IoT INFRASTRUCTURE
2019 Conference and Expo

Fibering up for the 4IR

by Vino Govender, Executive: Strategy, Mergers and Acquisitions, and Innovation at DFA

ee publishers

Impact of 4IR on data loads

Big data will reach 403EB by 2021, up almost 8-fold from 25EB in 2016.

Big data alone will represent 30% of data stored in data centres by 2021, up from 18% in 2016.

The amount of data stored on devices will be 4.5 times higher than data stored in data centres, at 5.9ZB by 2021.

Within the enterprise segment, database/analytics and IoT will be the fastest growing applications, with 21% CAGR from 2016 to 2021, or 2.6-fold growth.

Driven by the Internet of Things, the total amount of data created (and not necessarily stored) by any device will reach 847ZB per year by 2021, up from 218ZB per year in 2016. Data created is two orders of magnitude higher than data stored.

1 Zettabyte (SI)

1 000 000 000 000 Gigabyte (SI)

10 billion trucks or 500,000 aircraft carriers filled with books

10,000 books per person on the planet

Book stack equal to 5 return trips between earth and sun

250 billion DVDs

If 1GB filled a coffee cup, 1ZB would have been the volume of the Great Wall of China.

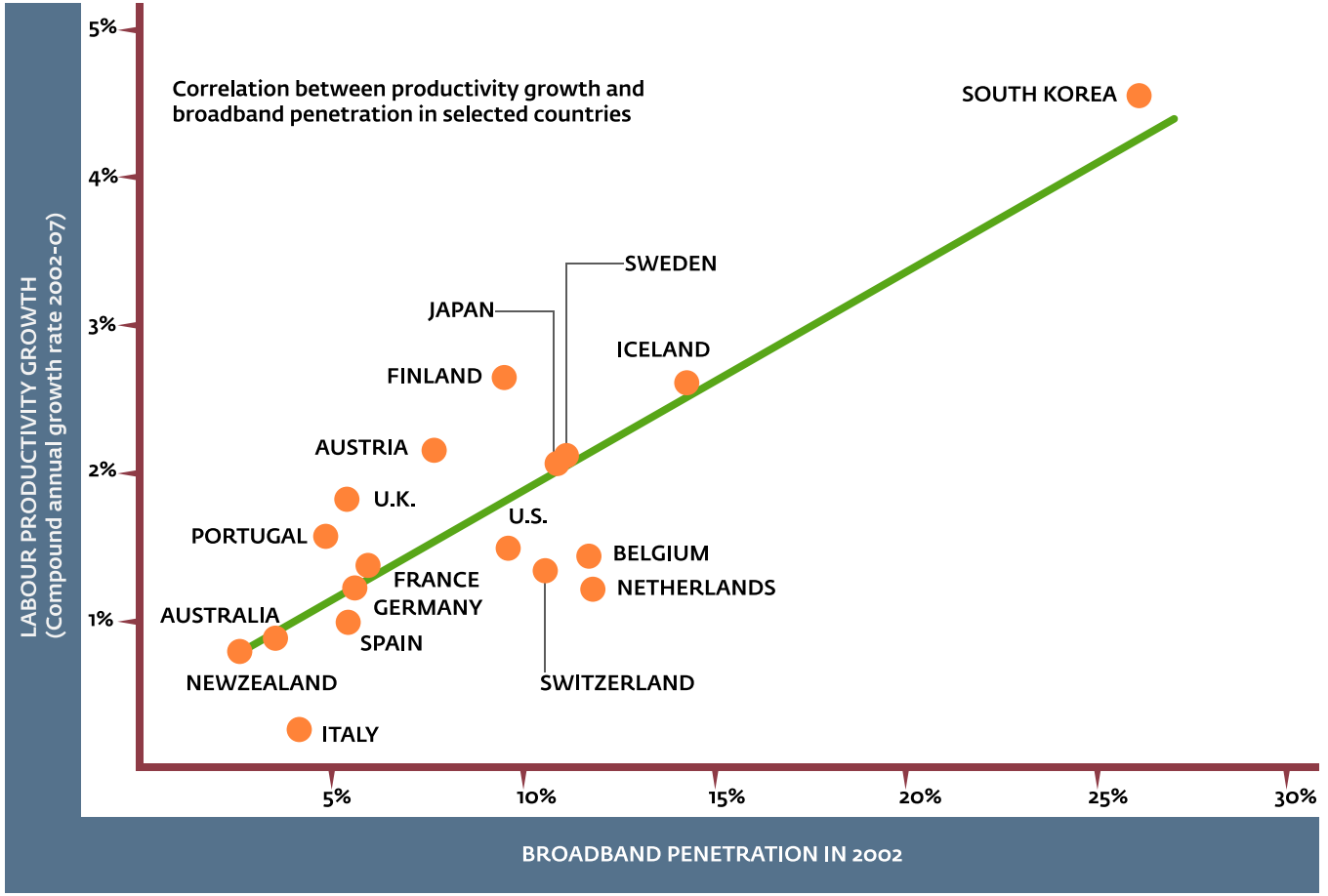
1000^5	PB	petabyte
1000^6	EB	exabyte
1000^7	ZB	zettabyte

