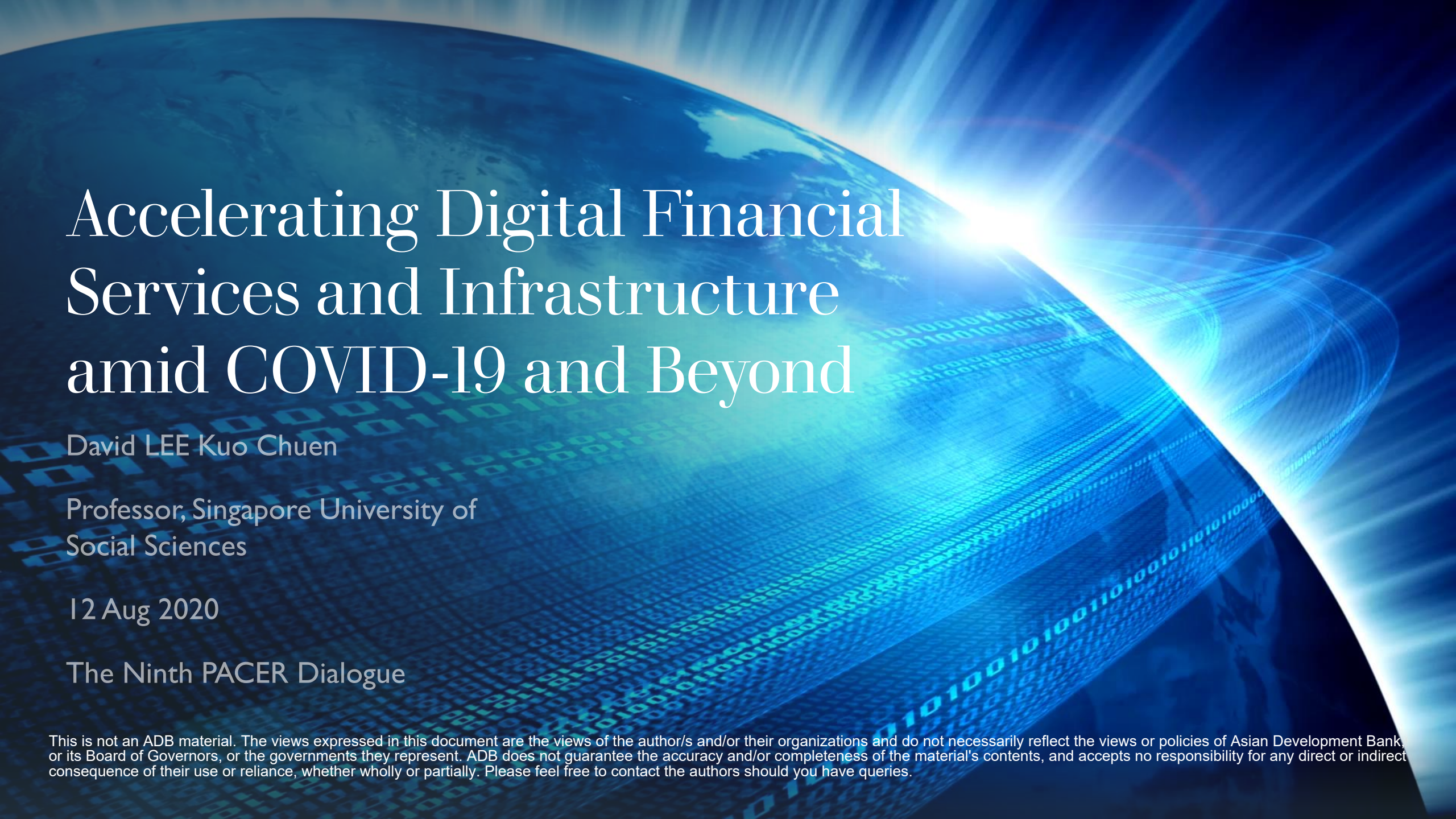

Accelerating Digital Financial Services and Infrastructure amid COVID-19 and Beyond

David LEE Kuo Chuen

Professor, Singapore University of Social Sciences

12 Aug 2020

The Ninth PACER Dialogue

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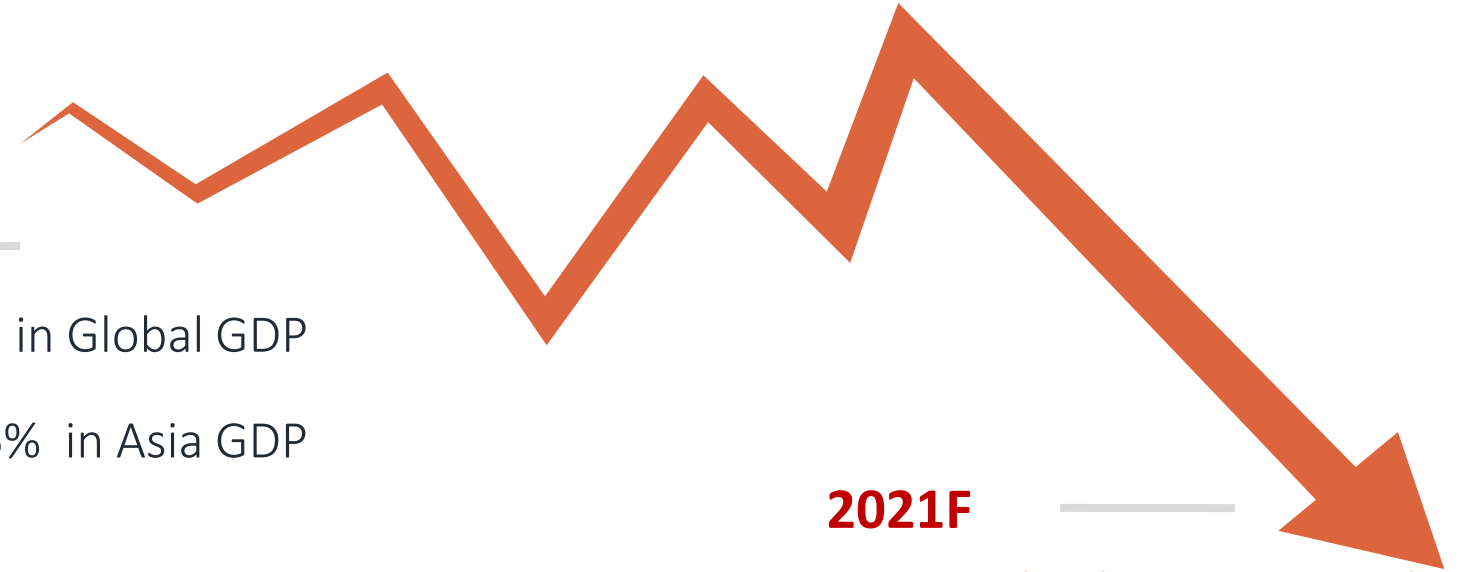
Impact of Covid-19

Economic Challenges

2020 Q1&Q2

- Loss of 6.7% total job hours
- 30m Job Losses in 2Qs (It was only 25m during 2008 GFC)



2020F

- -5.2% in Global GDP
- -1.6% in Asia GDP

2021F

- Recession in most countries

Source: World Bank; Financial Times; IMF; Forbes

Impacts of COVID-19

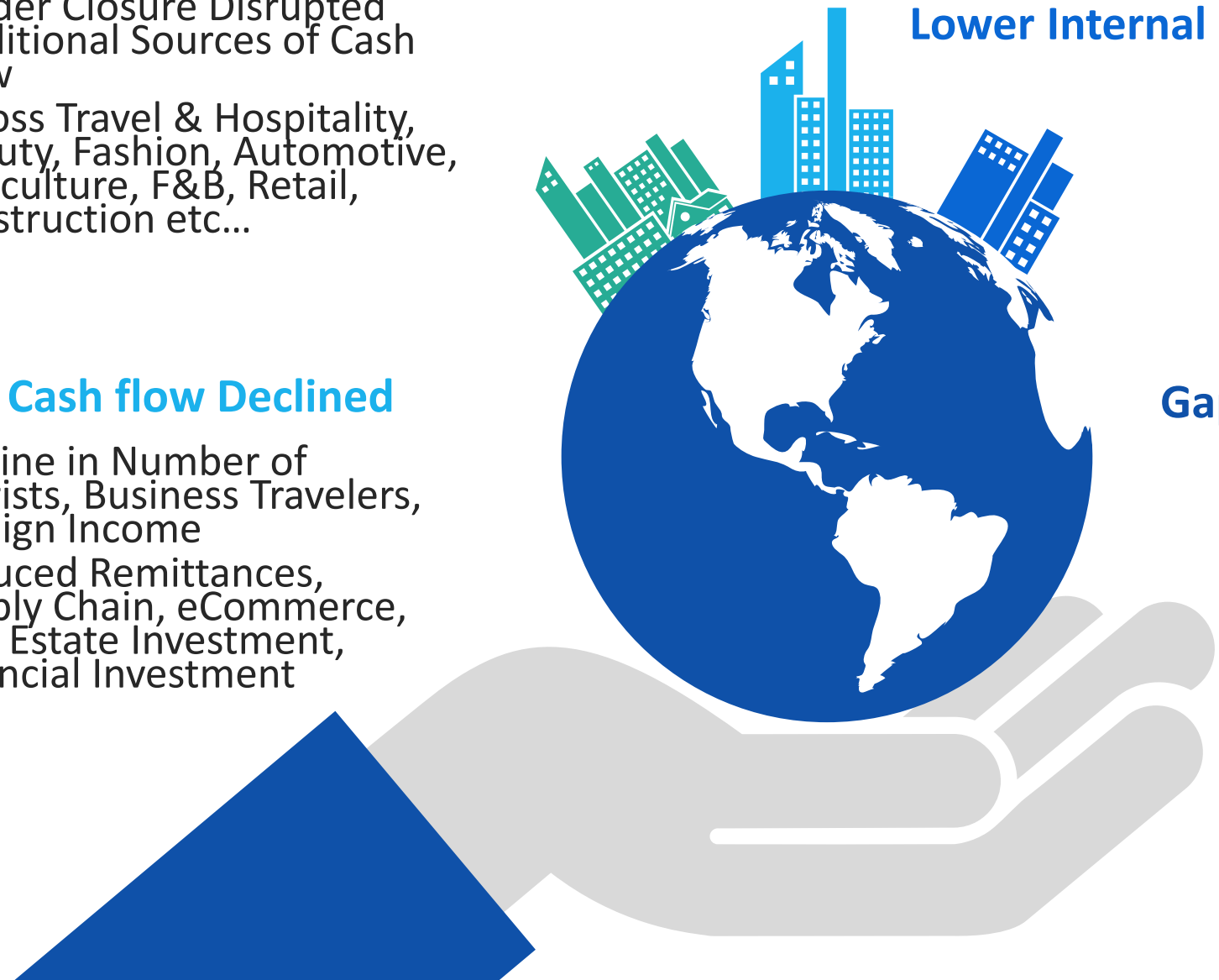
Risks due to Covid-19

Traditional Cash flow Declined

- Border Closure Disrupted Traditional Sources of Cash Flow
- Across Travel & Hospitality, Beauty, Fashion, Automotive, Agriculture, F&B, Retail, construction etc…

External Cash flow Declined

- Decline in Number of Tourists, Business Travelers, Foreign Income
- Reduced Remittances, Supply Chain, eCommerce, Real Estate Investment, Financial Investment



Lower Internal Consumption and Debt Servicing

- Slump in Internal Consumption and Debt Servicing Abilities
- Due to Layoffs, Strikes, Disruption to Operation and Governance etc…

Gaps in Regulatory and Governance

- Conflicts Between Physical Requirements and Digital Realities
- Affect Debt Servicing, Loan and Insurance Applications, Trade Related

Impacts of COVID-19

Opportunities during Covid-19

Online and Digital Services

- More personal time spent indoor
- Services switched to online operation
- More demand for online and digital services

Network Connectivity

- Shifting to remote working
- Growing reliance on online communication
- Increase demand for mobile & network infrastructure and connectivity

Virtual Assets Service Providers

- Digital representation of value that can be electronically traded, transferred or used for payment
- Cross border remittances, digital assets and tokens etc… have become an importance source of cash flow

Digital Identity

- Demand for digital certificates, digital wallets, and others
- Increased demand for digital identity and secured transparency

Challenges

Contactless Connection public infrastructure and regulation are in demand, but still lacking in most economies

