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INFORMATION ECONOMY REPORT 2013

The Cloud Economy and Developing Countries

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What is Cloud Computing?

- A way of delivering applications, services or content remotely, rather than requiring users to hold them on their own servers, computers or other devices.

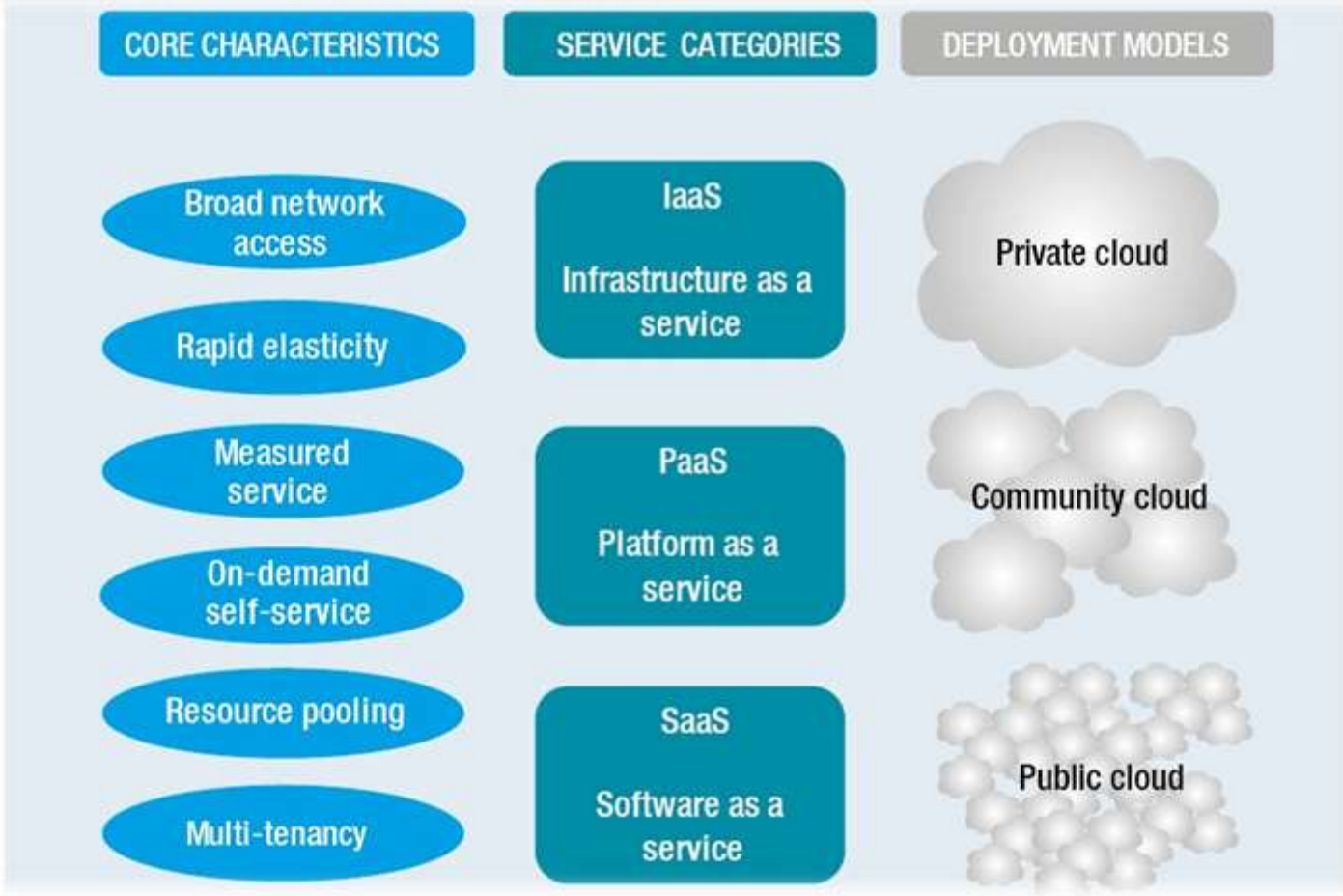
- Webmail, online social networks and file-sharing among the most popular applications on the Internet, also in the developing world.