Data centre **traffic trends**

- Traffic within hyperscale data centres will quadruple by 2021. Hyperscale data centres already account for 39% of total traffic within all data centres and will account for 55% by 2021.
- Global data centre IP traffic will grow 3-fold over the next 5 years. Overall, data centre IP traffic will grow at a compound annual growth rate (CAGR) of 25% from 2016 to 2021.
- By 2021 94% of workloads and compute instances will be processed by cloud data centres; 6% will be processed by traditional data centres.
- Annual global cloud IP traffic will reach 19.5ZB (1.6ZB per month) by the end of 2021, up from 6.0ZB per year (499EB per month) in 2016.
- Global cloud IP traffic will more than triple (3.3-fold) over the next 5 years. Overall, cloud IP traffic will grow at a CAGR of 27% from 2016 to 2021.
- By 2021 75% of the total cloud workloads and compute instances will be Software-as-a- Service (SaaS), up from 71% in 2016.
- By 2021 16% of the total cloud workloads and compute instances will be Infrastructure-as-a- Service (IaaS), down from 21% in 2016.
- By 2021 enterprise workloads and compute instances will account for 73% of total data-centre workloads and compute instances, down from 76% in 2016.
- By 2021 consumer workloads and compute instances will account for 27% of total data centre workloads and compute instances, up from 24% in 2016.
- Globally, the data stored in data centres will nearly quintuple by 2021 to reach 1.3ZB by 2021, up 4.6-fold (a CAGR of 36%) from 286EB in 2016.

Why is this a **national imperative?**

Labour productivity?

