



Externalization of the operation technology

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HEI4S3-RM

Building Ecosystem Integration
Labs at HEI to foster
Smart Specialization
and Innovation
on Sustainable
Raw Materials



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- I am Atufe Anthony Okuogume born Nigerian and a Finnish Citizen. I am an educator, consultant and a Technology entrepreneur. Also, I am a Digital technology enthusiast and interested to learn & grow. I am Passionate about life and people.
- My education includes; a Masters (1991) and licentiate (PhD) in International management (1997), postgraduate certificate in International business strategy from the Center for Executive Education, the London school of economics (1998).
- I have over 25 years of academic and consulting experience. I work currently as a Senior lecturer at LaplandUAS. Before that, have worked for seven years as a Principal Lecturer at the Kemi-Tornio UAS, Project Manager for CreaTol Lab, dept of information processing University of Oulu, Senior Researcher and Head of Degree Programme at Kajaani UAS, Senior Business Analyst at Kainuetu Ltd. I have held expert positions in several European ICT, SMEs and startups development projects. Additionally, I am an international startup consultant for Fastercapital Inc and also, an innovation coach and have co-founded many companies.

FOCUS

Trends in connectivity

Connectivity and consumer driven internet: New insights

Types of IoT: IOT Smart Devices

Connectivity and the emergence of IoT data

IoT data: The birth of a new data economy

AI and its value creation powers and its key challenges

The economy of digital data

Data-centric business models

Data as power and competitive advantages

Trends in the Global Digital Economy is driven by Trends in Data

The data economy: The emergence and the role of the data

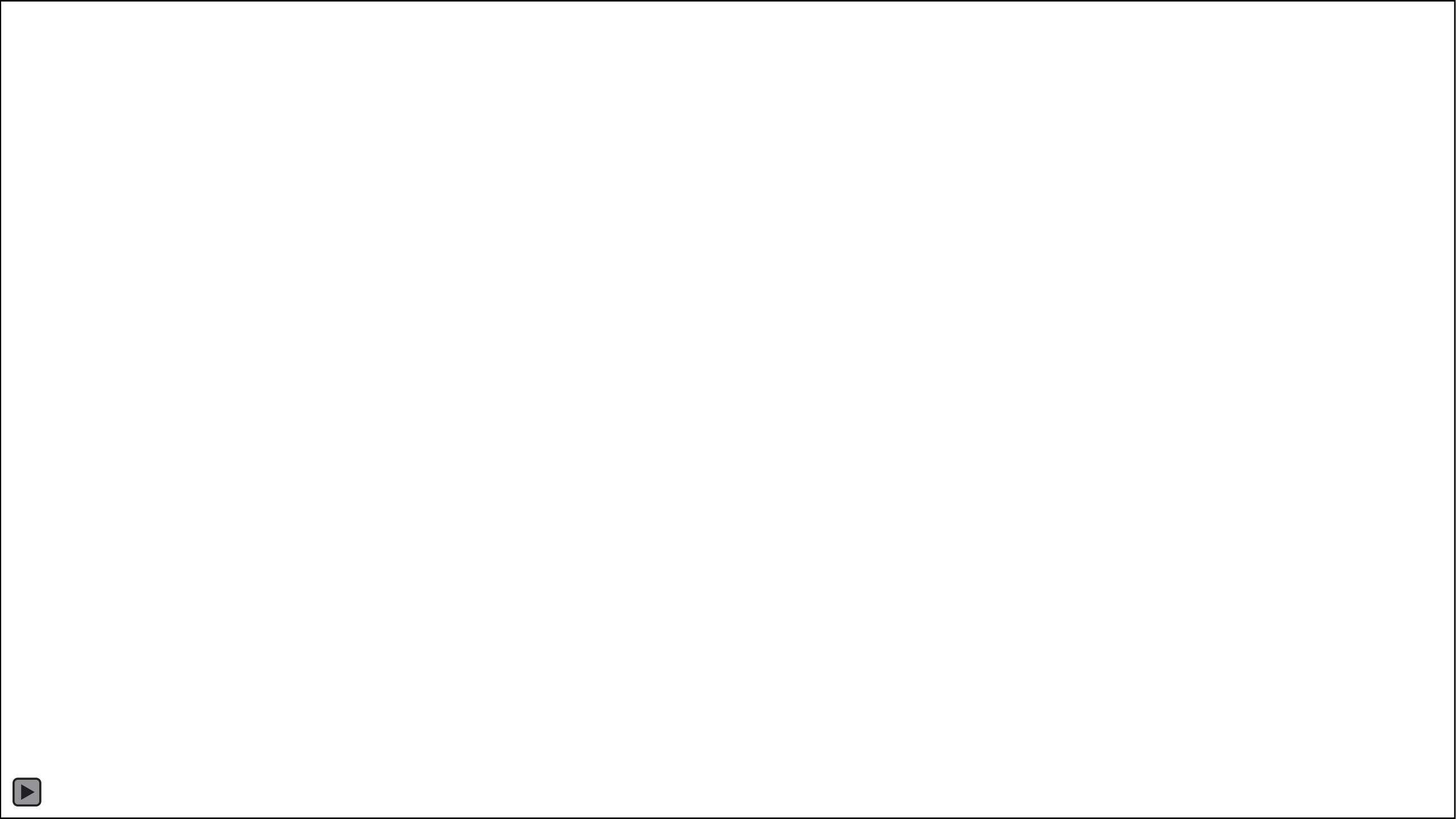
Digital data and digital platforms

Security and privacy challenges and digital trust



objectives

- The course is organized by HEI4S3-RM project consortium. It is focused on exploring and presenting the subject to appeal to a broader audience. **So, the focus is to simplify the subject on a practical level to boost its relevance to managerial decision-making and for students of the subject.**
- Therefore, students will gain strategic insight on Industry 4.0 as new digital technologies are transforming industries and business processes. You will learn how disruptive technologies such as, the 'Internet of Things (IoT), Big Data analytics, augmented reality, artificial intelligence, cloud computing, blockchain technology, cyber securities' are transforming all business processes. Also, how the growth of technologies is impacting industrial transformation from digital to smart Cyber-Physical Systems where IoT, along with other ICTs, plays a vital role.
- The course will highlight connectivity and interoperability in data movement, the nature of data and the adoption of industry 4.0. The course will also cover the power of IoT and smart devices to generate massive data with the advancement of 5G technology. It will also address IoT as a game-changer and the effects of IoT data in the new data economy, and its emergent challenges.
- From a business and organization perspective, the course will also look into the value of data is defined by how intelligence from data are converted into business value. In addition, the course will also explore IoT and Artificial Intelligence as a game-changer as it impacts the scale and scope of data generation and the level of intelligence that can be exploited from data. likewise, how IoT and Artificial Intelligence redefines trust, transparency, privacy, data ownership and monetization in a future where Machine Learning and IoT dominates.