- Metaphor of the "cloud" is misleading – cloud computing enabled by the combination of the physical hardware, networks, storage, services and interfaces needed to deliver computing as a service.

What enables the Cloud?

- **Processing power**
  - Intel's current 22 nanometre CPU is 4,000 times faster, uses 0.02 per cent of the energy and costs 1/50,000 of its first CPU released in 1971
- **Digital storage**
  - The first IBM PC (1981) cost $3,000; accepted diskettes of 160kb
  - By 2010, a hard disk for $600 could store all music ever recorded
- **Transmission speed**
  - Dial-up connection in 1993: 56kbps
  - As of 2013, some consumer broadband packages 2Gbps – some 36,000 times faster

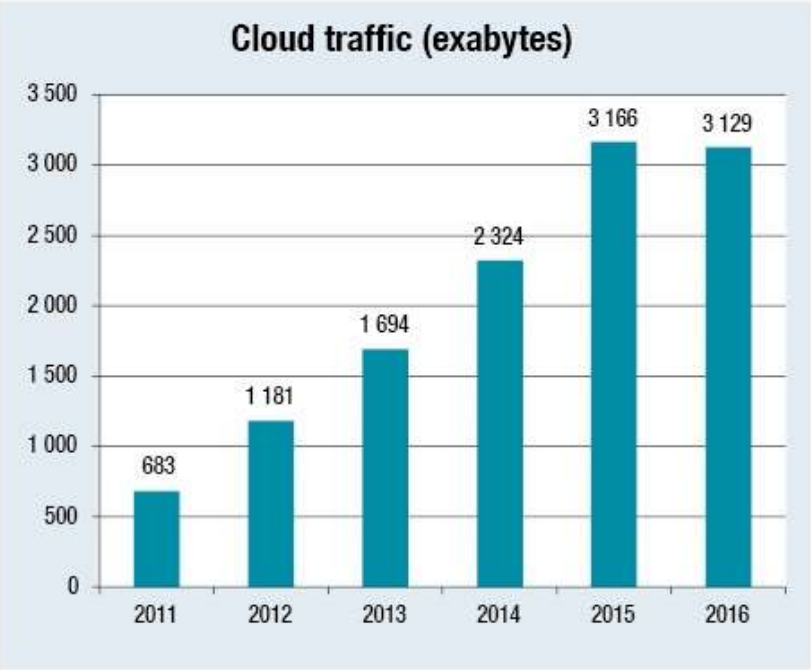
Cloud computing characteristics and models

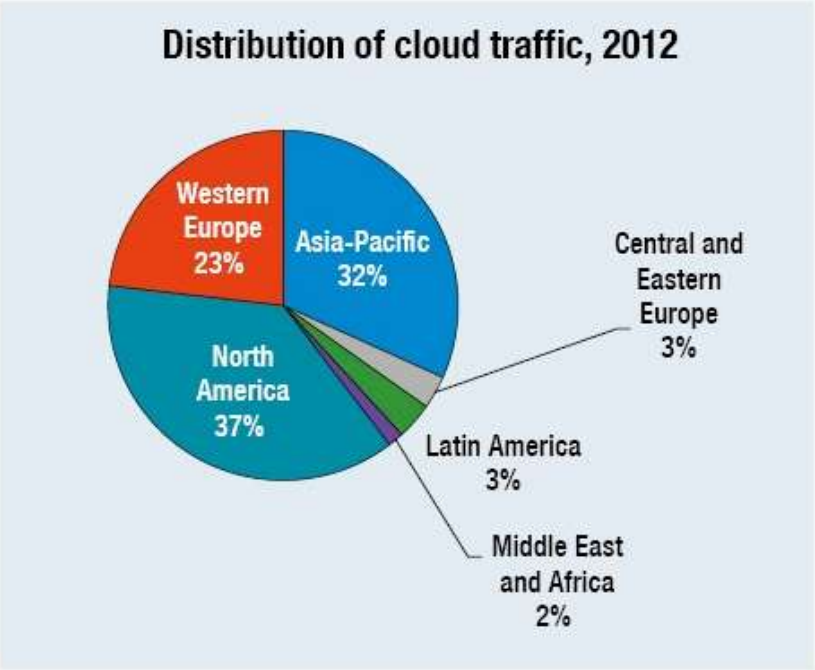


Source: UNCTAD, adapted from NIST 2011.