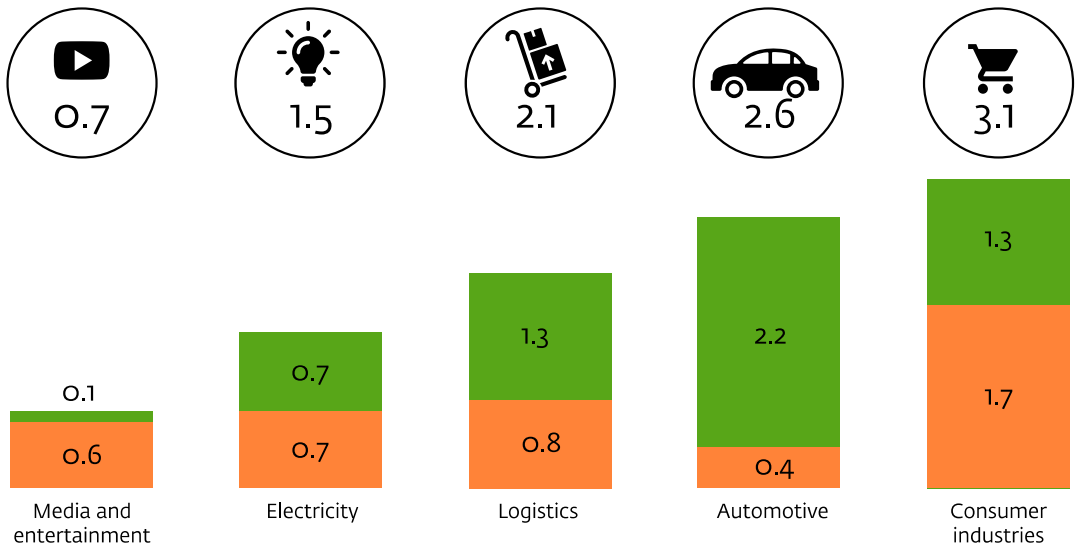


Source: Organisation for Economic Co-operation and Development, Booz & Company analysis

The telecom industry is central to the digital transformation of industries

The telecom industry is expected to unlock more than $10 trillion in value for five key industries over the next decade.

Cumulative digital value at stake for external industries and society enabled by digital transformation in the telecom industry ($ trillion 2016–2025)



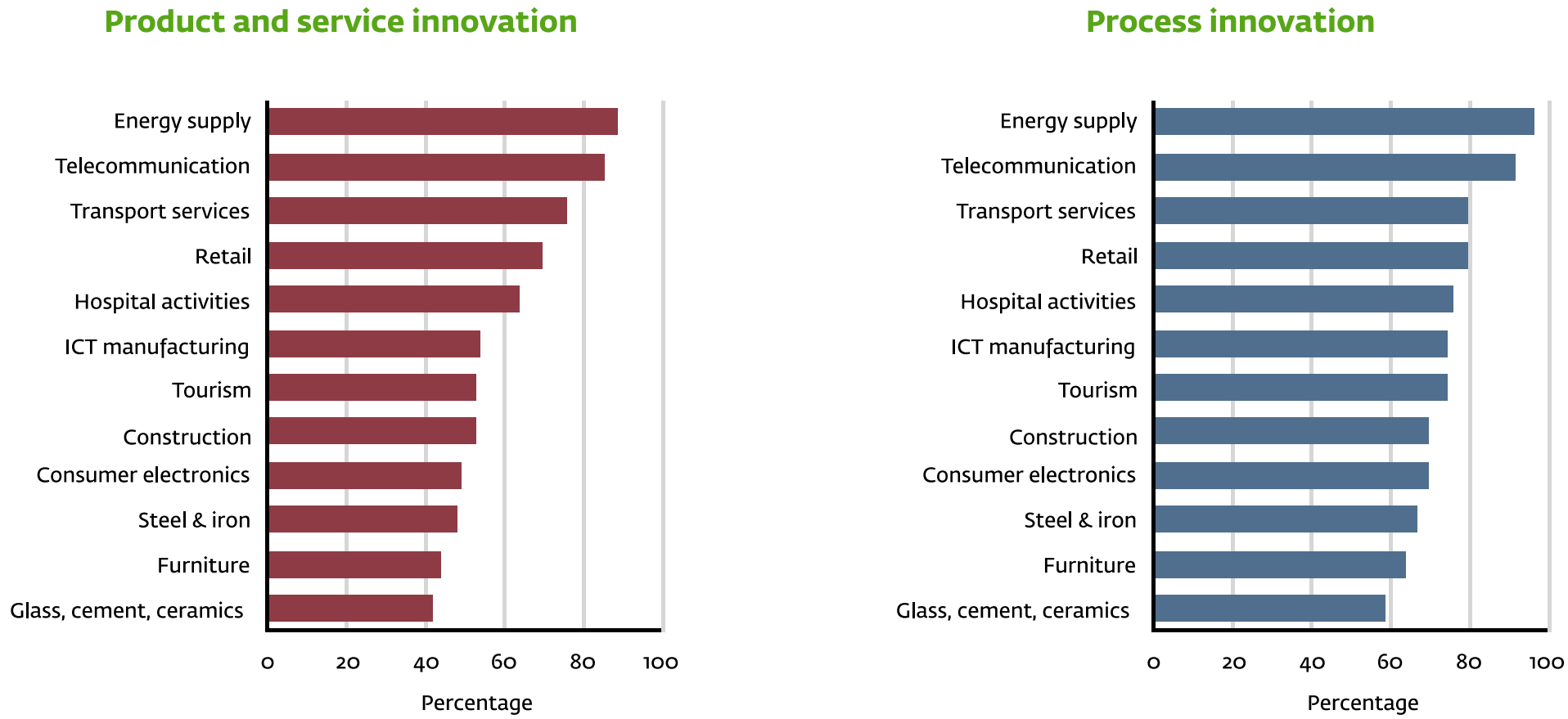
Note: The values above reflect only the share of total industry and societal value directly enabled by telecom infrastructure and applications. Rounded values may not add up. Source: World Economic Forum / Accenture analysis