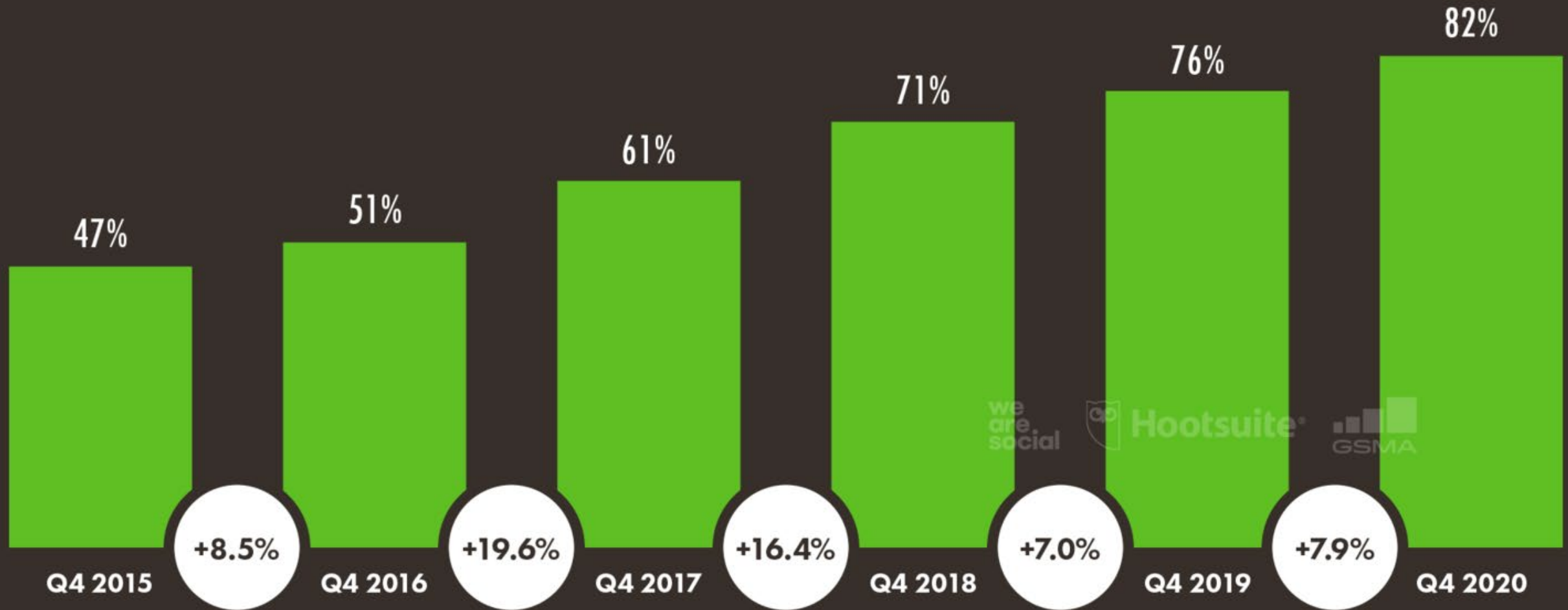
THE RISE OF CONNECTIVITY

Drivers of the digital economy

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MOBILE BROADBAND CONNECTIVITY OVER TIME

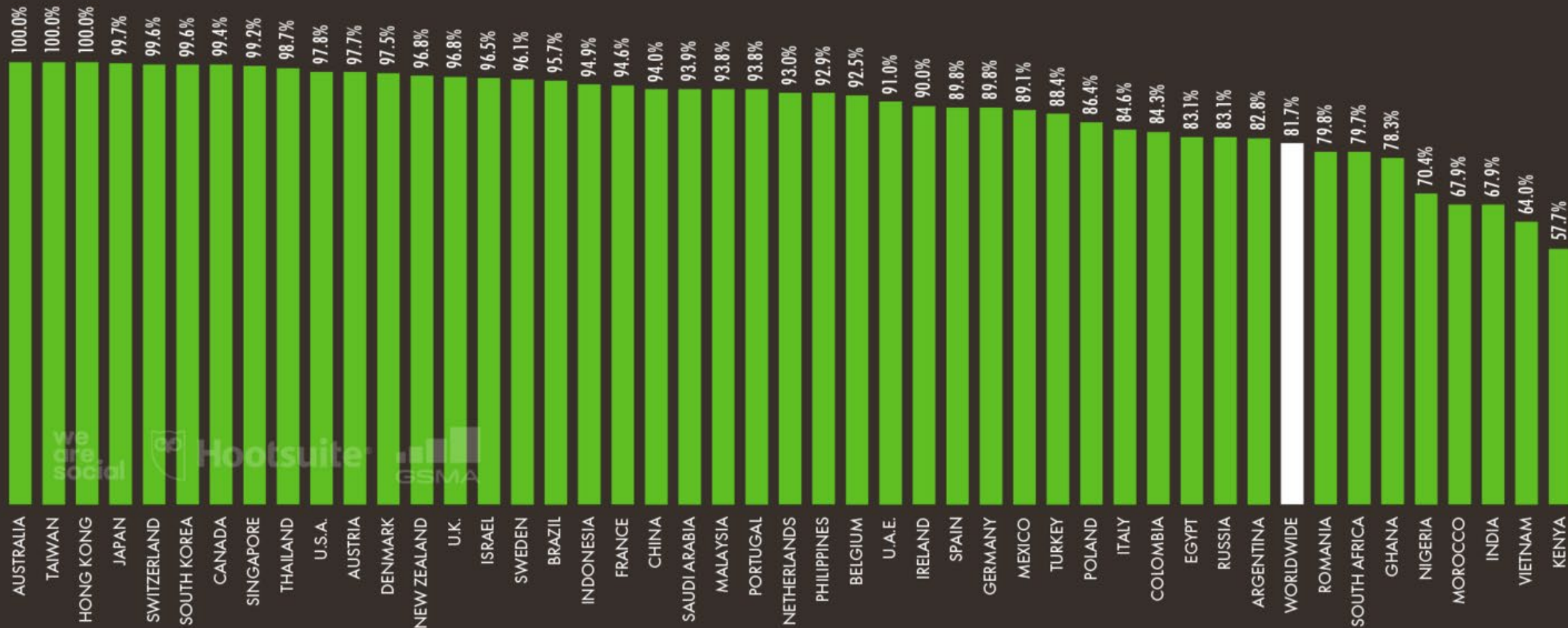
3G, 4G, AND 5G CONNECTIONS AS A SHARE OF TOTAL MOBILE CONNECTIONS, WITH YEAR-ON-YEAR RELATIVE CHANGE



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BROADBAND CONNECTIONS vs. ALL CONNECTIONS

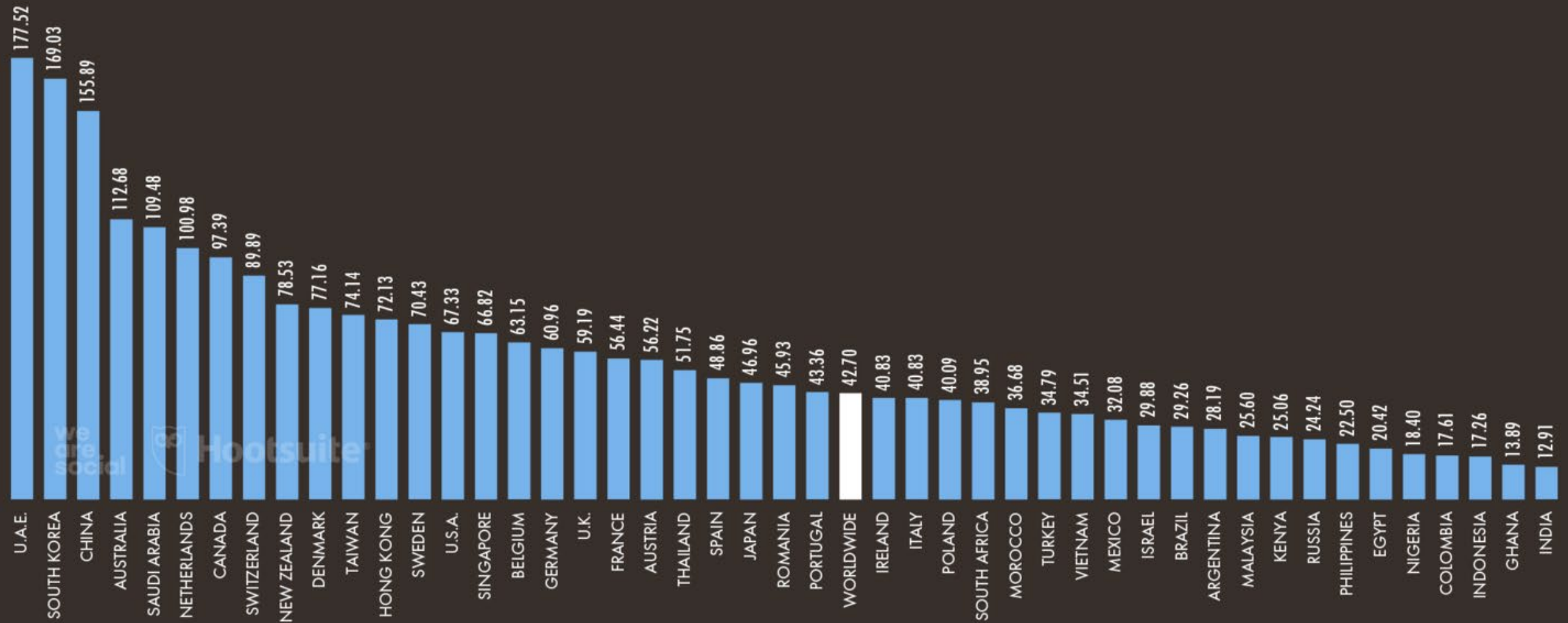
3G, 4G, AND 5G MOBILE CONNECTIONS AS A PERCENTAGE OF TOTAL MOBILE CONNECTIONS*



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AVERAGE MOBILE INTERNET CONNECTION SPEEDS

THE AVERAGE **DOWNLOAD** SPEED OF **MOBILE** INTERNET CONNECTIONS, IN MEGABITS PER SECOND (MBPS)