Cloud traffic

Mainly in developed countries but growing fast





Source: Cisco Analysis.

Pros and cons with the Cloud

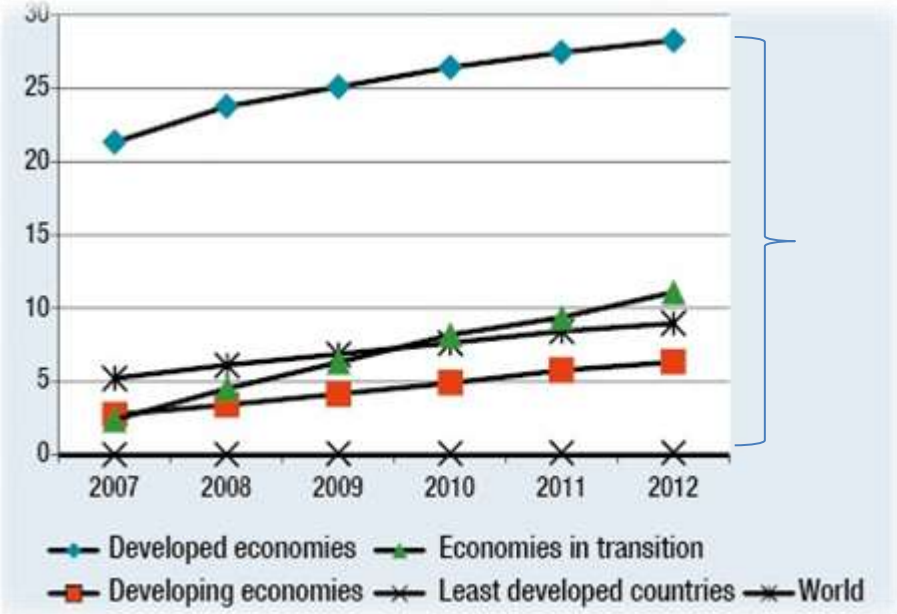
Potential advantages	Potential disadvantages
Reduced costs for rented IT hardware and software than for in-house equipment.	Increased costs of communications (to telecom operators/ISPs)
Reduced cost of in-house IT management	Increased costs for migration and integration
Enhanced elasticity of storage/processing capacity	Reduced control over data and applications
Greater flexibility and mobility of access to data and services	Data security and privacy concerns
Immediate and cost-free upgrading of software	Unreliable services, e.g. due to inadequate ICT or power infrastructure
Enhanced reliability/security of data and services	Risk of vendor lock-in (limited interoperability and data portability) with providers

Source: UNCTAD.