Impact of Covid-19

Digital Landscape

Digital Gap

- Gap in digital knowledge, education and skills remained the main concern
- Lack of public digital infrastructure is the bottleneck

Uplifting Emerging Markets

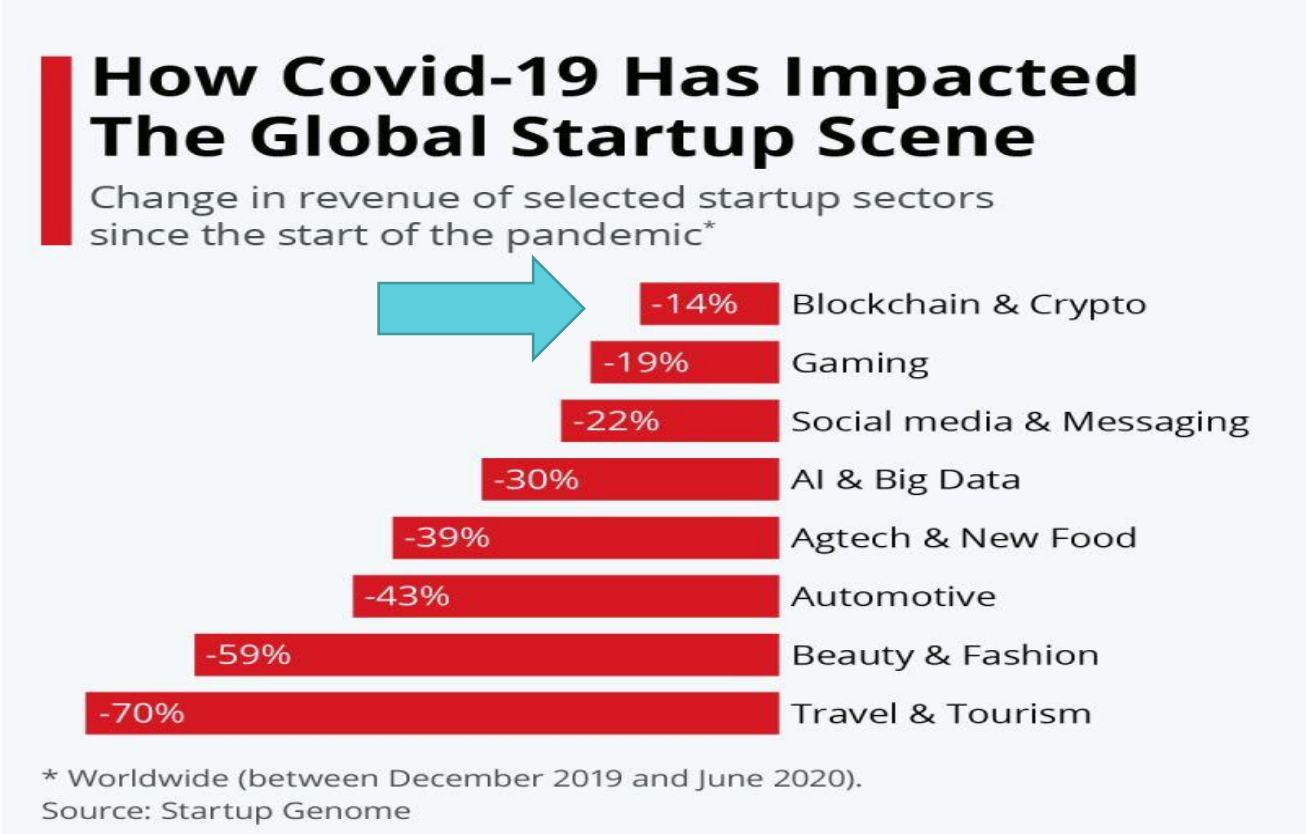
- More opportunities within emerging markets
- Leapfrogging possible in emerging markets given the nascent playing field

Digital Investments

- Funding for digital infrastructure, startups and education remains vital

Impact of Covid-19

- The pandemic had caused both devastation and opportunities in various different sectors (Refer to diagram on the right)
- Opportunities exist in terms of **job creation and capital inflows**



Source: McCarthy (2020), *Statista*

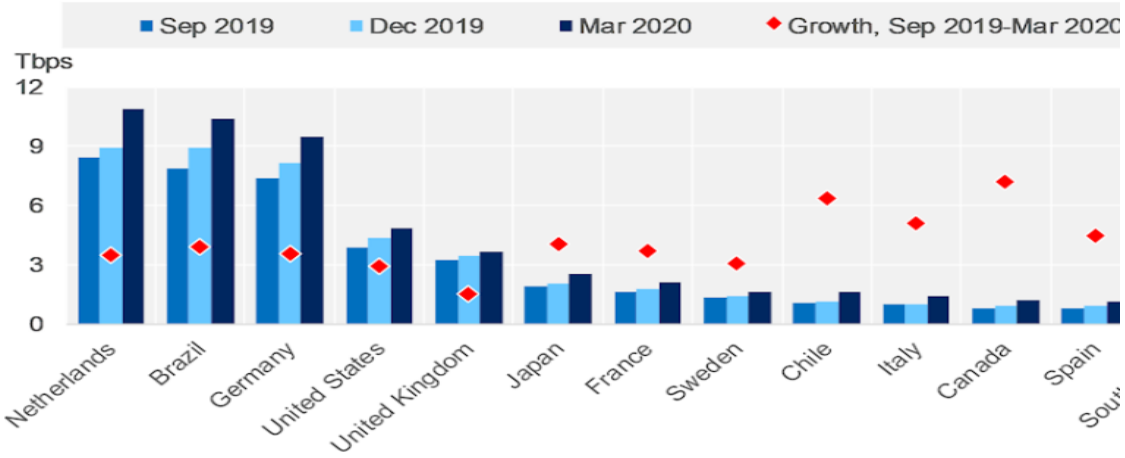
Impact of Covid-19

Internet Traffic

Increasing Internet Traffic

According to OECD, along the entire Internet value chain, fixed and mobile broadband operators, content and cloud providers, and points where Internet networks connect to each other to exchange traffic, called Internet exchange points (IXPs), are experiencing as much as **60% more Internet traffic than before the COVID-19 outbreak**.

Figure 1. **Internet bandwidth at Internet exchange points, by**



Notes: Data shows the median IXP peak traffic aggregated by country in September 2019, D March 2020, based on public sources. Tbps = terabits per second.

Source: OECD based on data from Packet Clearing House.

Overview of Action Plan

A Summary of the Pain-points and the Action Plan

- **Connect the Unconnected**
  - To adopt Mesh Network
  - To adopt Satellite and Mesh Boxes
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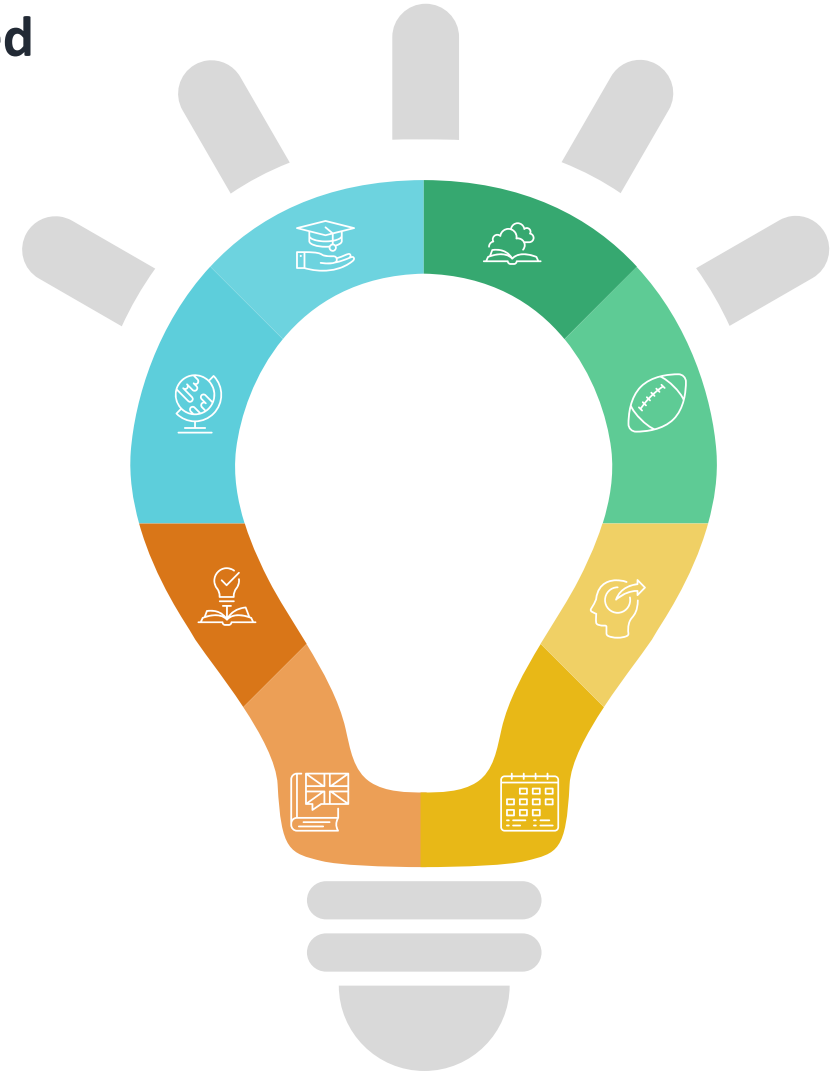
  - To adopt Travel with Health Screening
  - To adopt Zoning
  - To adopt Flight Pass



- **Trade**
  - To enhance Digital Connectivity
  - To keep supply chain opened
- **Fintech and Digitalisation**
  - To offer Education and Grant
  - To provide Sustenance and Digitalization Grants for FinTech

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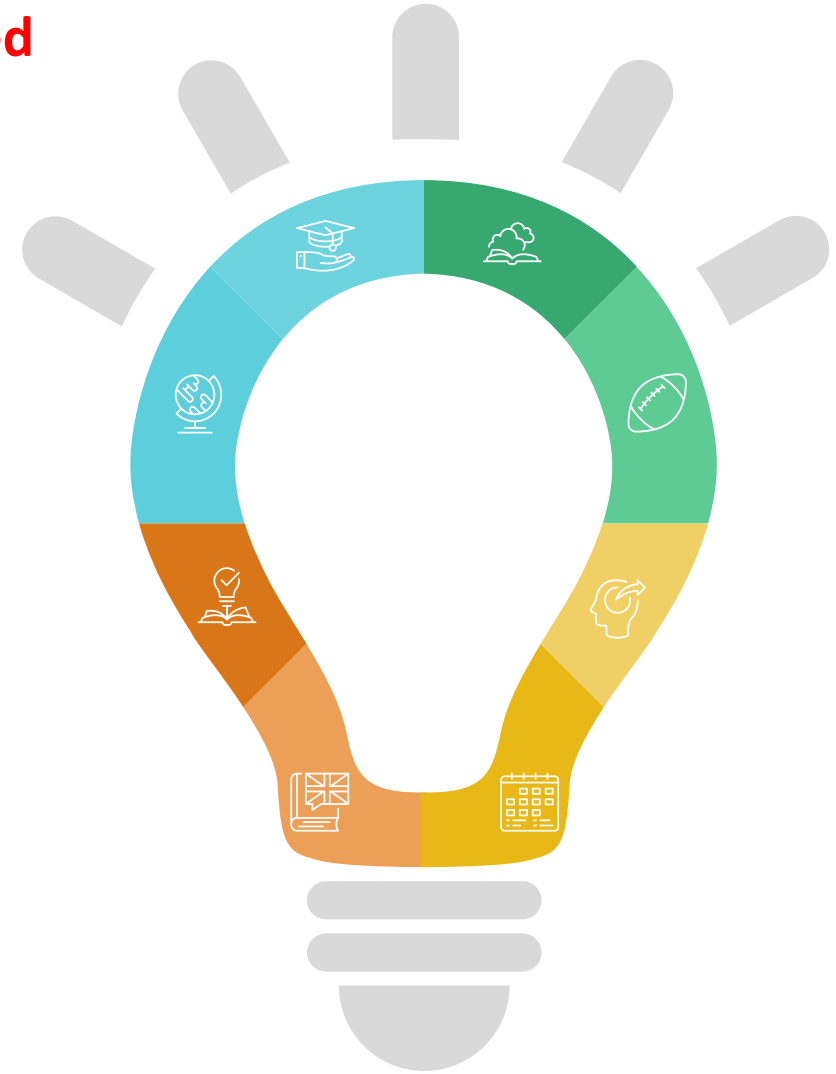