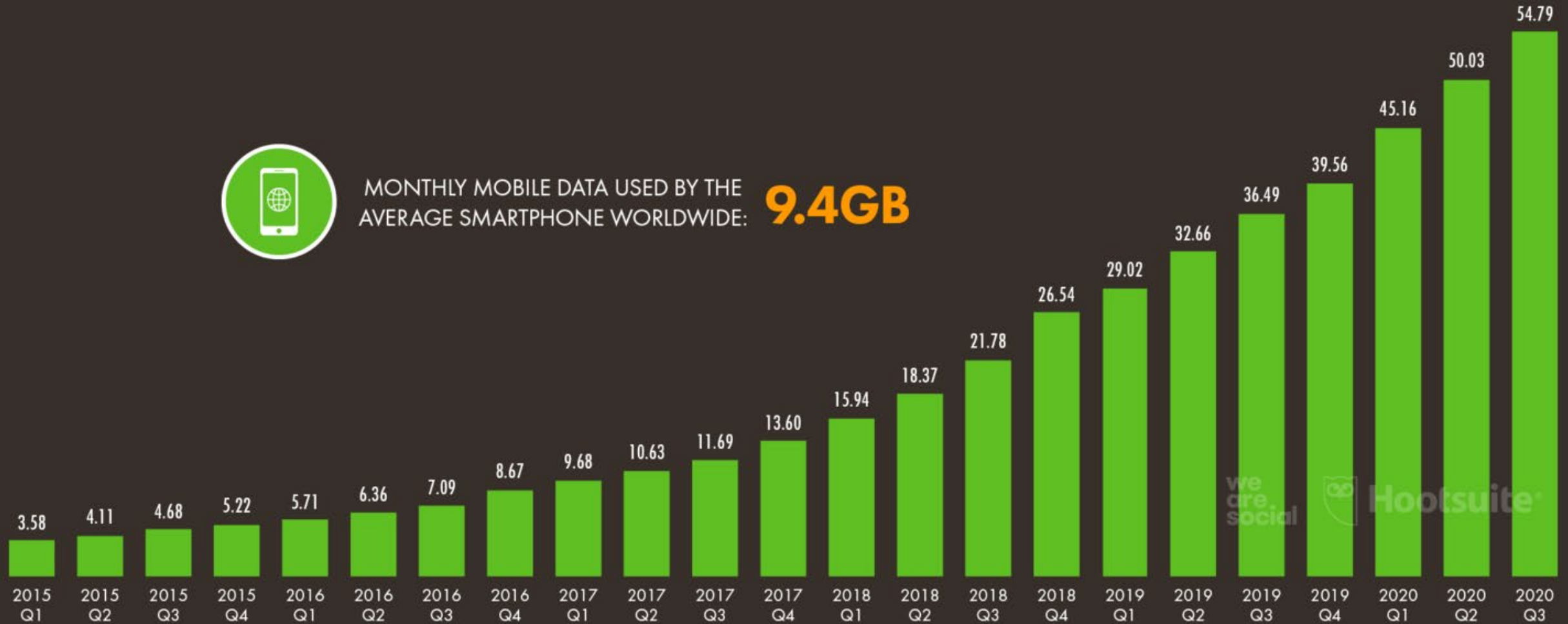
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EVOLUTION OF MOBILE DATA CONSUMPTION

AVERAGE GLOBAL MOBILE DATA TRAFFIC (UPLOAD & DOWNLOAD), IN EXABYTES* PER MONTH



MONTHLY MOBILE DATA USED BY THE
AVERAGE SMARTPHONE WORLDWIDE: **9.4GB**



Trends in connectivity

Figure I.4. Evolution of global Internet Protocol traffic
(Selected years)

2002
100 GB
per second

.

2007
2 000 GB
per second

•

2017
46 600 GB
per second

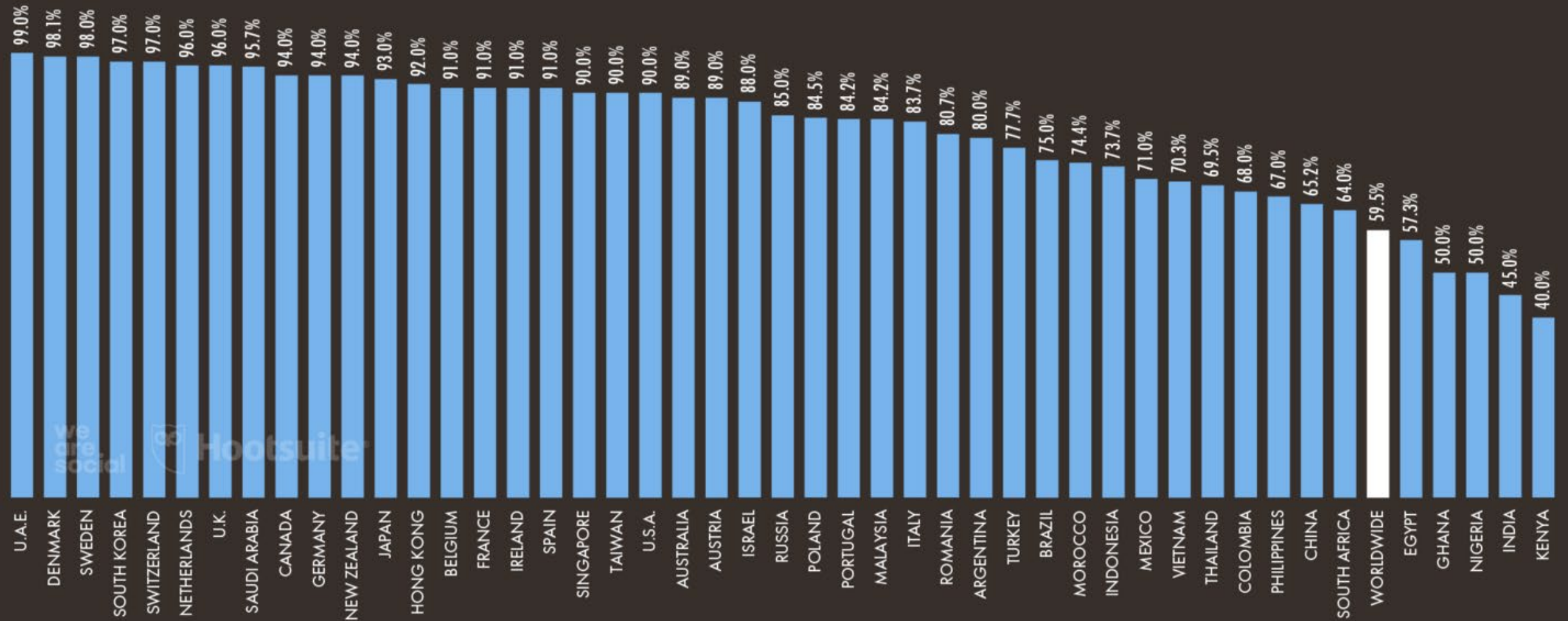
2022
150 700 GB
per second

Source: UNCTAD, based on Cisco, 2018b.