4.2% Contribution of the mobile industry to global GDP in 2015

20 million Jobs directly supported by the mobile industry by 2020

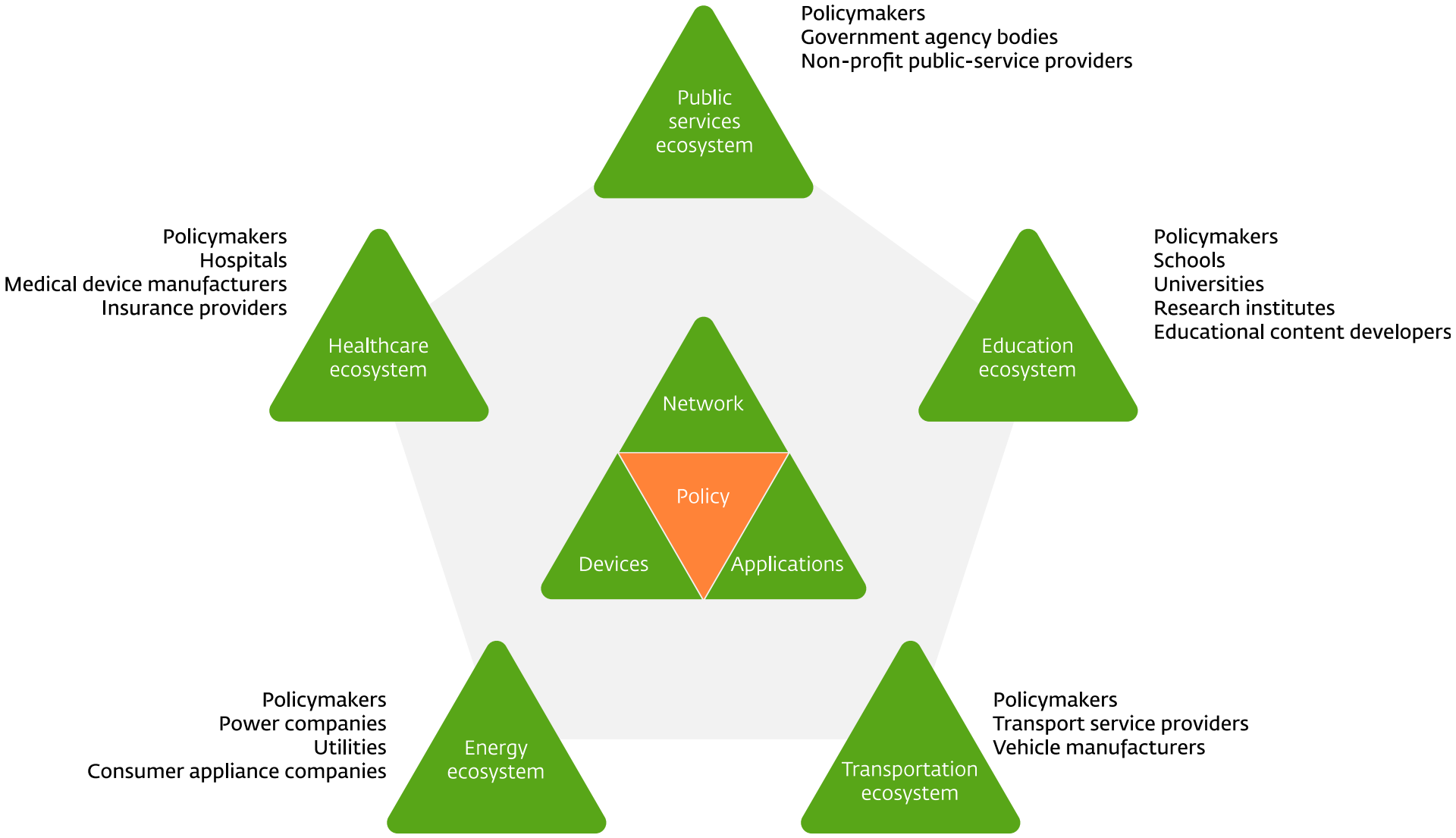
ICT drives innovation

The role of ICT in innovation by industry, 2006–09



Source: e-Business W@tch, 2010.
Note: The percentage is of the product and process innovation that is enabled by ICT in each sector. The methodology and metrics to assess both innovation and ICT contribution are defined by the e-Business W@tch study

Ecosystem engagements



Source: Booz & Company

Key policy issues?

Rights of Ways

"Finally, to tackle the biggest bottleneck – RoW (Rights of Way) – the right policies for permits is a must. There should be cooperation between central and local authorities, where the centre could help in resolving issues like enforcing advance notification of civil works for infrastructure deployment (e.g. road, sanitation, energy, telecoms) and creating a single point of information for granting permits. The state government on the other hand should change its approach to take a proactive stance on dealing with the RoW issues and treat the RoW approvals as social-economic enablers instead of a direct revenue source"

Government incentives

"While a case can be made for all the models in India, a "Private-led, graded government support" model suits the most. This resonates with the recent recommendation by TRAI (Telecom Regulatory Authority of India), especially for extension of internet and fibre networks to rural India. Subsequently, DoT has recently proposed to tie-up with the country's three private operators to ensure connectivity to every India village. DoT plans to work with the private operators by providing 100 subsidies on Capex incurred on extending the connectivity to 43,000 disconnected villages, and have also agreed to subsidise the operating costs for the next five years.." GSMA

GSMA Intelligence

Nation-wide Fiberization models used across the world…

Markets	Govt./Public investment	Private Investment	Driven By	High Regulatory Pressure
Singapore	Medium-Low	High	Government	High
Japan	Medium-Low	High	Incumbent OpCo	Low