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Telecommunication Infrastructure

5G- Gold Standard in Bringing Everything Up To Speed

5G – Wireless Network Technology

- Faster and greater bandwidth
- Enable more connected devices
- Reduce latency to virtually zero
- The gold standard and a luxury

Economic Effect

- Enable up to $13.2T worth of goods and services
- Create $22.3M worth of new jobs; $2.1T in global GDP

Global Leaders

- China and South Korea are the global 5G leaders

Current Needs

- Current demand due to Covid-19 and long term need for a digitalized economy
- Broader telecommunication infrastructure needed

Source: Samsung; Qualcomm; Digitaltrends; Ericsson; TheFastMode

Telecommunication Infrastructure

Edge Computing – Gold Standard to Attain More Personalized Services

Integration of 5G and Edge Computing

- 5G provides higher speed
- Edge Computing allows personalization of online video with target ads and users interaction
- Benefit online mobile video viewing

Edge Computing

- Mobile Edge Computing, MEC, or Multi-Access Edge Computing
- Doing computing as close to the source of data as possible
- Reduces latency and bandwidth use
- A luxury just like 5G

Digital Infrastructure as a Public Good

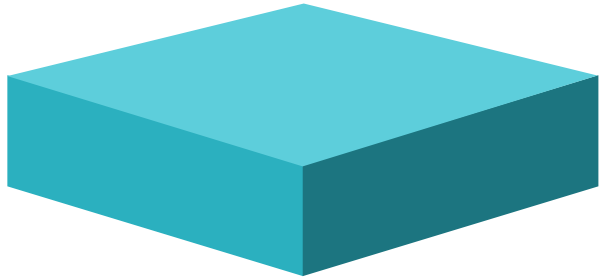
- Access to digital infrastructure is an important public good
- Enhance resilience, national competitiveness and international trade

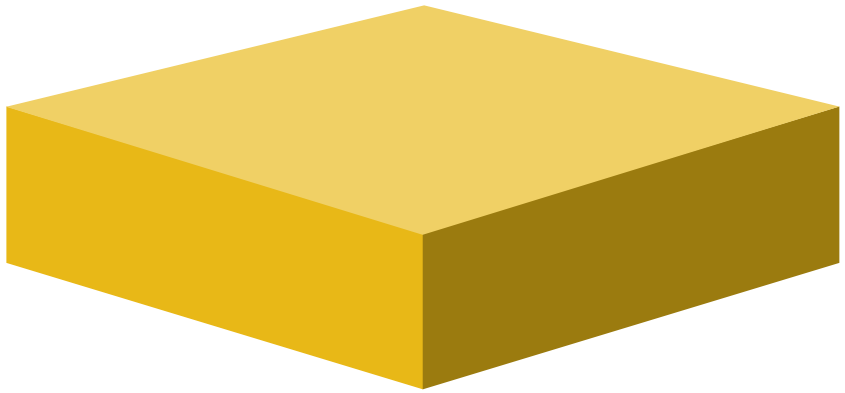
Utilization of Edge Computing

- 5G will make up 20% of mobile traffic by 2023
- 25% of the use-cases will depend on Edge Computing capabilities

Telecommunication Infrastructure

The Digital Gap: The connected vs the unconnected





The Connected

- 4.57B people, 59% of the world have access to internet access

The Unconnected

- **Over 3B people** globally do not have Internet Access
- The issue is the same in Asian
- **Cost and scalability are major concerns**

Source: Statista

Action Plan Connect the Unconnected

Mesh Network – Cheaper Alternative

Mesh Network

- To provides multiple Wi-Fi sources with faster, smoother, and more reliable for financial transactions

Focus of Network Deployment

- To focus on places with poor connection
- To focus on remote area with limited internet infrastructure and with high volume of migrant remittances

Network Expansion

- To continuously expand as additional points can be added to the network
- To act like router and providing internet access via a single connection to satellite or 3, 4, or 5G.

E-Inclusion

- To connect the unconnected
- To serve the unbanked with electronic means
- To provide cheaper and sustainable alternatives

Action Plan Connect the Unconnected

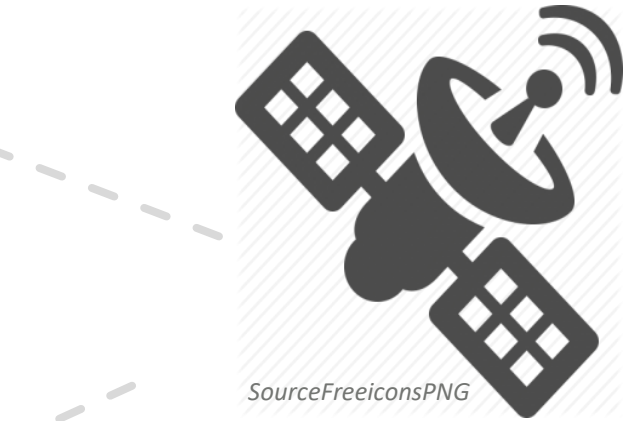
Satellite and Mesh Boxes – Sustainable for Remote Areas

Enhancing Traceability

- To trace, monitor and register source of origin and changes related to crop growth and other farming conditions
- To utilize satellite to trace goods in transit

Locations and Performance

- To locate farmers and measure crop performance remotely via storage in mesh boxes or data uploaded to the cloud via satellite.
- To use data analytic tools for the grant of loans and insurance



Satellite Communications

- To use low or high-orbit Satellite communications

E-Public Goods

- To take advantage of 1/3 of the cost of traditional methods
- To reduce permanent damage to the environment
- To increase transparency for branding/quality

To provide affordable and secured solutions for money transfer in remote areas.

Source: Lee and Lim (2020) Smartmesh, Google WiFi; Altencalsoftlabs; Geoawesomeness; ESOA

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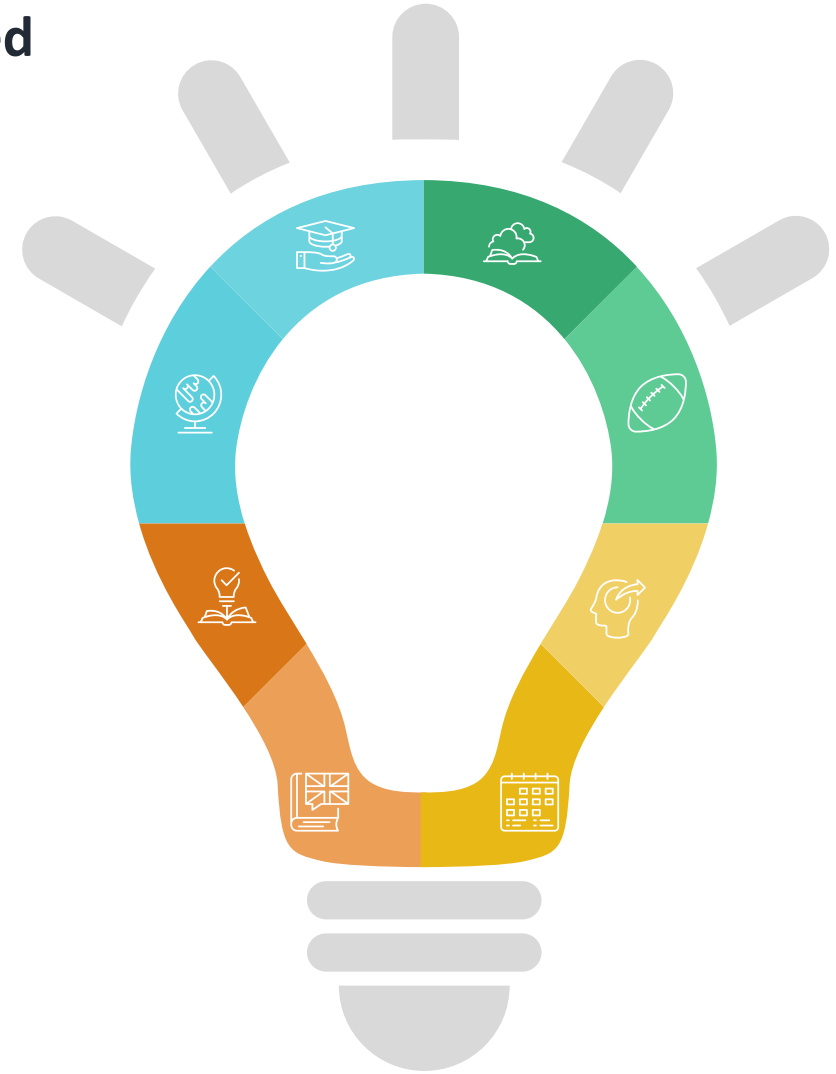

Trade
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Digital Identity

Digitised Ownership and Access

Decentralised Internet Connection

- Relies on a peer-to-peer network built on a community of users
- Users can pay for per use basis
- Users own the Mesh Boxes as revenue source and provide the connection and storage services
- No single entity in control and easily scalable with profit sharing

Contactless Connectivity

- Without Digital Identity, financial and economic activities are not assessable to most and especially during Covid-19
- Open Source and Portable IDs have advantages

Low Cost and Scalable

- Lack of digital identity impedes cash flow to the needy
- New P2P technology has almost zero marginal cost for expansion and social scaling

Democratisation of Ownership

- Provides transparency, protects privacy and enhances mobility
- Open-source model allow crowdsourcing of wisdom
- Responsive to user demand and low cost associated

Digital Identity

Self-Sovereign Identity

Self-Sovereign Identity

- Level the playing field with ownership
- Ensure global portability, enhances access, improving distribution of wealth
- Guarding data privacy
- Lowering cost of entry into international financial and payment markets

Cross Zone Travel

- Applies to medical records, tracing and tracking
- Users are in control of their own identity data

Benefits Associated

- Offer anonymous digital “persona” and defined ownership and generate cashflow/revenue
- Easier and low-cost compliance with FATF’s Travel Rule

Action Plan: Implement Self Sovereign Digital Identity

Digital ID Implementation

Digital Identity for all

- To provide digital identity for all
- Helps to onboard, tracks individuals' activities and provides access to international remittances.

Compliance with FATF

- Compliance with latest FATF's Travel Rule
- Implemented in June 2020

Digital Processes and Technologies

- To make available digital processes and technologies
- IoTs, document reader, recognition algorithms, matching algorithms, user-friendly APP or interface, etc.

Empower VASPs

- Empower Virtual Asset Service Providers
- Required to disclose customer information facilitating a trade of USD1000 or higher

Contactless Peer-to-Peer

- To enable contactless peer-to-peer activities at low cost
- To provide Digital ID implementation by VASPs

Promote Inclusiveness

- Inclusion in economic, financial, and health activities
- To provide an alternative contactless low-cost international remittance services and **assets custody**

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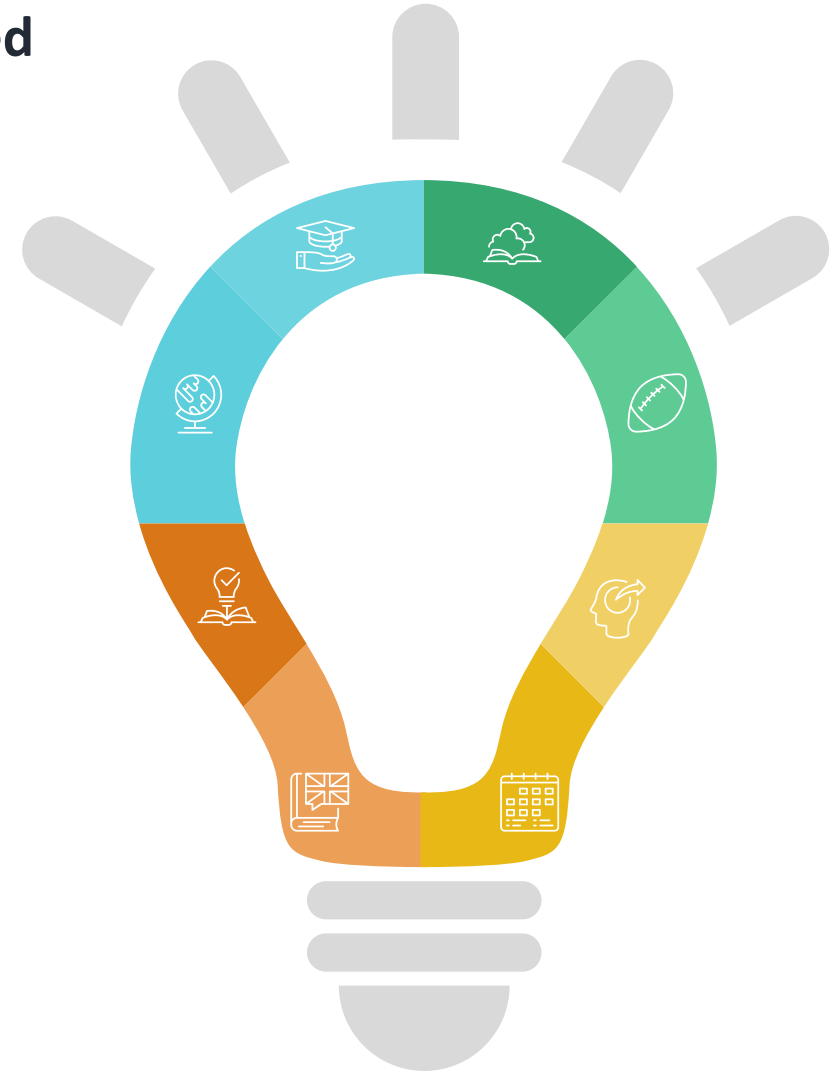