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INTERNET ADOPTION BY COUNTRY

PERCENTAGE OF THE **TOTAL POPULATION** THAT USES THE INTERNET



SOURCES: KEPIOS (JAN 2021) BASED ON EXTRAPOLATIONS OF DATA PUBLISHED BY: THE ITU; LOCAL GOVERNMENT BODIES; GWI; GSMA INTELLIGENCE; EUROSTAT; APJII; CNNIC; THE U.N.
NOTE: VALUES HAVE BEEN CAPPED AT 99%. **ADVISORY:** INTERNET USER NUMBERS NO LONGER INCLUDE DATA SOURCED FROM SOCIAL MEDIA PLATFORMS. FIGURES ARE **NOT COMPARABLE** WITH DATA PUBLISHED IN PREVIOUS REPORTS.

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SHARE OF GLOBAL WEB TRAFFIC BY BROWSER

BASED ON WEB PAGES SERVED TO WEB BROWSERS RUNNING ON ANY DEVICE

CHROME



63.4%
-0.4% Y-O-Y

SAFARI



19.3%
+8.9% Y-O-Y

FIREFOX



3.8%
-14% Y-O-Y

SAMSUNG INTERNET



3.5%
+0.3% Y-O-Y

MICROSOFT EDGE*



3.4%
+66% Y-O-Y

OPERA



2.3%
-0.9% Y-O-Y

INTERNET EXPLORER



1.1%
-33% Y-O-Y

OTHER



3.4%
-31% Y-O-Y



SOURCE: STATCOUNTER (ACCESSED JANUARY 2021). ***NOTES:** VALUES FOR MICROSOFT EDGE INCLUDE EDGE LEGACY. BROWSER SHARE VALUES ARE FOR DECEMBER 2020; CHANGE FIGURES COMPARE EACH BROWSER'S SHARE IN DECEMBER 2020 TO ITS SHARE IN DECEMBER 2019. CHANGE VALUES ARE RELATIVE (I.E. AN INCREASE OF 20% FROM A STARTING VALUE OF 50% WOULD EQUAL 60%, NOT 70%).

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SHARE OF WEB TRAFFIC BY MOBILE OS

PERCENTAGE OF **WEB PAGE REQUESTS** ORIGINATING FROM MOBILE HANDSETS RUNNING DIFFERENT MOBILE OPERATING SYSTEMS

SHARE OF WEB TRAFFIC
ORIGINATING FROM
ANDROID DEVICES



we
are
social

72.5%

DEC 2020 vs. DEC 2019:

-2.2%

SHARE OF WEB TRAFFIC
ORIGINATING FROM
APPLE IOS DEVICES



KEPIOS

26.9%

DEC 2020 vs. DEC 2019:

+8.6%

SHARE OF WEB TRAFFIC
ORIGINATING FROM
KAI OS DEVICES



OW

0.1%

DEC 2020 vs. DEC 2019:

-62.9%

SHARE OF WEB TRAFFIC
ORIGINATING FROM
SAMSUNG OS DEVICES*



Lightbulb icon

0.2%

DEC 2020 vs. DEC 2019:

+27.8%

SHARE OF WEB TRAFFIC
ORIGINATING FROM
OTHER OS DEVICES



0.3%

DEC 2020 vs. DEC 2019:

-55.4%

The Digital Economy

Connectivity and the move to internet-based society



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GLOBAL ECOMMERCE SPEND BY CATEGORY

THE TOTAL AMOUNT SPENT IN CONSUMER ECOMMERCE CATEGORIES AROUND THE WORLD IN 2020, IN U.S. DOLLARS

 CHANGES TO CATEGORY DEFINITIONS AND REVISIONS TO HISTORICAL FIGURES MEAN **VALUES ARE NOT COMPARABLE** WITH THOSE PUBLISHED IN PREVIOUS REPORTS

TRAVEL, MOBILITY, &
ACCOMMODATION*



\$593.6
BILLION

statista 

FASHION
& BEAUTY



\$665.6
BILLION



ELECTRONICS &
PHYSICAL MEDIA



\$501.8
BILLION

we
are
social

FOOD &
PERSONAL CARE



\$413.8
BILLION

FURNITURE &
APPLIANCES



\$330.9
BILLION



TOYS, DIY
& HOBBIES



\$525.6
BILLION

we
are
social

DIGITAL
MUSIC



\$21.73
BILLION

statista 

VIDEO
GAMES



\$135.8
BILLION

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2021

GLOBAL ECOMMERCE GROWTH BY CATEGORY

YEAR-ON-YEAR GROWTH IN THE TOTAL AMOUNT SPENT IN CONSUMER ECOMMERCE CATEGORIES AROUND THE WORLD IN 2020, IN U.S. DOLLARS

 CHANGES TO CATEGORY DEFINITIONS AND REVISIONS TO HISTORICAL FIGURES MEAN **VALUES ARE NOT COMPARABLE** WITH THOSE PUBLISHED IN PREVIOUS REPORTS

TRAVEL, MOBILITY, &
ACCOMMODATION*



-51%

statista 

FASHION
& BEAUTY



+27%



ELECTRONICS &
PHYSICAL MEDIA



+18%

we
are
social

FOOD &
PERSONAL CARE



+41%

FURNITURE &
APPLIANCES



+20%



TOYS, DIY
& HOBBIES



+25%

we
are
social

DIGITAL
MUSIC



+26%

statista 

VIDEO
GAMES



+23%



CONNECTIVITY

**The socio life aspect: The move
to internet-based society**

NEW ENVIRONMENT AND NEW DEMANDS



SURPRISES OF THE COVID-19

2020: Who would have imagined life would be this way?

Companies who exploited digital opportunities did very well during the pandemic

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DIGITAL AROUND THE WORLD

ESSENTIAL HEADLINES FOR MOBILE, INTERNET, AND SOCIAL MEDIA USE

INTERNET USER NUMBERS NO LONGER INCLUDE DATA SOURCED FROM SOCIAL MEDIA PLATFORMS, SO VALUES ARE **NOT COMPARABLE** WITH PREVIOUS REPORTS

TOTAL
POPULATION



7.83
BILLION

URBANISATION:
56.4%

UNIQUE MOBILE
PHONE USERS



5.22
BILLION

vs. POPULATION:
66.6%

INTERNET
USERS*



4.66
BILLION

vs. POPULATION:
59.5%

ACTIVE SOCIAL
MEDIA USERS*



4.20
BILLION

vs. POPULATION:
53.6%



we
are
social



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GLOBAL DIGITAL GROWTH

THE YEAR-ON-YEAR CHANGE IN DIGITAL ADOPTION

INTERNET USER NUMBERS NO LONGER INCLUDE DATA SOURCED FROM SOCIAL MEDIA PLATFORMS, SO VALUES ARE **NOT COMPARABLE** WITH PREVIOUS REPORTS

TOTAL
POPULATION



we
are
social

+1.0%

JAN 2021 vs. JAN 2020

+81 MILLION

UNIQUE MOBILE
PHONE USERS



+1.8%

JAN 2021 vs. JAN 2020

+93 MILLION

INTERNET
USERS*



+7.3%

JAN 2021 vs. JAN 2020

+316 MILLION

ACTIVE SOCIAL
MEDIA USERS*



+13.2%

JAN 2021 vs. JAN 2020

+490 MILLION

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SOCIAL MEDIA USE AROUND THE WORLD