The Broadband Challenge

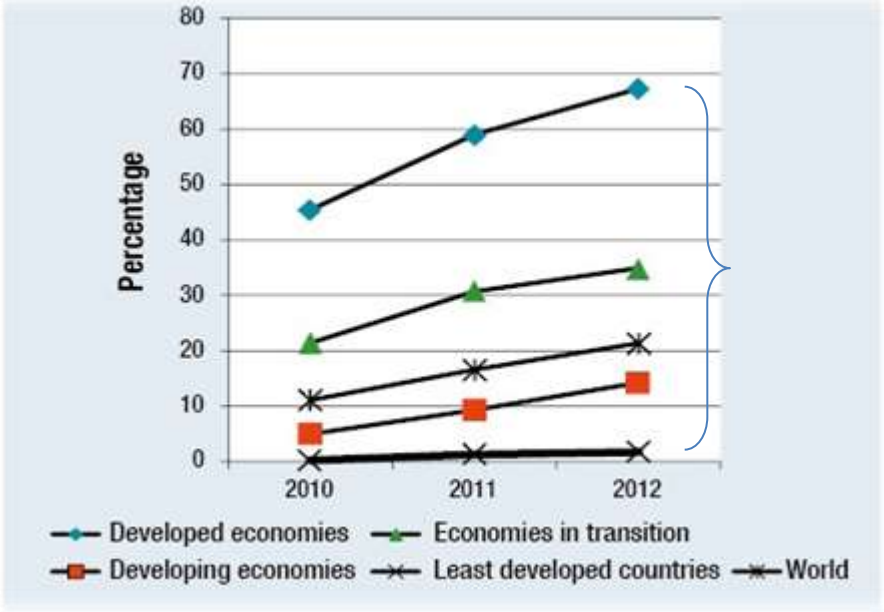
Gap to LDCs keep widening

Fixed broadband subscriptions per 100 people, 2007-2012



Developing Asia-Pacific (2012): 6
Africa (2012): 1

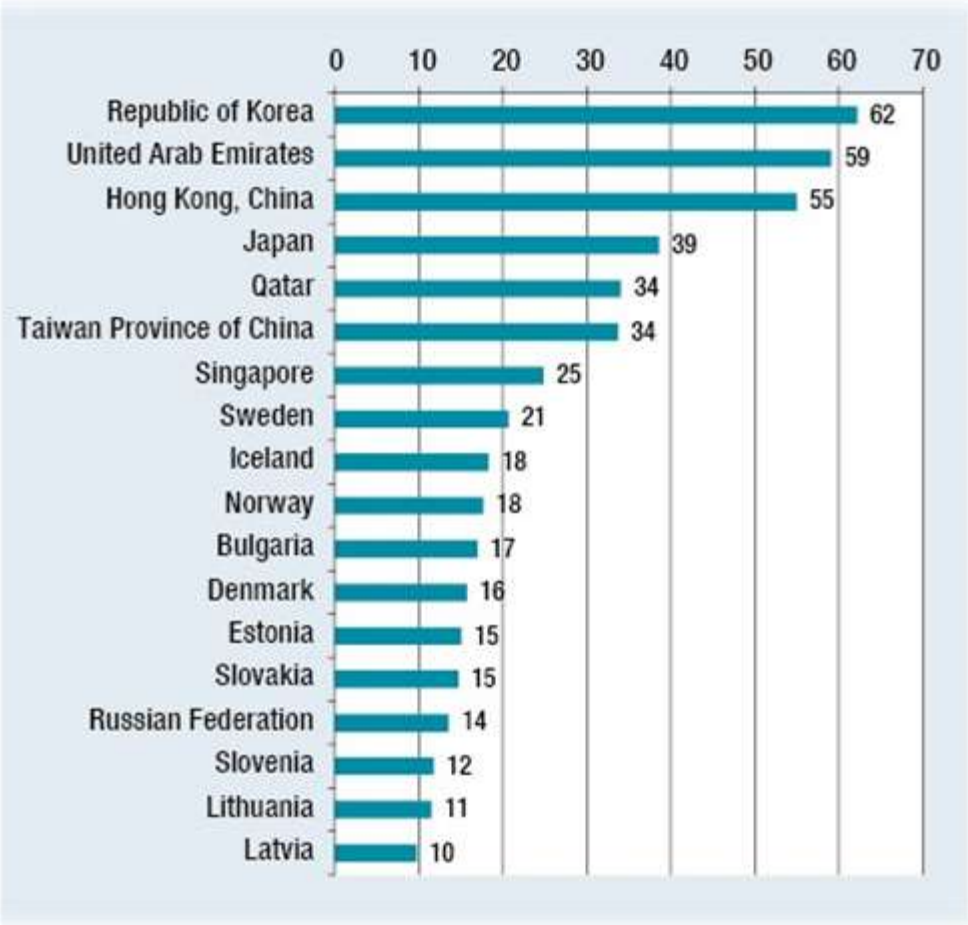
Active mobile broadband subscriptions per 100 people, 2010-2012



Developing Asia-Pacific (2012): 20
Africa (2012): 6

Source: ITU.