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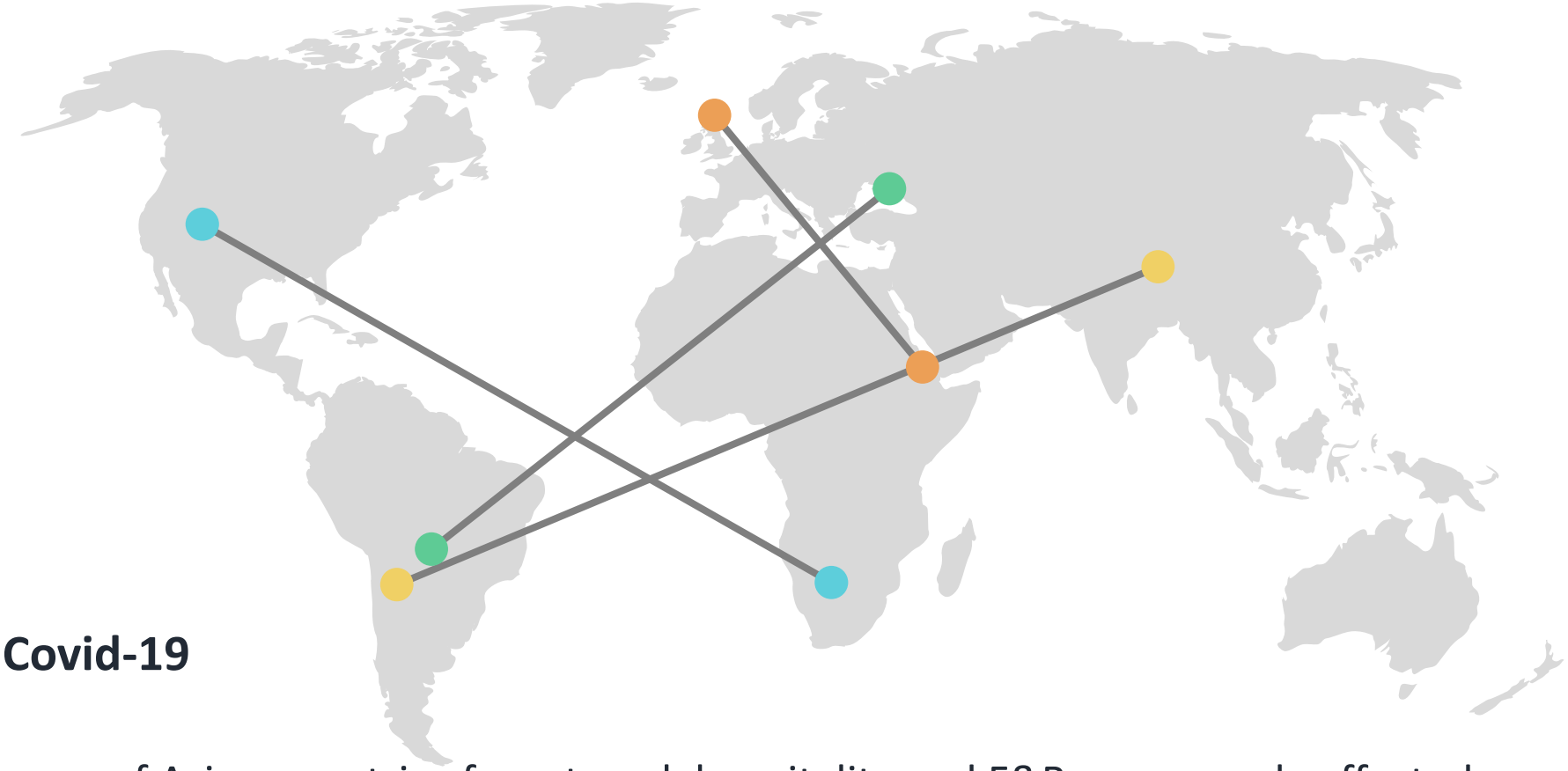
Travel Industry

Facts About Travel Industry



Impact by Covid-19

- Source of income of Asian countries from travel, hospitality and F&B are severely affected
- 20-30% decrease in international tourist arrival, estimated US$30-50B loss
- Global loss of 75M jobs and $2.1T in revenue, by World Travel and Tourism Council
- Air transport industry revenues fall by $252B, 44% below 2019, estimated by International Air Transport Association (IATA)

Source: Wikipedia; 101blockchains; Netki

Action Plan: Digital Passes

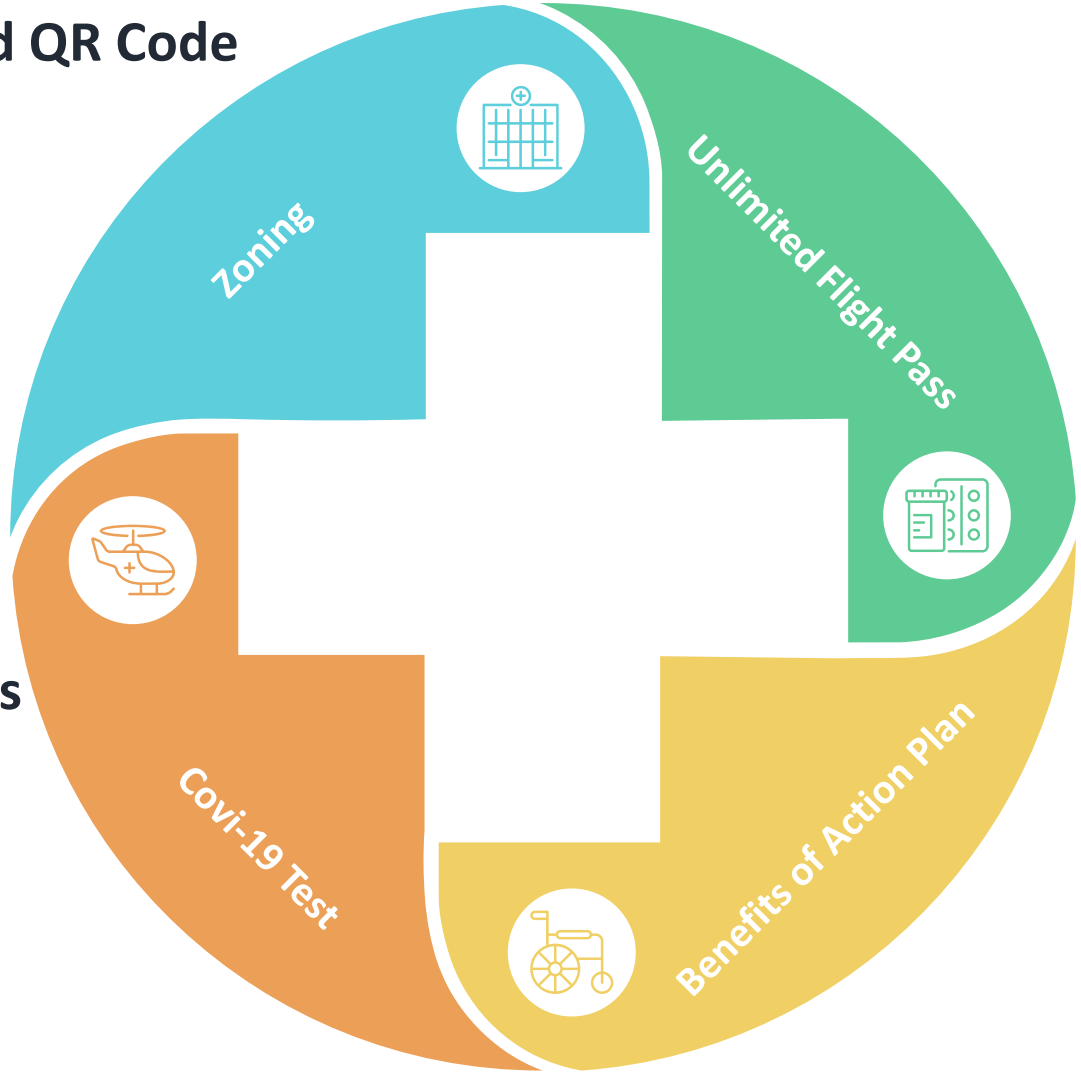
Encourage Travel with Health Screening

Zoning with Digital Passes and QR Code

- To implement zoning to boost internal travel
- To ensure self sufficient zones established
- To reduce overcrowding, cross-interaction and cross infection
- To complement Travel Bubble, Safe & Seal, and other zoning plans

Covid-19 Tests

- To conduct pre-travel and arrival Covid-19 Tests
- To store medical Test-e Records



Unlimited Flight Pass

- To provide unlimited monthly or yearly flight pass
- To tabulate Digital Records of Temperature, Molecular RT-PCR or Antibody Tests

Benefits

- Essential for short term cash flow of businesses

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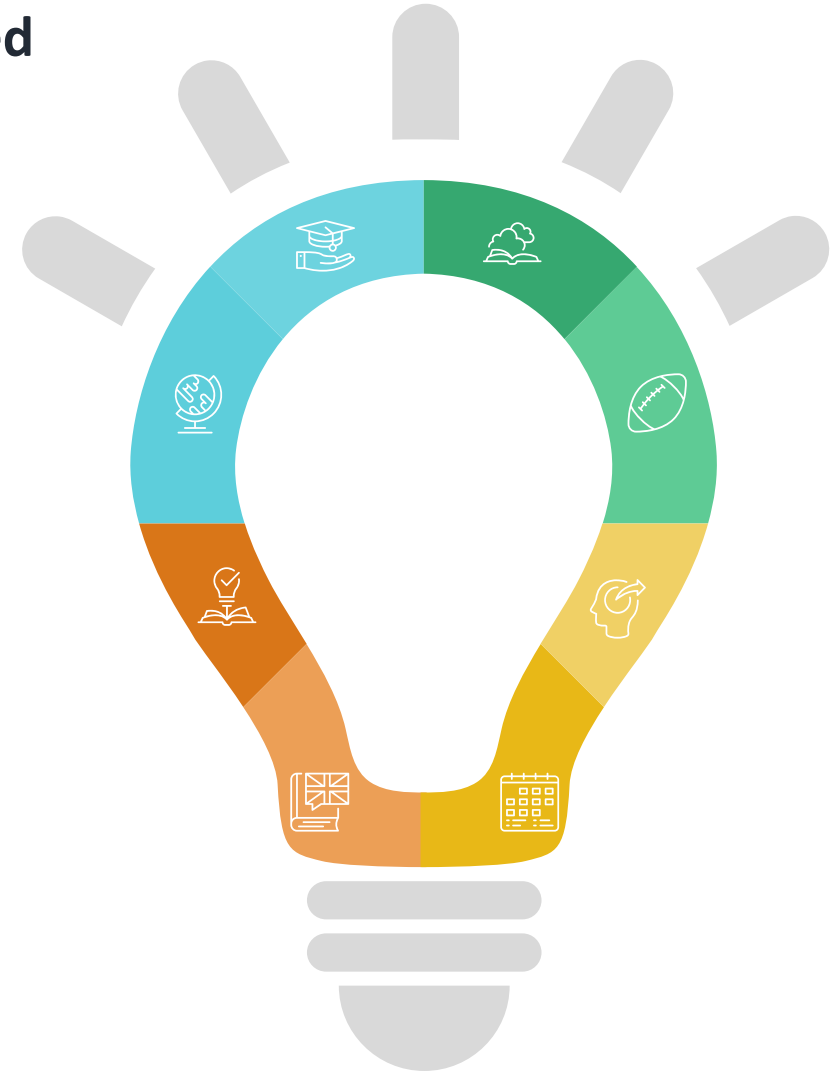