USE OF SOCIAL NETWORKS AND MESSENGER SERVICES, WITH DETAIL FOR MOBILE SOCIAL MEDIA USE

 SOCIAL MEDIA USER NUMBERS MAY NOT REPRESENT UNIQUE INDIVIDUALS

TOTAL NUMBER OF
ACTIVE SOCIAL
MEDIA USERS*



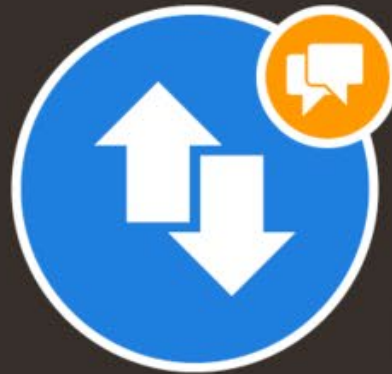
4.20
BILLION

SOCIAL MEDIA USERS AS
A PERCENTAGE OF THE
GLOBAL POPULATION



53.6%

ANNUAL CHANGE IN
THE NUMBER OF GLOBAL
SOCIAL MEDIA USERS



+13.2%
+490 MILLION

TOTAL NUMBER OF SOCIAL
MEDIA USERS ACCESSING
VIA MOBILE PHONES



4.15
BILLION

PERCENTAGE OF TOTAL
SOCIAL MEDIA USERS
ACCESSING VIA MOBILE



98.8%

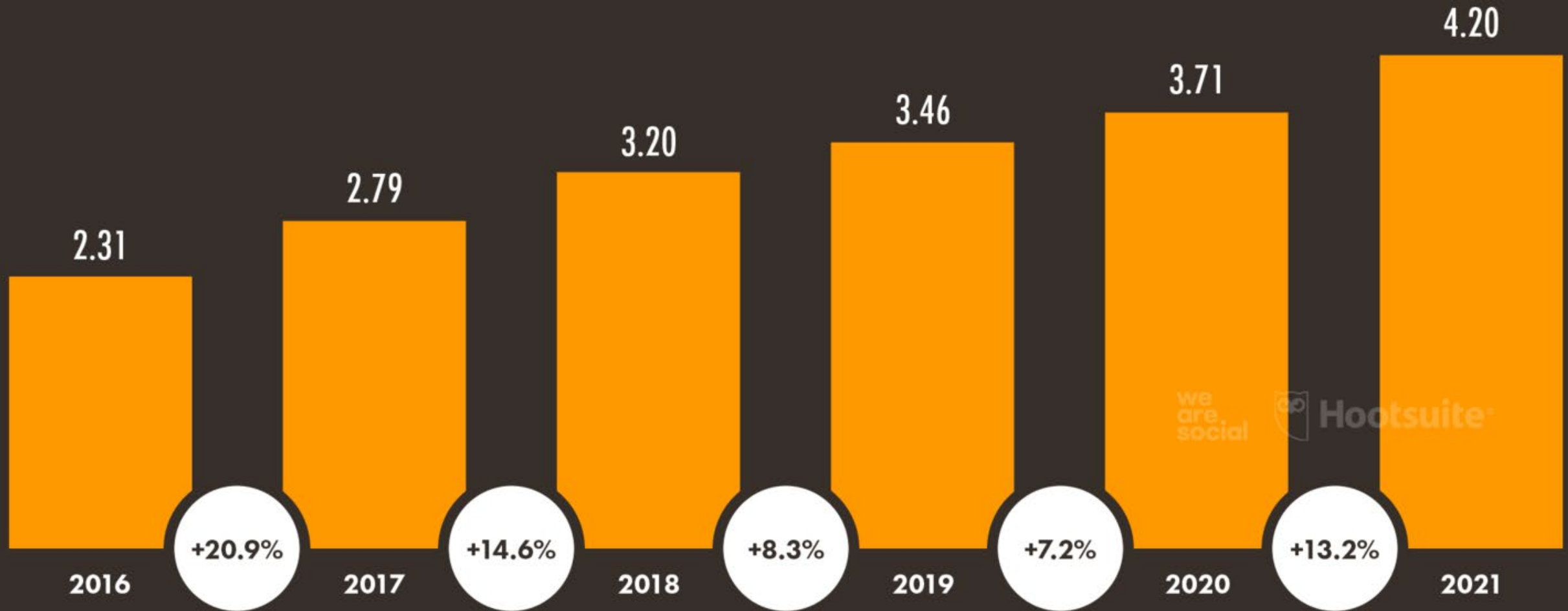
SOURCES: KEPIOS (JAN 2021), BASED ON EXTRAPOLATIONS OF DATA FROM: COMPANY EARNINGS ANNOUNCEMENTS; PLATFORMS' SELF-SERVICE ADVERTISING TOOLS; CNNIC; MEDIASCOPE.
***ADVISORY:** SOCIAL MEDIA USERS MAY NOT REPRESENT UNIQUE INDIVIDUALS, AND MAY EXCEED INTERNET USER NUMBERS IN SOME COUNTRIES.  **COMPARABILITY ADVISORY:** BASE CHANGES AND HISTORICAL REVISIONS. DATA MAY NOT CORRELATE WITH FIGURES PUBLISHED IN PREVIOUS REPORTS.

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GLOBAL SOCIAL MEDIA USERS OVER TIME

NUMBER OF GLOBAL SOCIAL MEDIA USERS* BY YEAR (IN BILLIONS), WITH YEAR-ON-YEAR CHANGE

⚠️ SOCIAL MEDIA USER NUMBERS MAY NOT REPRESENT UNIQUE INDIVIDUALS

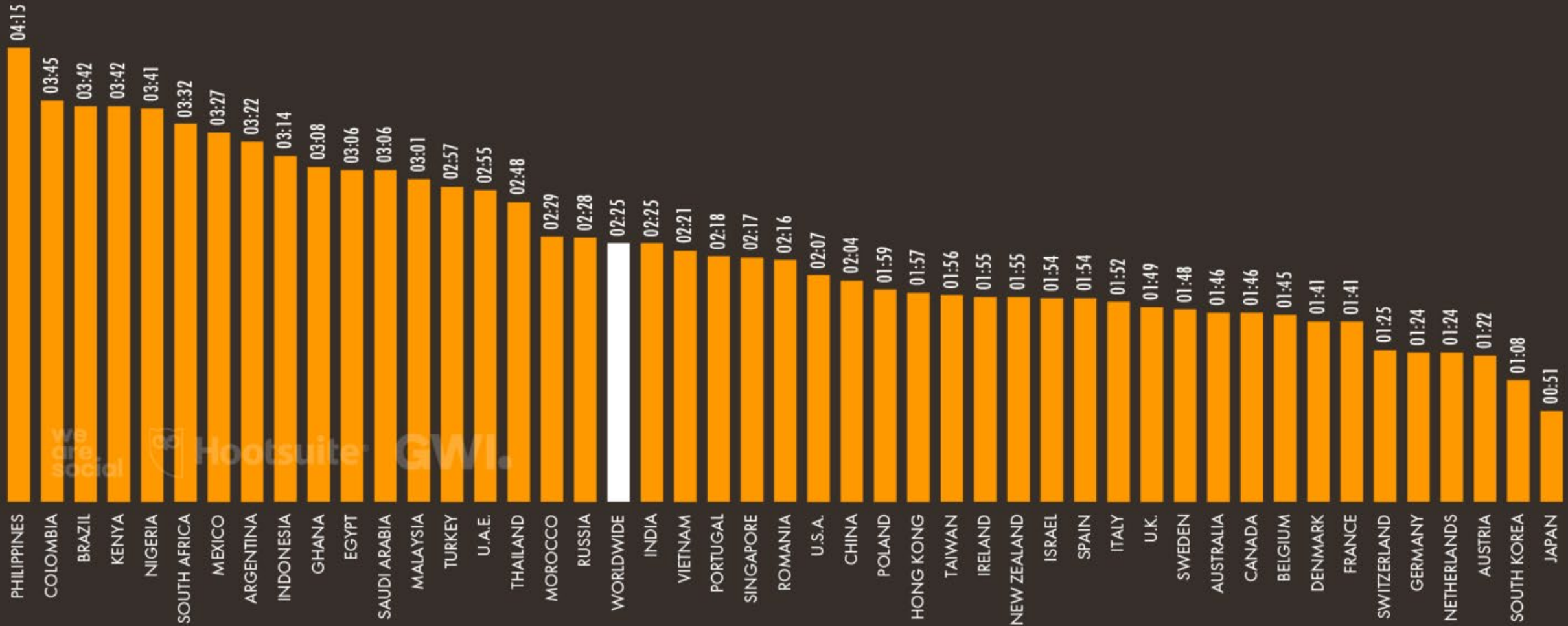


SOURCES: KEPIOS (JAN 2021), BASED ON EXTRAPOLATIONS OF DATA FROM: COMPANY EARNINGS ANNOUNCEMENTS; PLATFORMS' SELF-SERVICE ADVERTISING TOOLS; CNNIC; MEDIASCOPE.
***ADVISORY:** "USER" FIGURES MAY NOT REPRESENT UNIQUE INDIVIDUALS. **COMPARABILITY ADVISORY:** BASE CHANGES AND HISTORICAL REVISIONS. DATA MAY NOT CORRELATE WITH FIGURES PUBLISHED IN PREVIOUS REPORTS.

