of best use of technologies for implementation of development solutions

We have identified key implications for how the World Bank Group accomplishes its mission going forward

Emerging Ideas for Transformation include:

- Establishing **Foresight / Sensing Capabilities** to identify new solutions and pathways for development
- Creating flexible **Clusters and Joint Teams** to address disruptive challenges across VPUs
- Ensuring new ideas and initiatives are **focused on areas that will lead to scalable impacts**, or “pilots with purpose”, that have a better chance of being used across the organizations
- Developing an approach to talent to bring **the right person at the right time to the right need** from inside or outside the WBG including technology partners
- **Anchor the deployment of technologies** in our core values, and in our way of doing business