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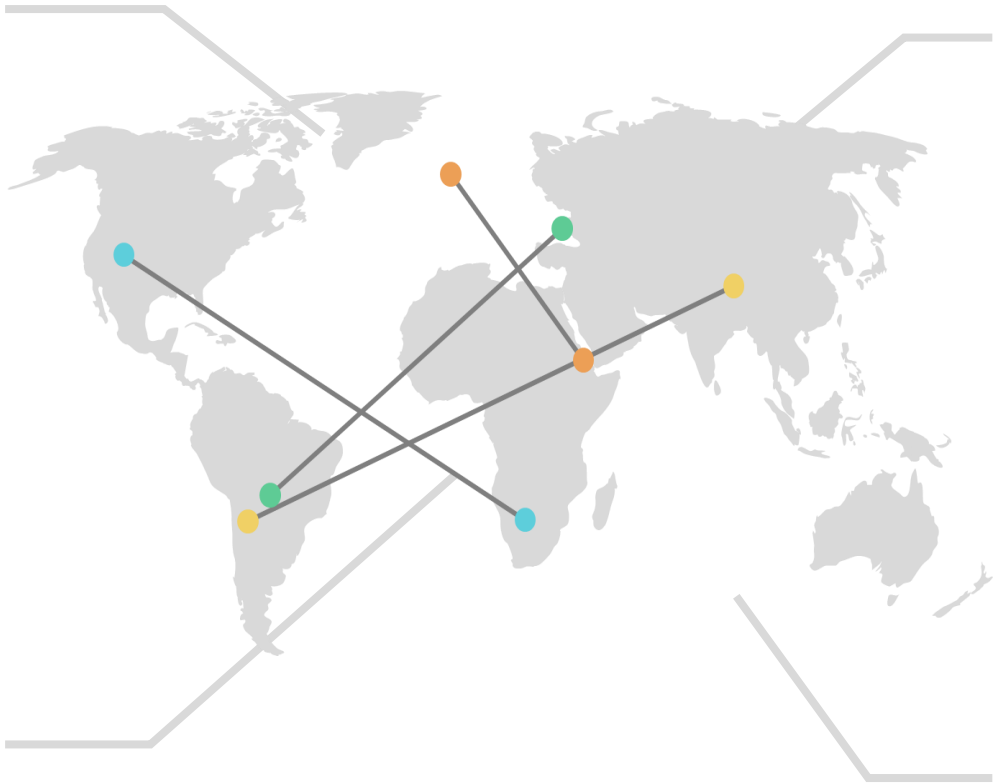
Trade

Facts About Trade

Impacts on Trade

- Global trade projected to fall by 12%
- 43/46 countries recorded lower trade
- Trade are affected and rebounding with e-supply chain tracing and maintaining ports operability



E-Documentation

- Related e-filing of trade documents and export health certification
- Ensure minimal disruptions

Food Traceability

- Traceability in ensuring safety, quality, and sustainability

Digitalisation & Tokenisation

- Matching buyers and sellers
- Credit rating
- Access to financing during Covid-19

Source: IMF; UNIDO; OECD

Action Plan: Cross Border Collaboration

More Connectivity with Cross Border Digital Collaboration

Supply Chain

- To keep supply chain opened
- To adopt higher utilization of digital trade documents

Food Traceability

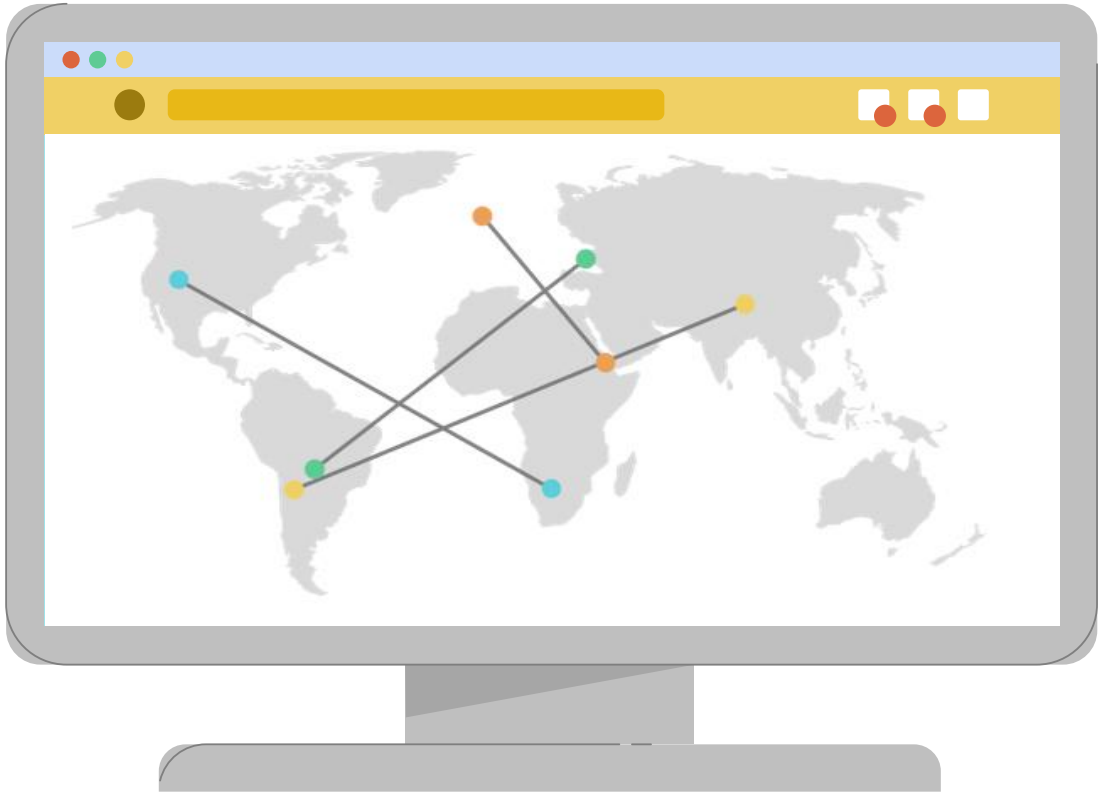
- To form partnership with foreign suppliers to ensure food traceability

Digital Connectivity

- To leverage on cloud and blockchain
- To achieve cross-border cooperation

Digital Economy Agreement

- To sign partnership agreements with other countries



Source: Monetary Authority of Singapore

Cross Border Remittance Capabilities

Instruments and Horizons

Cross-Border Payment Virtual Assets

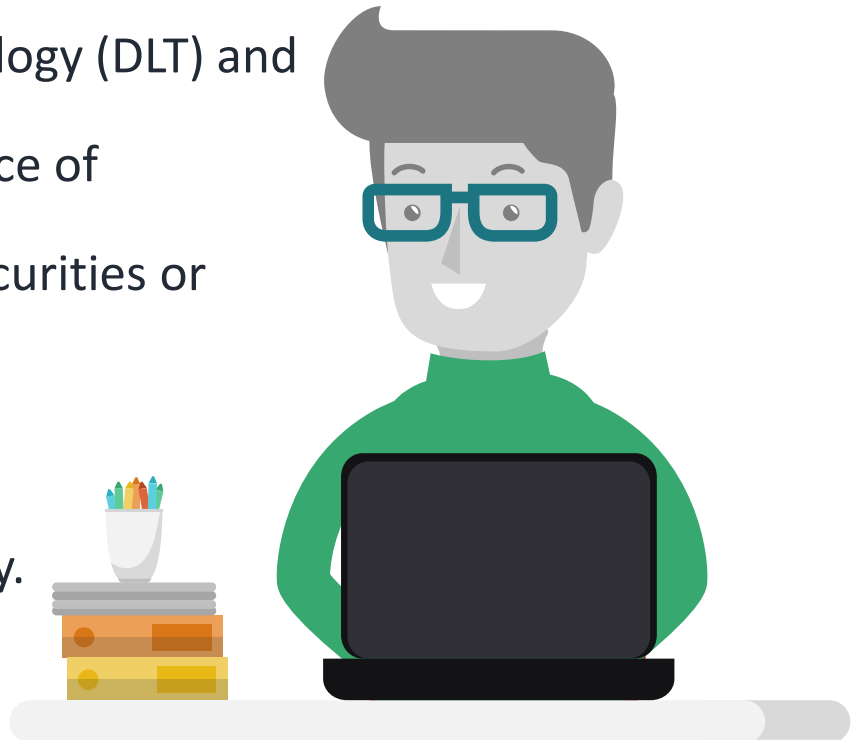
- Distributed Ledger Technology (DLT) and cryptocurrencies
- Decentralised trust, absence of governmental regulation
- Not tagged to values of securities or currencies

Stable Coins

- DLT and cryptocurrencies
- Tagged to securities or currencies. Lower volatility.
- ‘Trusted’ forms of coins
- E.g. Libra by Facebook

Central Bank Digital Currencies

- CBDC: Central Bank Digital Currency
- CBDC in China – DC/EP by PBoC
- High regulation imposed



Short Term

- Cross-Border Payment Tokens and Virtual Assets

Medium Term

- Stable Coins
- CBDCs

Long Term

- Regional Cooperation of CBDCs

Source: Monetary Authority of Singapore

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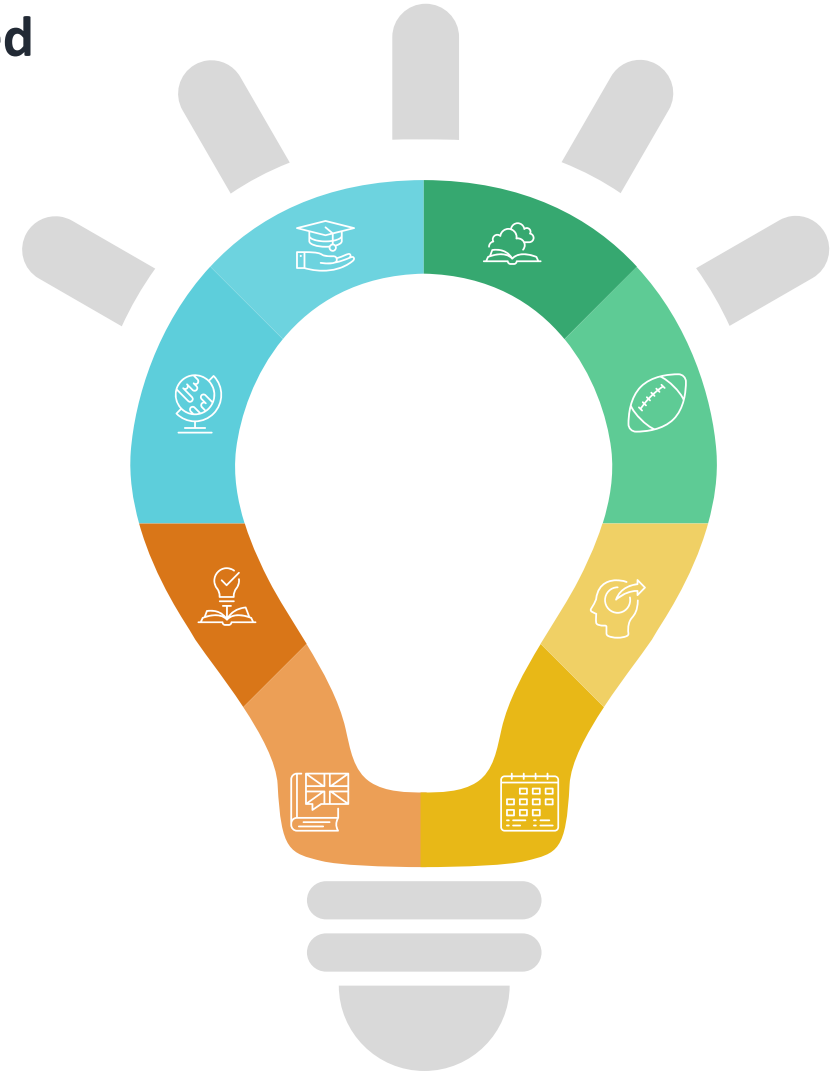

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FinTech and Digitalisation

More About Education And Grant

Potential to Scale Up

- Opportunity for FinTech companies and start ups to scale up during Covid-19
- Provide solutions with Digital ID

Transforming Business

- Corporates can scale and collaborate with startups to digitise and transform the business model

Need for Grants and Education

- Education and grants are needed
- Government should provide for them at this juncture

Seizing the Opportunity

- Opportunity to transform during this pandemics.
- Otherwise, regional economies will miss the low hanging fruits of the 4th Industry Revolution

Action Plan: Fintech and Digitalisation Grants

Offering Grants for Digitalisation and Drive Fintech

Purpose of Grants

- For FinTech, to ensure sustenance and growth.
- For Digitalisation, to foster acceleration and upskill.