South Korea	Medium-Low	High	Incumbent OpCo	Low
UAE	No	High	Private Sector	Low
Qatar	Medium-Low	High	Incumbent OpCo	Low
Portugal	Medium-Low	High	Government	Medium
France	Medium-Low	High	Government	Medium
Netherlands	No	High	Private Sector	High
USA	No	High	Private Sector	Low
Germany	No	High	Private Sector	High
Australia	High	No	Government	High
UK	No	High	Private Sector	HIgh

Public Private Partnership Models

Model	Description
Unregulated Private investment	In this model, service providers are free to invest in fibre where they deem it profitable. There is little to no regulatory pressure to unbundle to competitors, and regulated prices are not enforced
Incumbent-led, graded government support	In this model, the incumbent operator, usually still with a tangible government investment stake or a high level of influence, is mandated to roll out an extensive national fibre network. Public money is involved directly or indirectly, and some regulation is applied to create a competitive environment.
Private-led, graded government support	While similar to the above model, the government in this model distances itself from the incumbents. Importantly, the government drives and partially funds a national fibre agenda through all the players in the market.
Government-controlled fibre	In this model, the government takes a full hands-on approach to creating and, in some cases, operating a national fibre network. The agenda behind this is open digital economy, and the objective of policy and regulation is to openly offer and possibly transfer the infrastructure to the communication service providers in the country for commercial service operation.
Private investment with heavy regulation	With its focus on private investment, this model assumes strong competition and easy access to financing. Further, this model then applies open access and regulated price controls so that other, usually smaller, operators can offer services without the burden of heavy infrastructure investment. The intent is to induce considerable infrastructure competition that drives low prices for highly specialised services.