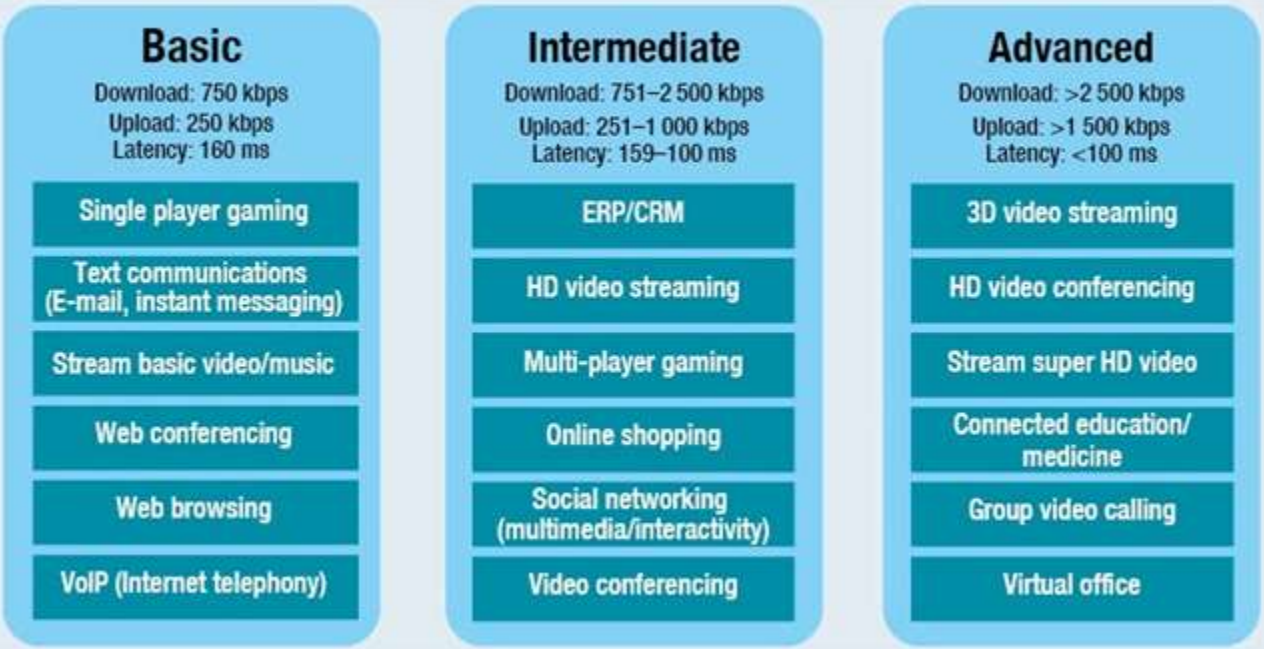
Economies with more than 10% household penetration with Fibre to the Home/Building plus local area network 2012



* Data for the United Arab Emirates, Japan, Bulgaria, Estonia and Latvia refer to 2011.

Source: ICTData.org.

"Quality of Service" requirements vary



Latency and upload speeds main bottlenecks for developing count

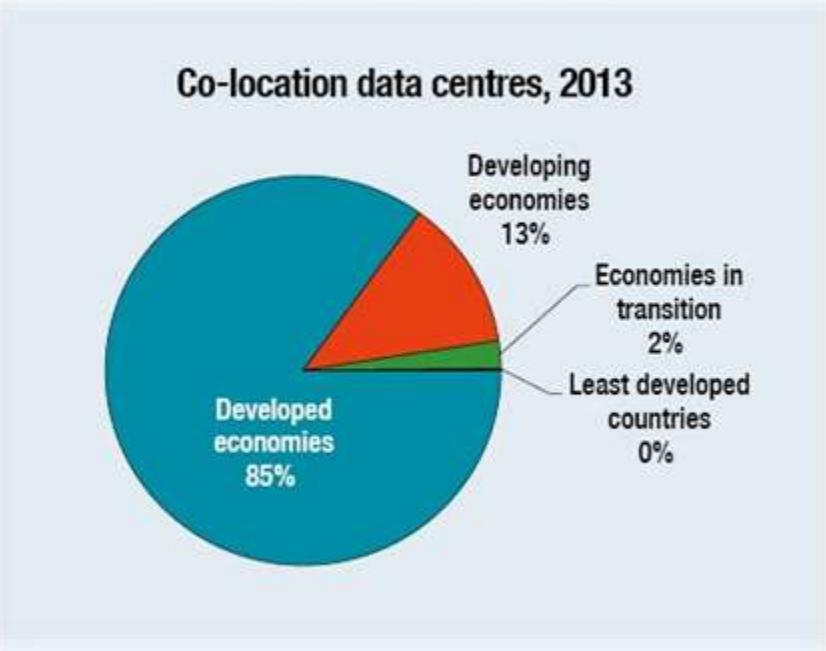
Source: Cisco Analysis.