Business Sustenance and Growth Grants

- To reduce lay offs
- To assist in long term growth

Digitalisation Grants

- To offer support in digitalization and creating new products to serve new customers for inclusion and scalability
- To offer training allowances for approved courses

Source: Monetary Authority of Singapore

Decentralized Inclusion

The Appropriate Option: Low-cost, Sustainable, Scalable

- Converting dead assets to live, tradable assets
- Tokenise the non-securities and securities the tokens

- Cheap Capital via globalised funding
- Convergence of Tech
- Sustainable Green Business Model

- Greatest demand came from the excluded, the people and the assets

- Fractionised and heterogenised (differentiate) the digital assets

- **Serving the underserved as a priority**

Digital Infrastructure

Treating Digital Infrastructure As A Public Good

Digital Infrastructure

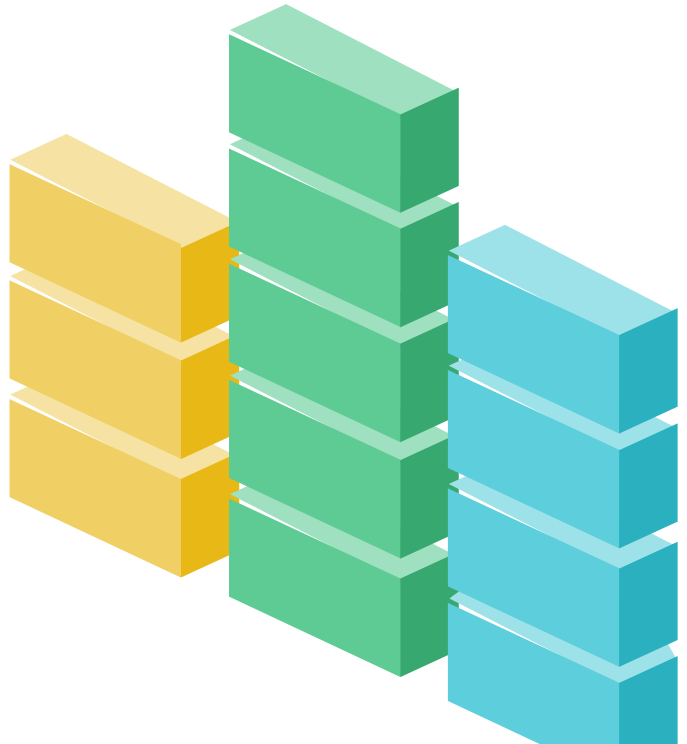
- The need for resource allocation for building virtual network

Regional Digital Infrastructure

- Key to "Facilitating Cheaper, Secure, and Sustainable Source of Remittances, e-Trading of Digital Assets and Tokens, and Access to Capital"
- Distributed Ledger Technology Based (Blockchain) for Cross-Border Data Storage Protection and Collaboration

National Digital Infrastructure

- Key to "Accelerating Financial Services for Inclusion"
- Mesh-Satellite or 3G/4G Network, Virtual Assets Service Providers Open Platform, CBDC, Open Data and API (Application Programming Interface)



10 Enablers

Critical Enablers for Decentralized e-inclusion

1. Fast, stable internet/mobile/mesh network connectivity
2. Interoperable value transfer gateway
3. Privacy protection for users
4. Strong security framework
5. Open Source and Trust Distribution governance
6. Digital literacy and UX
7. Portable Digital ID
8. Compliance easy
9. Comprehensive data and Oracle ecosystem
10. Talent, knowledge and skills

Source: Author

Modified from Bank Negara, AFI

Singapore Narrative

Case study based on policies implemented by Singapore

Singapore Initiative Overview

A Summary of Singapore Initiatives to be Discussed

Project Ubin
1. CBDC and regional cooperation

Business Sustenance Grant
2. Grant in assisting staff retention

Business Growth Grant
3. Grant in assisting Fintech

Digital Acceleration Grant
4. Grants in assisting company digitalise

Training Allowance Grant
5. Training and education grants

Digital Banking Licensing
6. License for new digital banks

Payment Service Act
7. Governs payment

Digital Resilience Bonus
8. Helping F&B and Retail digitalise

ICT Sector Accelerator
9. Expand the ICT sector and provide training

Job Support Scheme
10. Staff Retention for all companies

Company-Led Training
11. Training and educating the workforce

TeSA Mid-Career Advancement
12. Train senior professionals with relevant ICT skills

Cross Border Collaboration

MAS Commitment Case Study

"We Need More Connectivity, Not Less."
- Mr Ravi Menon, Managing Director, Monetary Authority of Singapore, 22 June 2020

MAS Commitment	Scope of Focus	Desired Benefits
Keeping supply chains opened	Trade Finance	Higher utilisation of digital trade documents
Strengthen digital connectivity	Food Safety	Partnership to ensure food traceability
	Data Connectivity and Storage	Leveraging on cloud for data storage and connectivity
	Digital Economy Agreements	Cross-border cooperation

Source: Monetary Authority of Singapore

Cross Border Remittance Capabilities

Singapore Case: Project Ubin

Project Steps	Accomplished Milestones	Inclusive Ecosystem
Tokenised SGD	Tokenise SGD	Improving efficiency of clearance and settlement
Re-imagining Real- Time Gross Settlement Systems	Expand inter-bank payment system	Cooperation with local and international banks
Delivery versus Payments	Improve transactional efficiency of tokens	Cooperation with Tech Partners
Cross-border Payment vs Payment	Co-develop better models of cross-border transaction	Cooperation with JP Morgan Chase
Enabling Broad Ecosystem Collaboration	Improve multi-currency payments with blockchain	Cooperation with other Central Banks

Source: Monetary Authority of Singapore

FinTech and Digitalisation

MAS Commitment to Fintech and Digitalisation

"FinTech firms have a great opportunity to step up actively during this period."
- Sopnendu Mohanty, Chief FinTech Officer of MAS

Business Sustenance Grant

- Grant each firm up to S$20,000 to cover work expenses
- Help Fintech firms reduce lay offs

Business Growth Grant

- S$4.5m grants assisting in improving Fintech long term growth
- Focus on innovation and partnerships

Digital Acceleration Grant

- Support smaller financial institution and Fintech
- Funds expenses in customizing digital solutions for their firms

Training Allowance Grant

- Training grants for employees within Fintech firms and financial institutes during the pandemic
- S$15/hr of training allowance
- 90% subsidy on approved courses

Source: Monetary Authority of Singapore

Regulations and Initiatives

Case Study: Monetary Authority of Singapore

Digital Bank Licensing

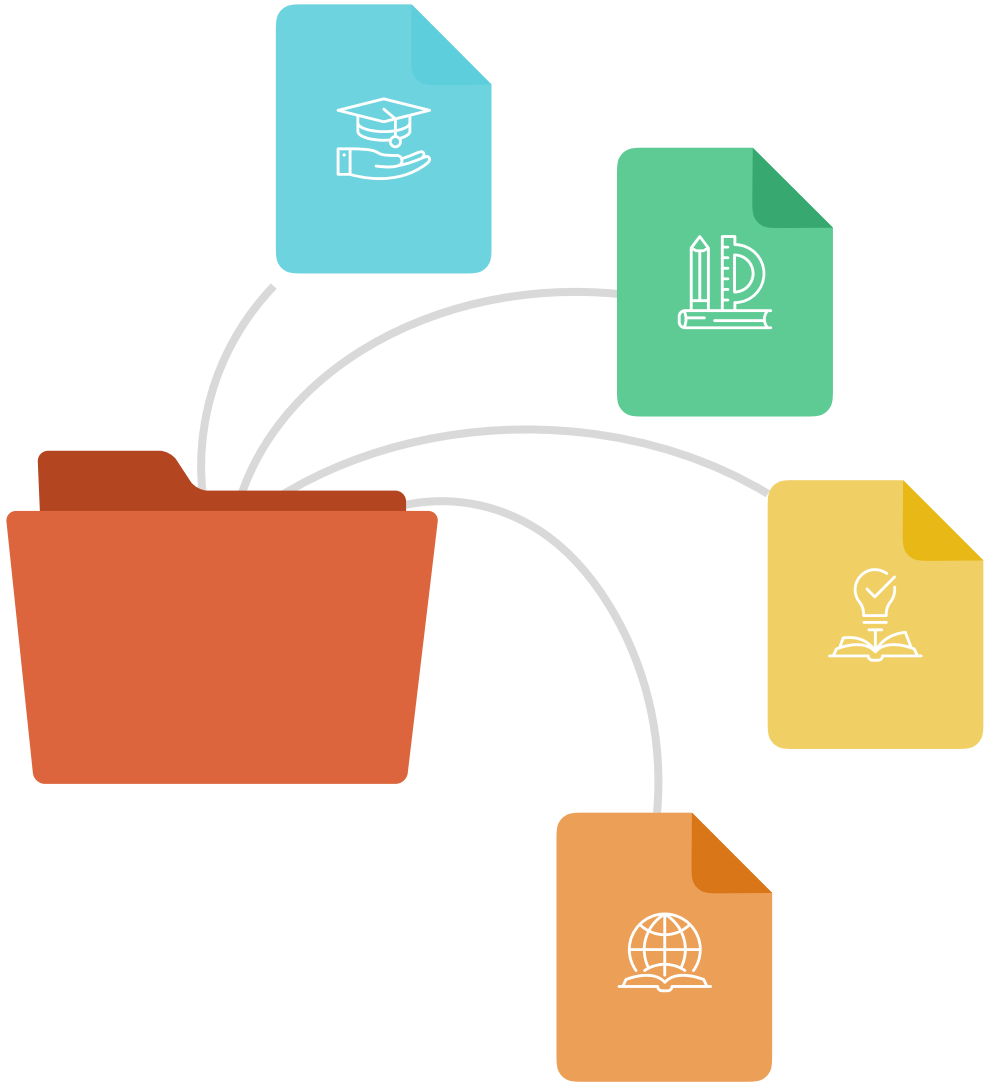
- Issued up to 2 digital full bank licenses and 3 digital whole bank license
- Ensuring that Singapore's banking sector continues to be resilient, competitive and vibrant

Payment Service Act

- Governs digital payment services, like digital payment tokens
- Focus on risk regulations
- Forward looking initiative

Education Initiatives and Support

- Establishment of Asian Institute of Digital Finance (AIDF) in a joint development led by MAS.
- Publish advisories and relevant guidelines to advice financial institutes
- New Training Allowance Grant (TAG)



Source: Monetary Authority of Singapore

Singapore Budget 2020

Budget 2020 and Related Initiatives

Staff Retention
- Job Support Scheme
- S$15b pay-out to support employee wages
- 140k employers & 1.9m employees reached

Business Model
- New Digital Resilience Bonus
- Hawkers go Digital Initiative
- Digitlise the F&B industry and Retail Industry