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DAILY TIME SPENT USING SOCIAL MEDIA

AVERAGE AMOUNT OF TIME (IN HOURS AND MINUTES) THAT INTERNET USERS AGED 16 TO 64 SPEND USING SOCIAL MEDIA EACH DAY



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MOBILE USERS vs. MOBILE CONNECTIONS

A COMPARISON OF UNIQUE MOBILE USERS TO MOBILE CONNECTIONS

NUMBER OF UNIQUE
MOBILE USERS (ANY
TYPE OF HANDSET)



we
are
social

5.22
BILLION

UNIQUE MOBILE
USERS AS A PERCENTAGE
OF TOTAL POPULATION



GSMA

66.6%

NUMBER OF MOBILE
CONNECTIONS
(EXCLUDING IOT)



8.02
BILLION

MOBILE CONNECTIONS
AS A PERCENTAGE OF
TOTAL POPULATION



GSMA

102.4%

AVERAGE NUMBER OF
CONNECTIONS PER
UNIQUE MOBILE USER



1.54

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SHARE OF WEB TRAFFIC BY DEVICE

EACH DEVICE'S SHARE OF TOTAL **WEB PAGES** SERVED TO **WEB BROWSERS**

⚠ THE FIGURES ON THIS CHART ARE BASED ON TRAFFIC TO WEB BROWSERS ONLY, AND **DO NOT INCLUDE** DATA FOR OTHER CONNECTED ACTIVITIES (E.G. USE OF NATIVE MOBILE APPS)

MOBILE
PHONES



55.7%

DEC 2020 vs. DEC 2019:

+4.6%

+244 BPS

LAPTOPS &
DESKTOPS



41.4%

DEC 2020 vs. DEC 2019:

-5.8%

-253 BPS

TABLET
COMPUTERS



2.8%

DEC 2020 vs. DEC 2019:

+3.3%

+9 BPS

OTHER
DEVICES



0.07%

DEC 2020 vs. DEC 2019:

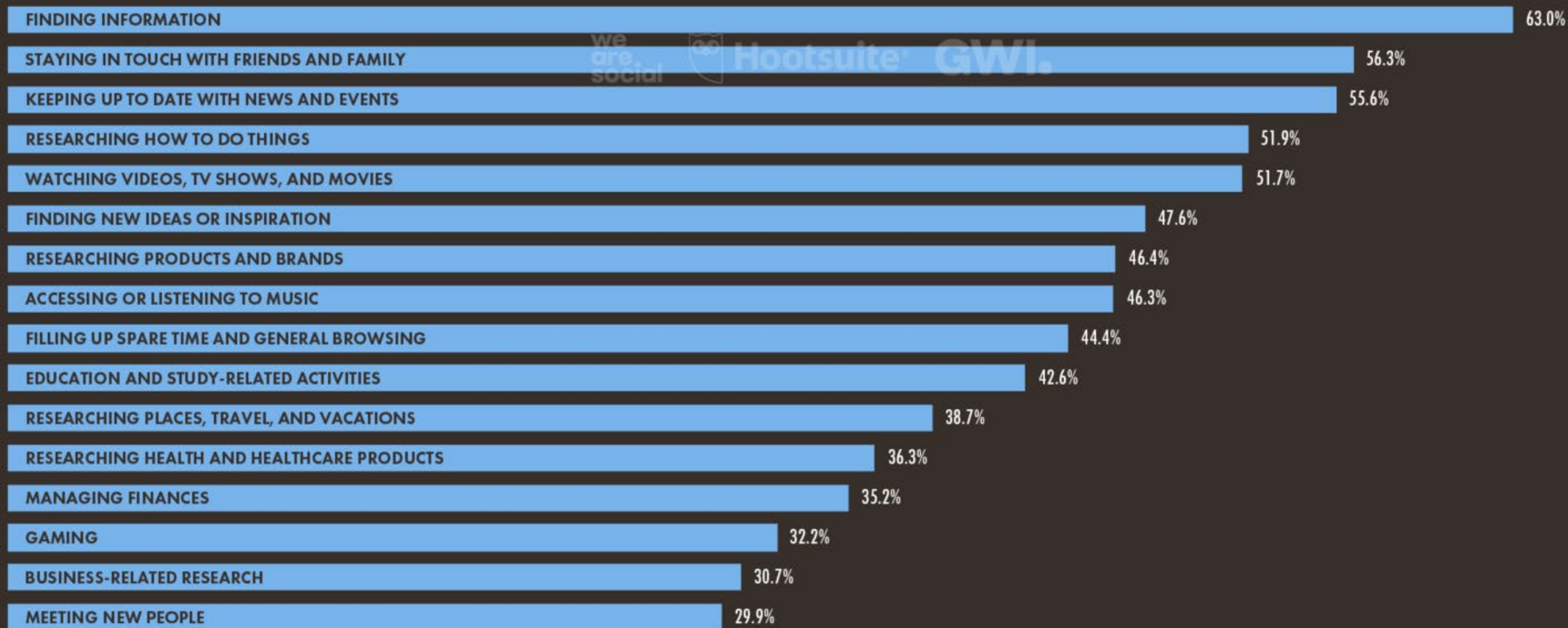
[UNCHANGED]



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REASONS FOR USING THE INTERNET

PRIMARY REASONS WHY GLOBAL INTERNET USERS AGED 16 TO 64 USE THE INTERNET



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PRIMARY CHANNELS FOR BRAND RESEARCH

PERCENTAGE OF GLOBAL INTERNET USERS WHO USE EACH CHANNEL AS A PRIMARY SOURCE OF INFORMATION WHEN RESEARCHING BRANDS

16 TO 24
YEARS OLD

SEARCH ENGINES

51.3%

SOCIAL NETWORKS

53.2%

25 TO 34
YEARS OLD

SEARCH ENGINES

51.3%

SOCIAL NETWORKS

48.2%

35 TO 44
YEARS OLD

SEARCH ENGINES

52.6%

SOCIAL NETWORKS

42.4%

45 TO 54
YEARS OLD

SEARCH ENGINES

56.4%

SOCIAL NETWORKS

35.7%

55 TO 64
YEARS OLD

SEARCH ENGINES

60.7%

SOCIAL NETWORKS

28.1%

APR
2020

COVID-19: TYPES OF CONTENT PEOPLE WANT

PERCENTAGE OF INTERNET USERS AGED 16 TO 64 IN SELECT COUNTRIES* WHO SAY THEY'D LIKE MORE OF EACH KIND OF CONTENT

FILMS
(MOVIES)