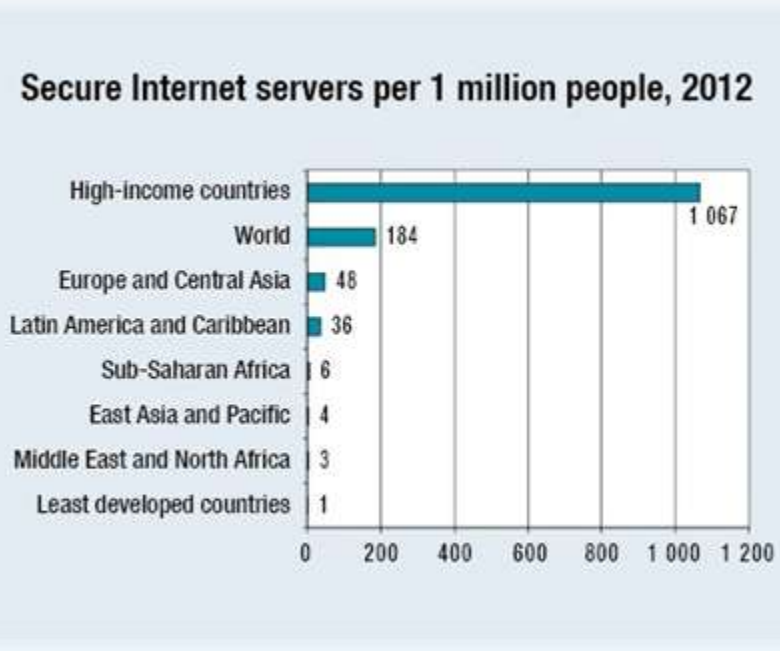
Broadband Quality of Service - ESCWA

Meet minimum requirements for advanced cloud services	Meet minimum requirements for basic cloud services	Do not yet meet requirements for basic cloud services
United Arab Emirates	Bahrain Egypt Iran (Islamic Republic of) Jordan Kuwait Morocco Oman Qatar Saudi Arabia Tunisia Turkey	Iraq Lebanon Sudan Syrian Arab Republic Yemen

Source: UNCTAD, based on Cisco Analysis.

The Data Centre and Server Divides





Bahrain: 1 Egypt: 9 Iran (Islamic Rep.): 5 Jordan: 3 Kuwait: 1 Lebanon: 1 Morocco: 2 Qatar: 3 Saudi Arabia: 10 Turkey: 27 UAE: 4

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Source: DataCentreMap and World Bank.

Regulatory issues

- Cloud data can become subject to multiple jurisdictions
- The transfer of data out of the user's jurisdiction may raise issues of control, effective oversight and audit.
- For some regulated sectors, such as financial services, cloud-related transfers and storage outside the jurisdiction may breach national rules.
- Key legal areas to address:
  - Data protection
  - Privacy
  - Cybercrime

Source: UNCTAD.

Policy Recommendations

- Welcome the cloud economy but tread carefully.
- Start with “cloud readiness assessment“ and then define a national cloud strategy with relevant stakeholders.
- Consider all cloud configurations: public/private/hybrid clouds implemented nationally, regionally or globally.
- Enhance access to reliable and affordable broadband infrastructure.
- Adopt and enforce appropriate laws and regulations concerning privacy, data protection and cybercrime.
- Recognize the supply side opportunities of the cloud economy.
- Consider the Government's own use of the cloud services and need for national data centres.
- Seek support from Development Partners.

Supply-side cloud opportunities in developing countries

- **Data centre services**
  - Local and foreign providers
  - Government-owned centres
- **Provision of cloud services for local customers**
  - Infrastructure as a Service (IaaS) – typically first step in low-income countries
  - Platform as a Service (PaaS)
  - Software as a Service (SaaS)
- **Cloud aggregation, system integration, brokerage and related services**
  - Leverage experience with national business, legal and communications environment.

Source: UNCTAD.

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