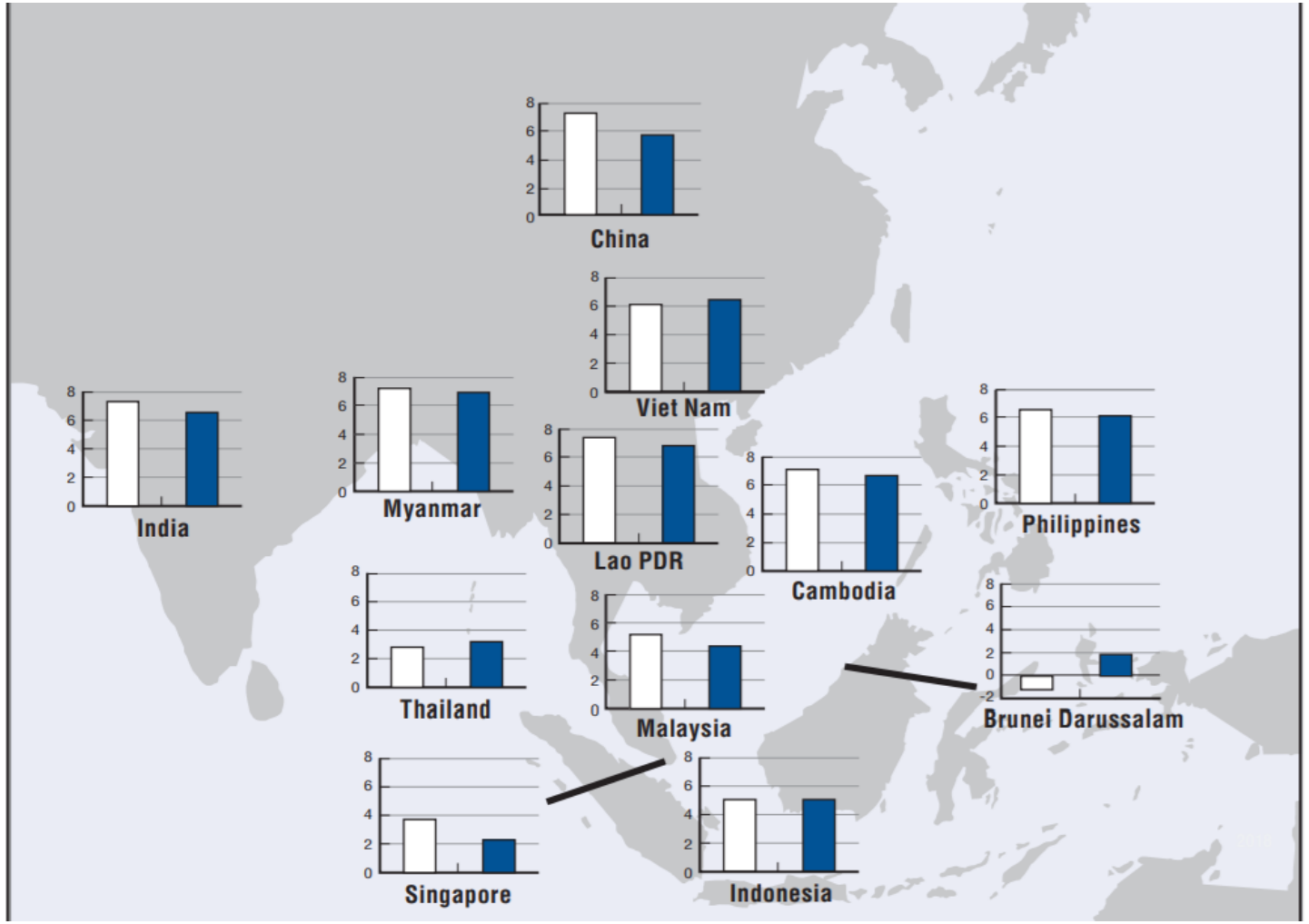
Singapore Budget 2020
- Resilience Budget
- Solidarity Budget
- Fortitude Budget

Expand ICT Sector
- ICT Sector Accelerator Programme
- TeSA Mid-Career Advance Programme
- 3.5% expansion in ICT sector
- Train senior professionals with ICT related skills

Training & Education
- Company- Led Training Programme
- Place 3,000 workers in ICT by 2023
- Train skills such as 5G, IOT, Cloud…

Source: Straits Time, IMDA, MAS, MOF

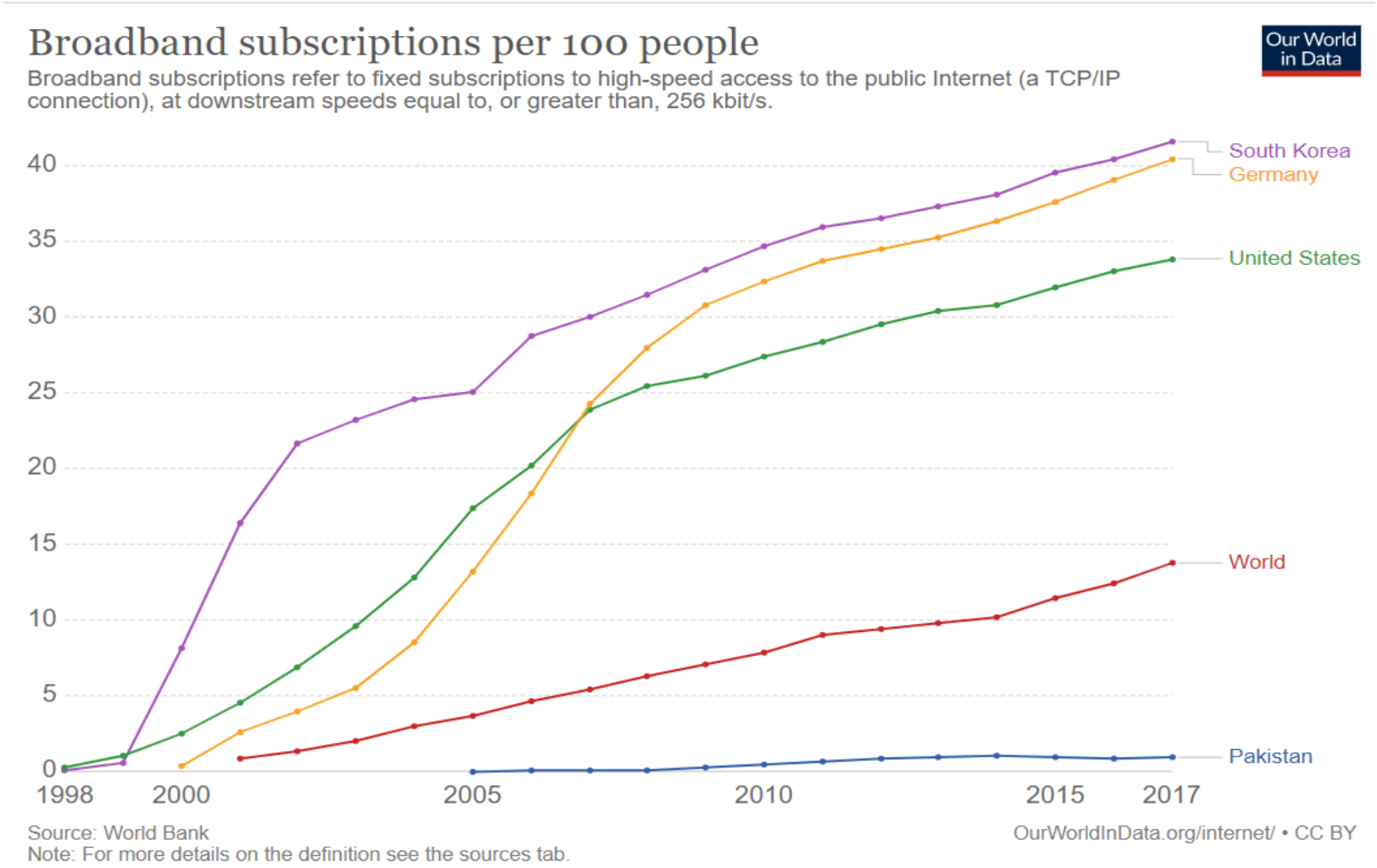
ANNEX



Real GDP Growth in Southeast Asia, China and India

Broadband Subscriptions

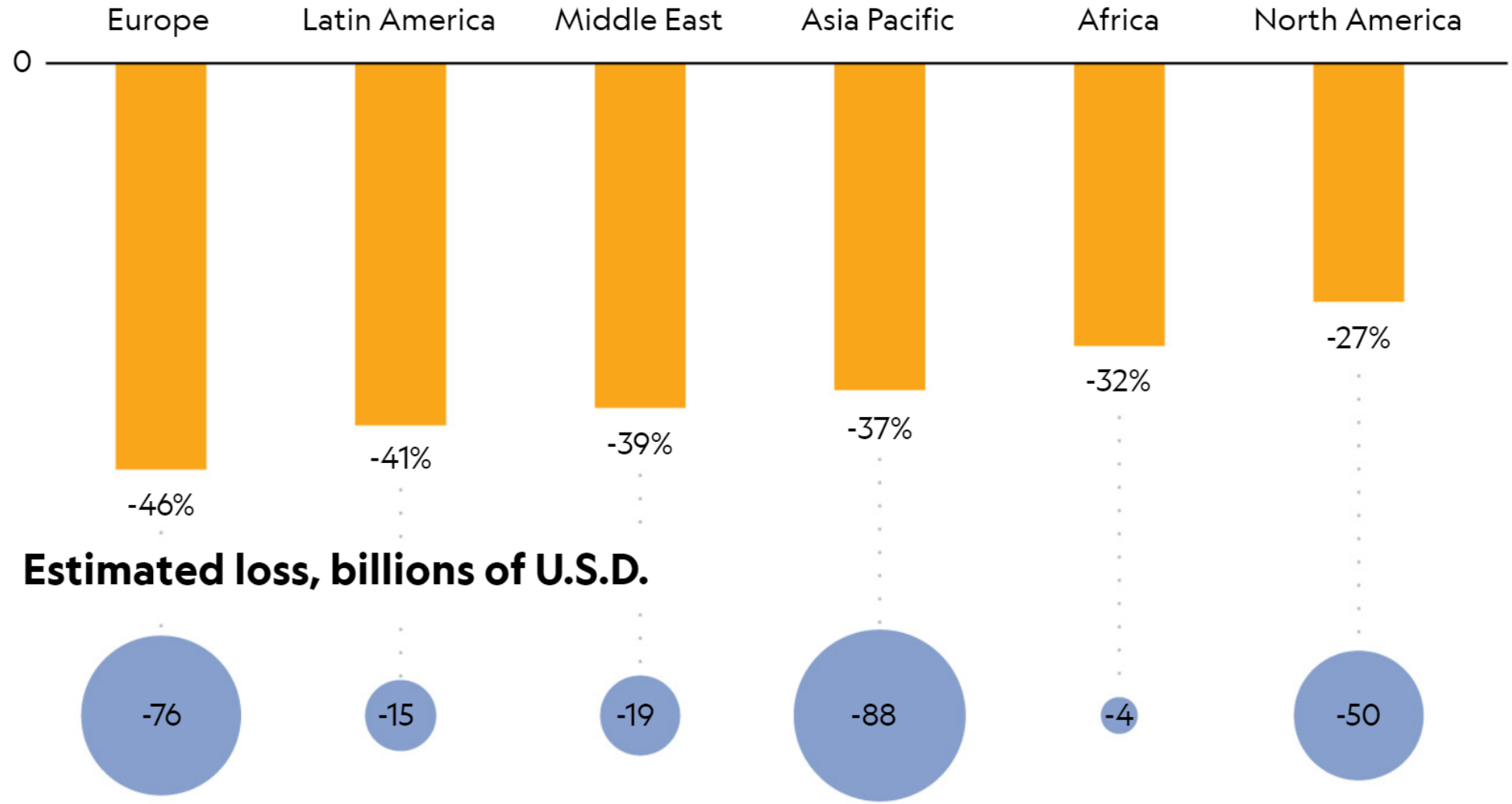
- 13 out of 100 people in the world have broadband subscriptions.