FEMALE: 47%
MALE: 50%

FUNNY VIDEOS
AND MEMES



FEMALE: 34%
MALE: 33%

HOW-TO AND
TUTORIAL VIDEOS



FEMALE: 34%
MALE: 32%

REPEATS OF POPULAR
CLASSIC TV SHOWS



FEMALE: 35%
MALE: 30%

LIVE-STREAMS FROM MY
FAVOURITE MUSICIANS



FEMALE: 21%
MALE: 20%

REPEATS OF CLASSIC SPORTS
MATCHES AND EVENTS



FEMALE: 13%
MALE: 21%

LIVE-STREAMS FROM MY
FAVOURITE SPORTS STARS



FEMALE: 11%
MALE: 17%

LIVE-STREAMS
OF ESPORTS



FEMALE: 8%
MALE: 14%

UPDATES FROM
BLOGGERS AND VLOGGERS



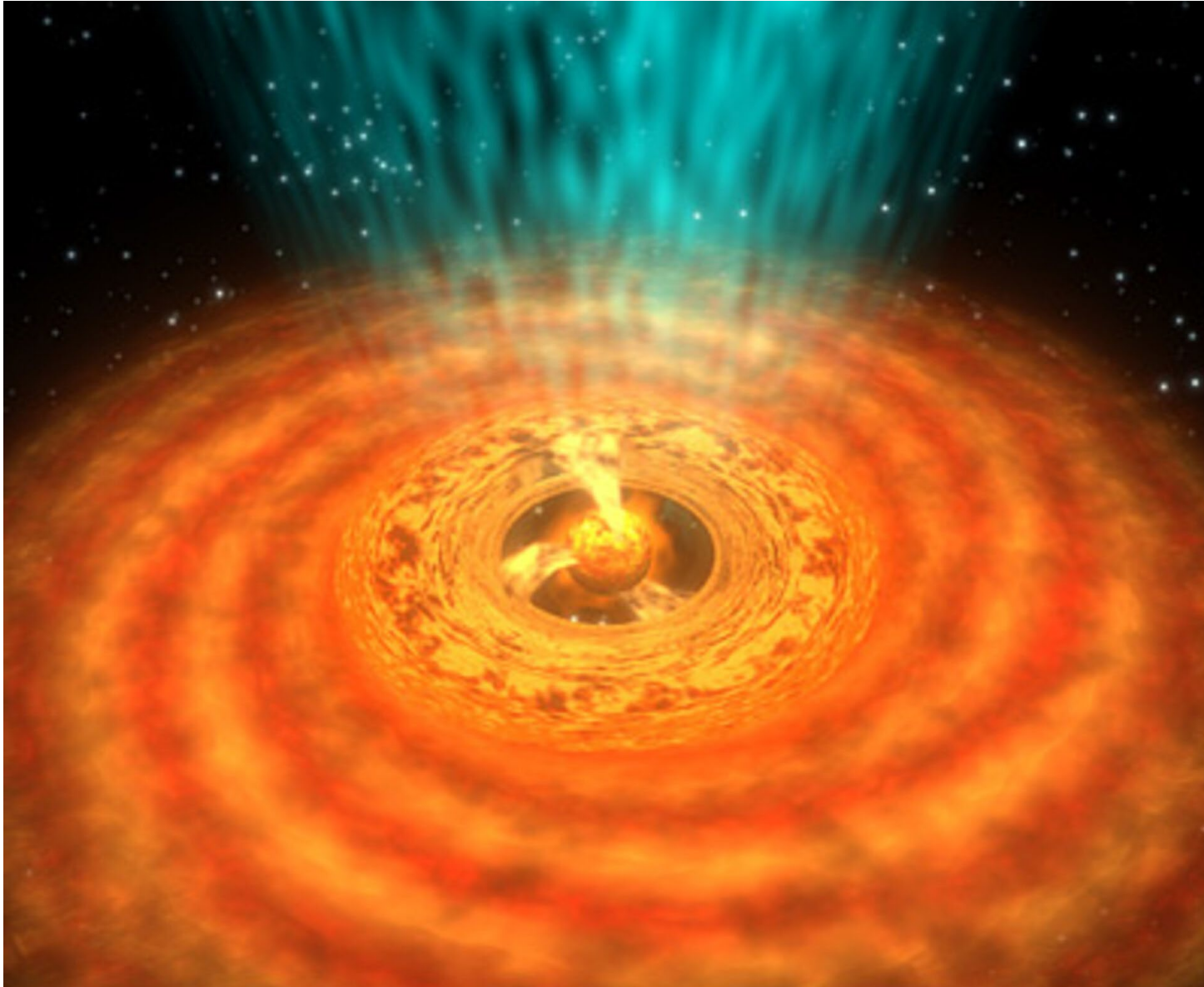
FEMALE: 11%
MALE: 11%

NONE OF THESE
KINDS OF CONTENT



FEMALE: 13%
MALE: 14%

“Metaverse”



**A new star is
born?**

METaverse – THE FUTURE OF THE INTERNET? The shift from digital experience to digital living



Zuckerberg promised that in the future we would all work, play and “organize surprise birthday parties” as avatars in Facebook’s virtual-reality “Metaverse”.



In one sequence, Zuckerberg arrives on a spaceship – “This place is amazing! It was made by a creator I met in LA!” – before opening up his contacts list, scrolling past 2007’s hottest rapper T-Pain and arriving at a friend who dials in some “3D-street art” from the streets of New York to the spaceship platform. “This is stunning! I love the movement,” say Zuckerberg’s virtual cronies, as they stare at something that looks like a piece of clip art - Then just as it’s disappearing from view, Zuckerberg purchases it, apparently as an NFT, so it can stay in virtual space forever. => <https://amp.theguardian-com.cdn.ampproject.org/c/s/amp.theguardian.com/lifeandstyle/2021/oct/29/metaverse-zuckerberg-mars-billionaires-escape-world>

Habbo Hotel to SecondLife, Sansar and High Fidelity, there are hundreds of similar VR social offerings. Why is Facebook’s METAVERSE different?

What is the virtual economy of the Metaverse?

Metaverse: From digital experience to digital living !

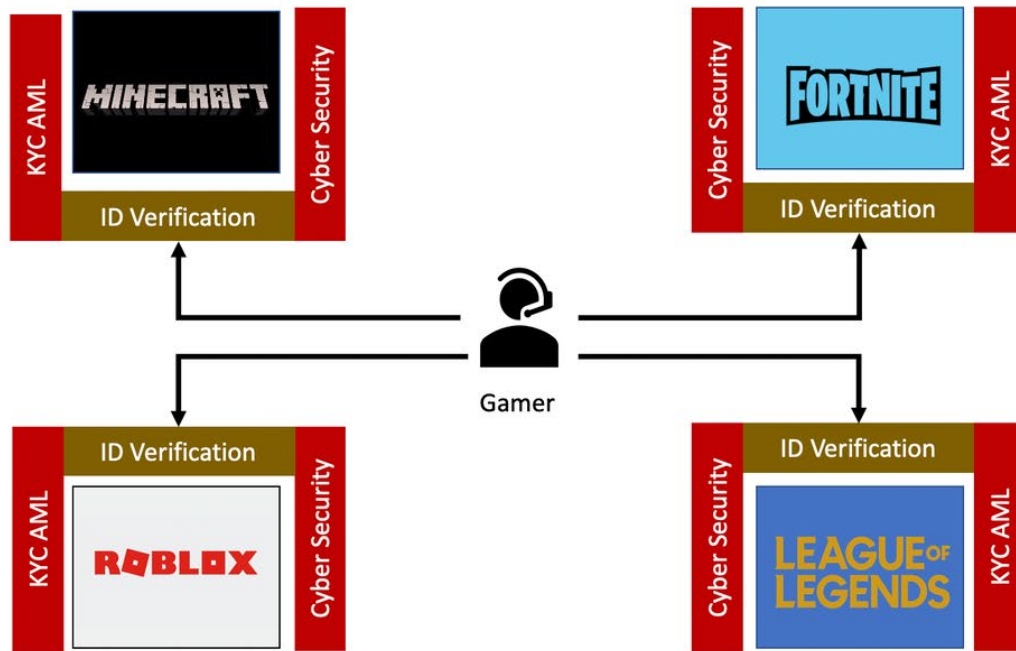


Metaverse would become a multi-trillion-dollar economy

The Size of the Metaverse Prize

Proponents of the Metaverse predict that it will be a multi-trillion-dollar digital economy that replaces the internet with shared virtual worlds. If the internet is 2D and siloed, the Metaverse is 3D and interoperable

Siloed Gaming Universes



PERMISSIONED ACCESS NECESSARY

Third-Party Brands



Crucible and The Direct-to-Avatar Economy

To us olds, and I'm including myself here, it seems crazy that people are willing to spend large sums of money on outfits for their video game avatars. In 2018, over \$1 billion of Fortnite's \$2.4 billion in revenue came from the sale of skins (outfits) or emotes (dance moves). In 2019, League of Legends generated \$1.5 billion in revenue from skins. Kids are asking their parents for Robux (Roblox credits) and V-Bucks (Fortnite credits) instead of cash or toys. Currently, the value of skins and other virtual items is largely contained within each individual game. In 2019, Louis Vuitton began selling skins in League of Legends, but that skin can't move with its owner to other games yet.