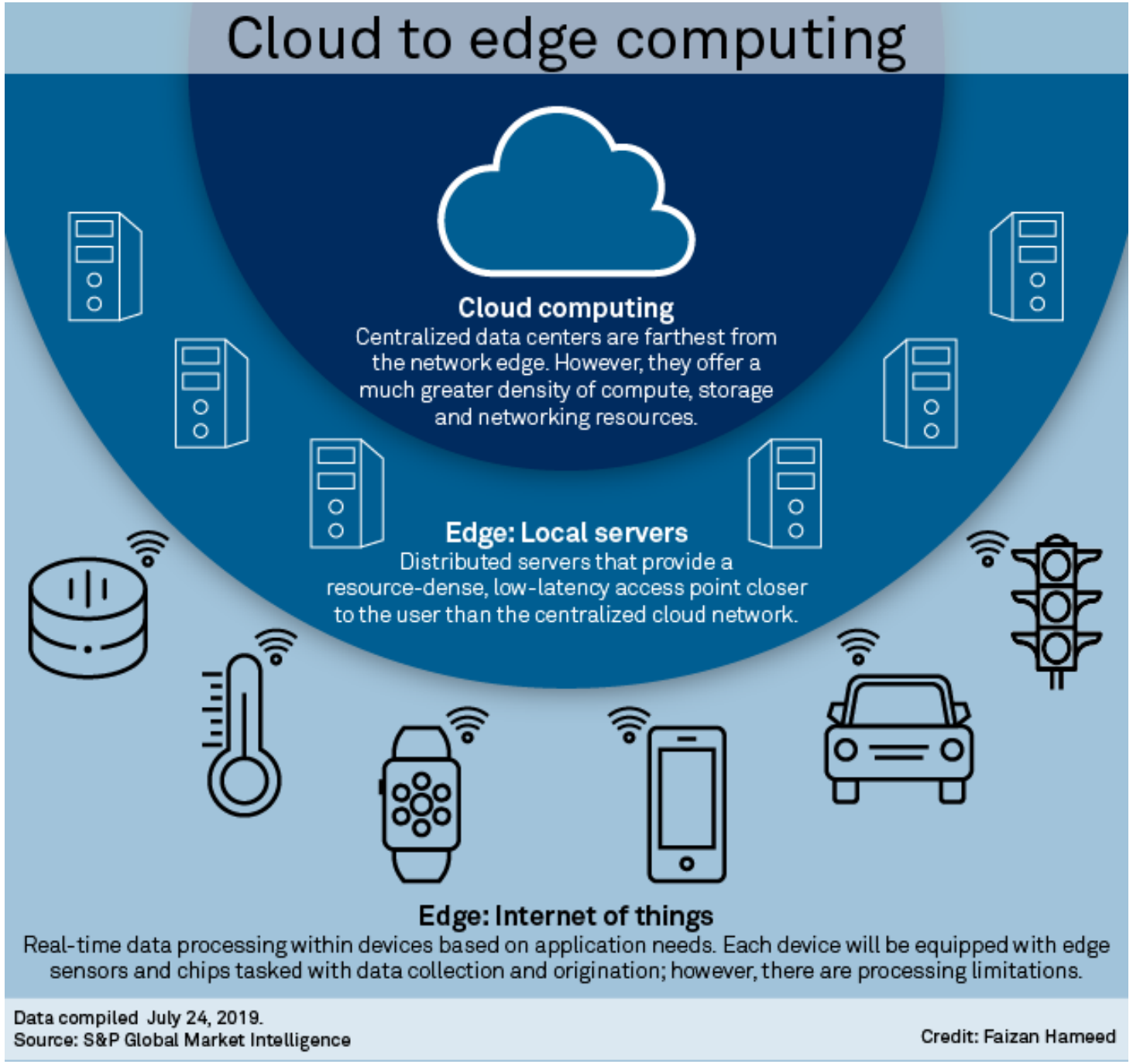
Source: World Bank and ourworldindata.org

Impact of the pandemic on airlines

- Percentage change in revenue from 2019 to 2020 (Per passenger and kilometers)



Source: National Geographic



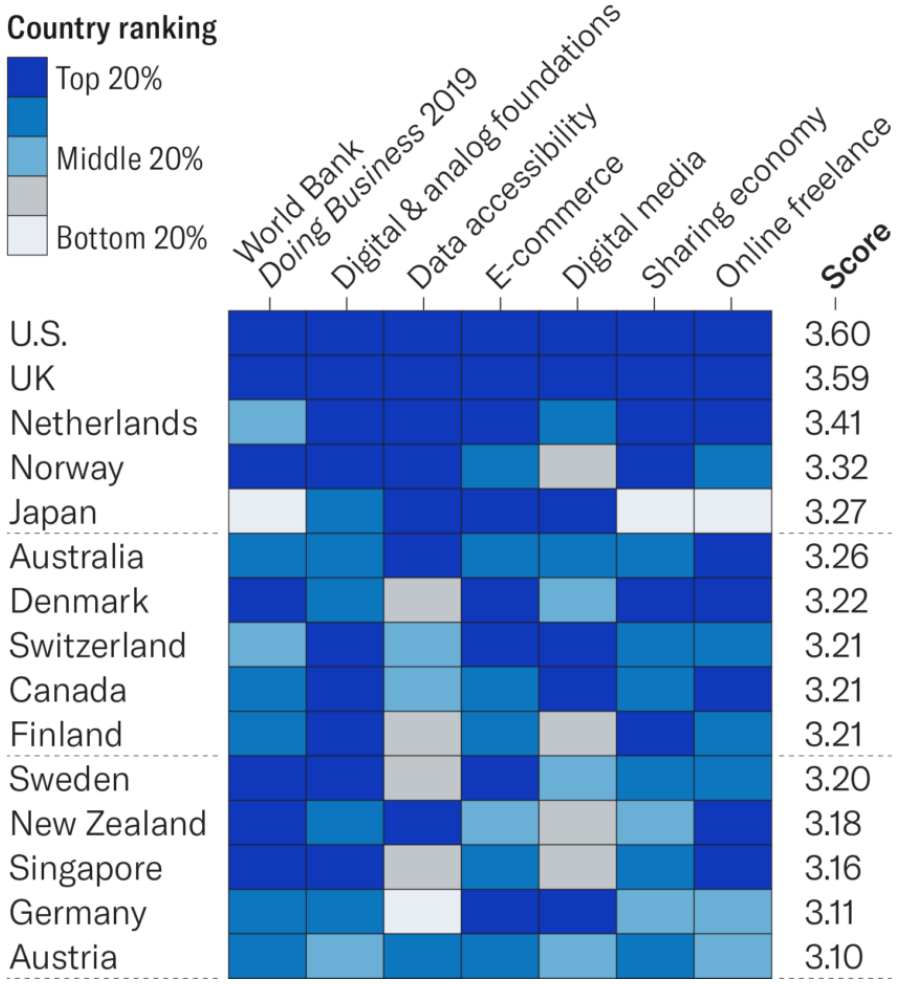
As wireless operators begin lighting up next-generation 5G networks, the combination of faster mobile broadband speeds coupled with massive modern data loads is expected to drive an emerging technology: edge computing.

Edge computing aims to make data processing more efficient by cutting down on the distance that information must travel. The major U.S. wireless carriers are all testing edge processing platforms to compete for this next wave of computing, with demand driven by increased data consumption as consumers, businesses and municipalities embrace a growing number of connected devices, and the internet of things expands.

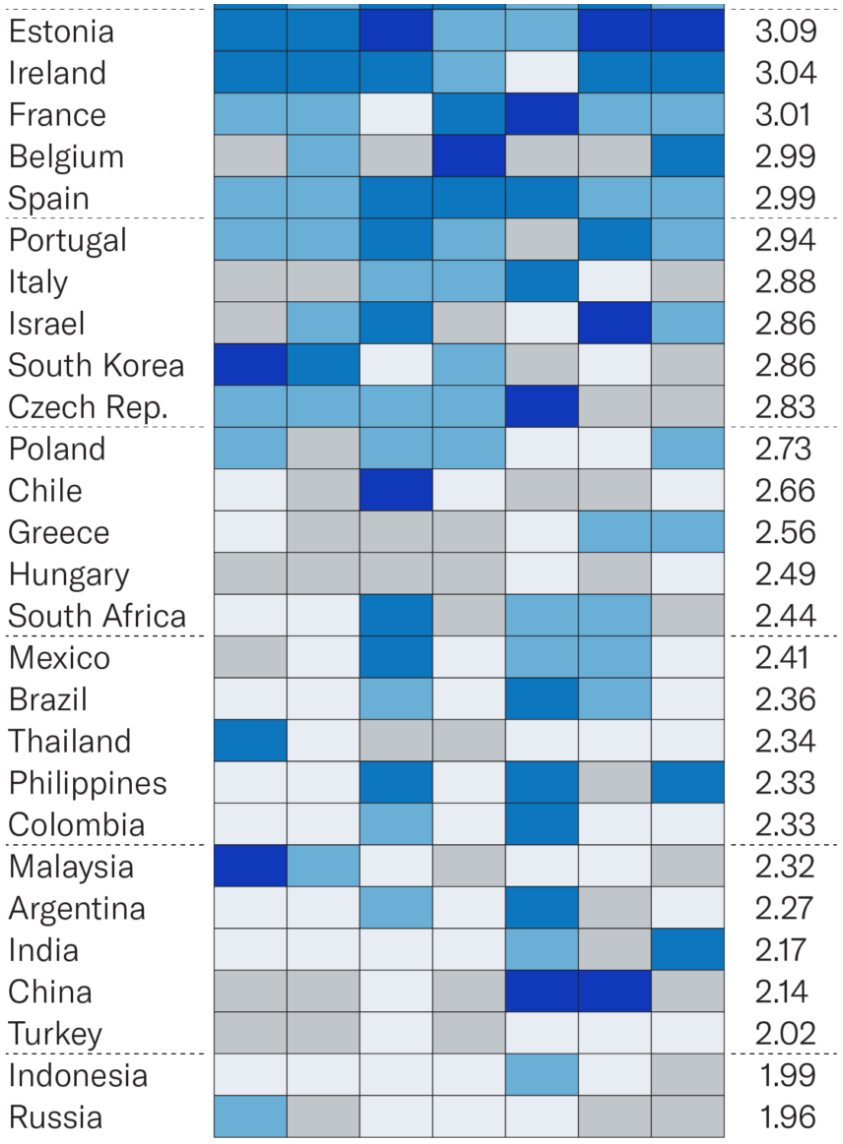
Source: S&P Global

Ease of Doing Digital Business

- US and UK ranked the top of 42 countries.



Source: [Harvard Business Review]



Source: Digital Planet research initiative, The Fletcher School at Tufts University

HBR

Digital Infrastructure Investment in China

- China is expecting over the next five years to top more than CNY27.1 trillion (US$3.78 trillion) in new infrastructure construction and related investments, which amounts to an average of $63 billion per month between 2020 and 2025. In 2020, as much as CNY3 trillion ($423 billion) are to be invested already in new projects, benefiting 5G base stations, data centres, industrial internet, artificial intelligence, new energy vehicle charging infrastructure, and intercity high-speed rail network. As many as 20 provincial-level regions have unveiled plans with Shanghai planning to spend around $37.7 billion in the next three years.
- Governments in China are investing and supporting fintech startups. For example, Guangzhou Municipal Government has given the Chinese AI startup CloudWalk $301 million grant.
- China is one of the only two countries with a nationwide rollout of 5G so far, and the other is South Korea. China's 5G user base has exceeded 85 million, ranking first in the world. As of February, Huawei had obtained 91 5G commercial contracts worldwide and shipped more than 600,000 5G Massive MIMO active antenna units, the backbone of 5G networks. Three Chinese telecom operators have tripled their investment in 5G over the past year. The coronavirus epidemic has stimulated China's policy support for 5G, along with consumers' increasing demand for a faster internet during telecommuting, online education and livestreaming. In November 2019 China announced the formation of a research team dedicated to 6G.

Source: BoardGroup

Actions in Europe

- **Digital Education Action Plan**: 11 actions with the following three priorities to support the use of technology in education and the development of digital competences.

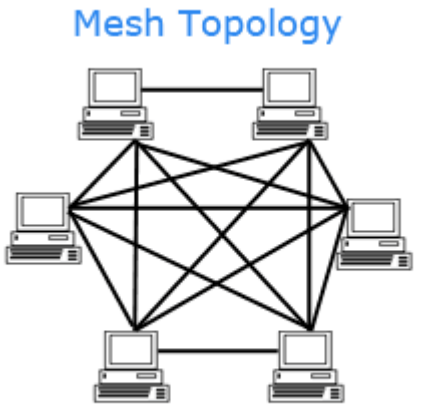
  - Making better use of digital technology for teaching and learning
  - Developing digital competences and skills
  - Improving education through better data analysis and foresight

- **FinTech Action Plan**: initiatives to establish a more competitive and innovative financial market.

  - Enabling innovation business models to reach EU scale
  - Supporting the uptake of technological innovation in the financial sector
  - Enhancing security and integrity of the financial sector

Source: European Commission

Mesh Topology



Source: Computer Hope

- A mesh topology is a network setup where each computer and network device is interconnected with one another.
- This topology setup allows for most transmissions to be distributed even if one of the connections goes down.
- It is a topology commonly used for wireless networks
- There are two forms of this topology: full mesh and a partially-connected mesh.
- Mesh can manage high amounts of traffic, because multiple devices can transmit data simultaneously.
- A failure of one device does not cause a break in the network or transmission of data.
- Adding additional devices does not disrupt data transmission between other devices.

Source: Computer Hope