<https://www.notboring.co/p/the-value-chain-of-the-open-metaverse>



THE RISE OF TECHNOLOGY AND GROWTH OF THE DIGITAL ECONOMY

RECENT TRENDS IN THE DIGITAL ECONOMY



The evolving digital economy

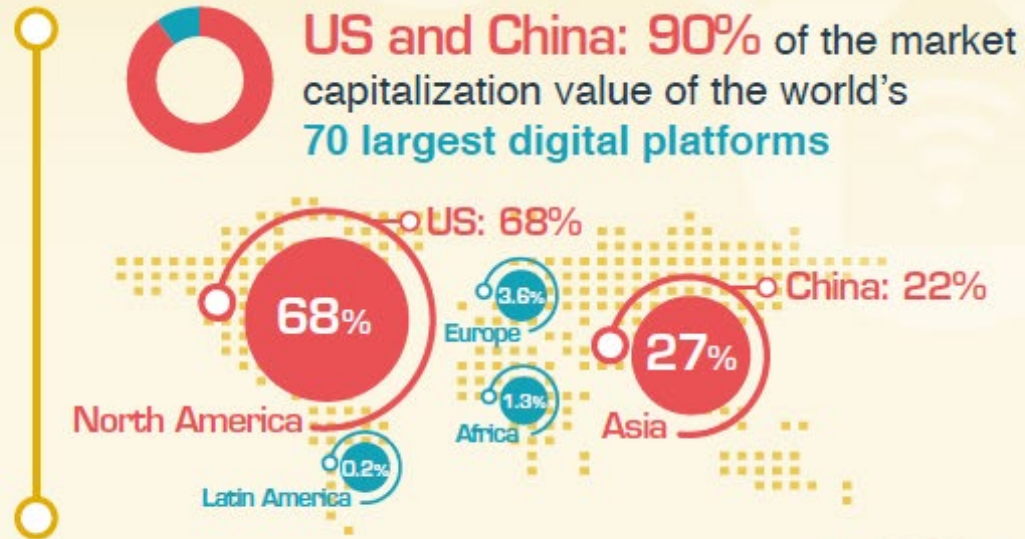
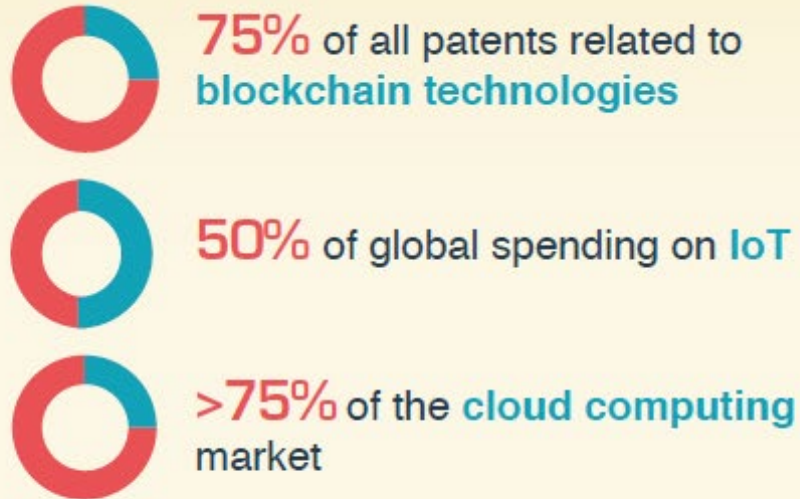
is closely associated with several frontier technologies and fuelled by data



-  Blockchain
-  Data analytics
-  Artificial intelligence
-  3D printing
-  Internet of Things
-  Automation & Robotics
-  Cloud computing

Geography of the digital economy is highly concentrated in two countries

● United States and China ● Rest of the world



Still huge digital divides



Half of the world remains **offline**

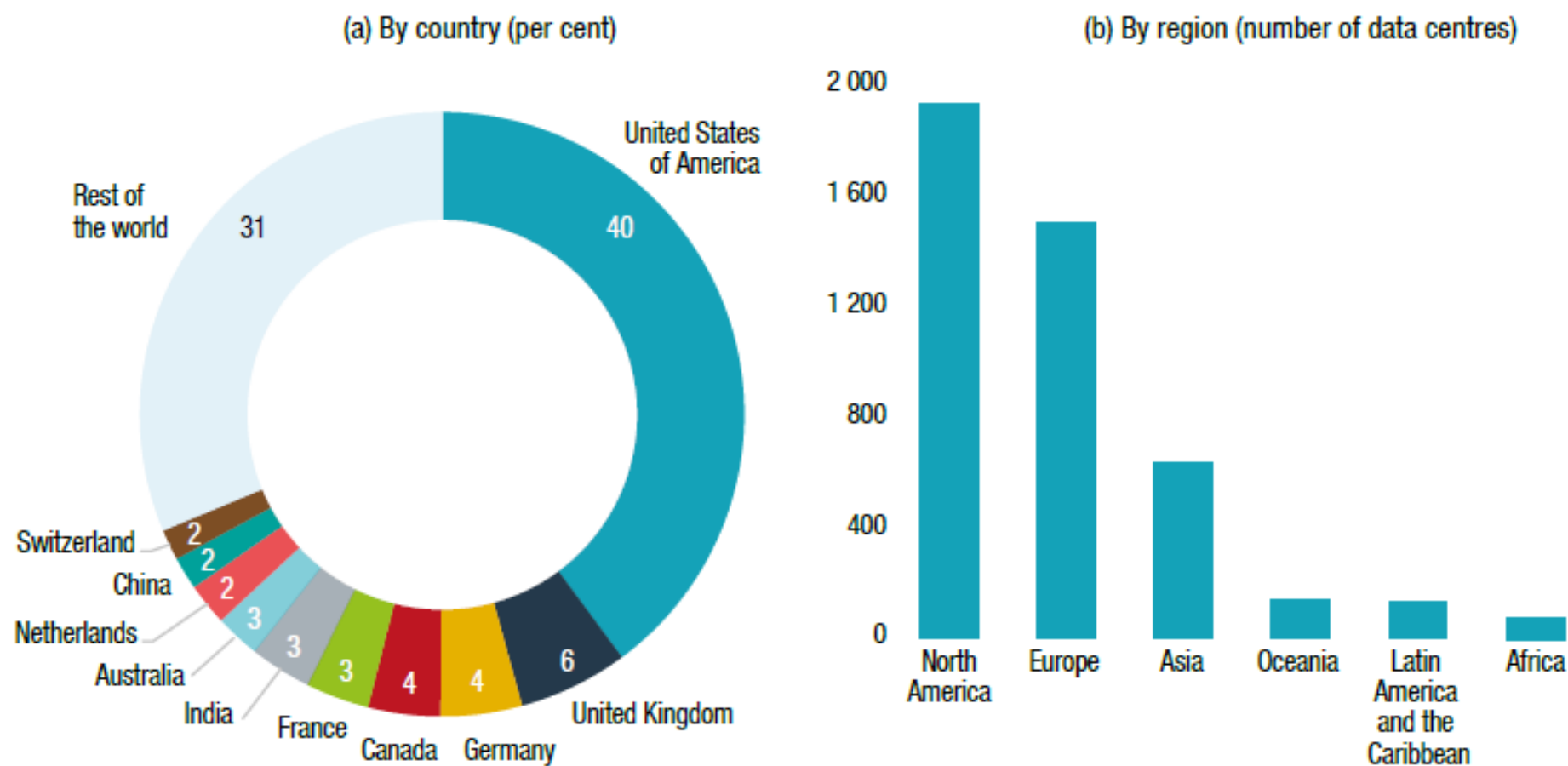


In **LDCs** only **1 in 5** people are **online**



Gender gap is the widest in the poorest economies

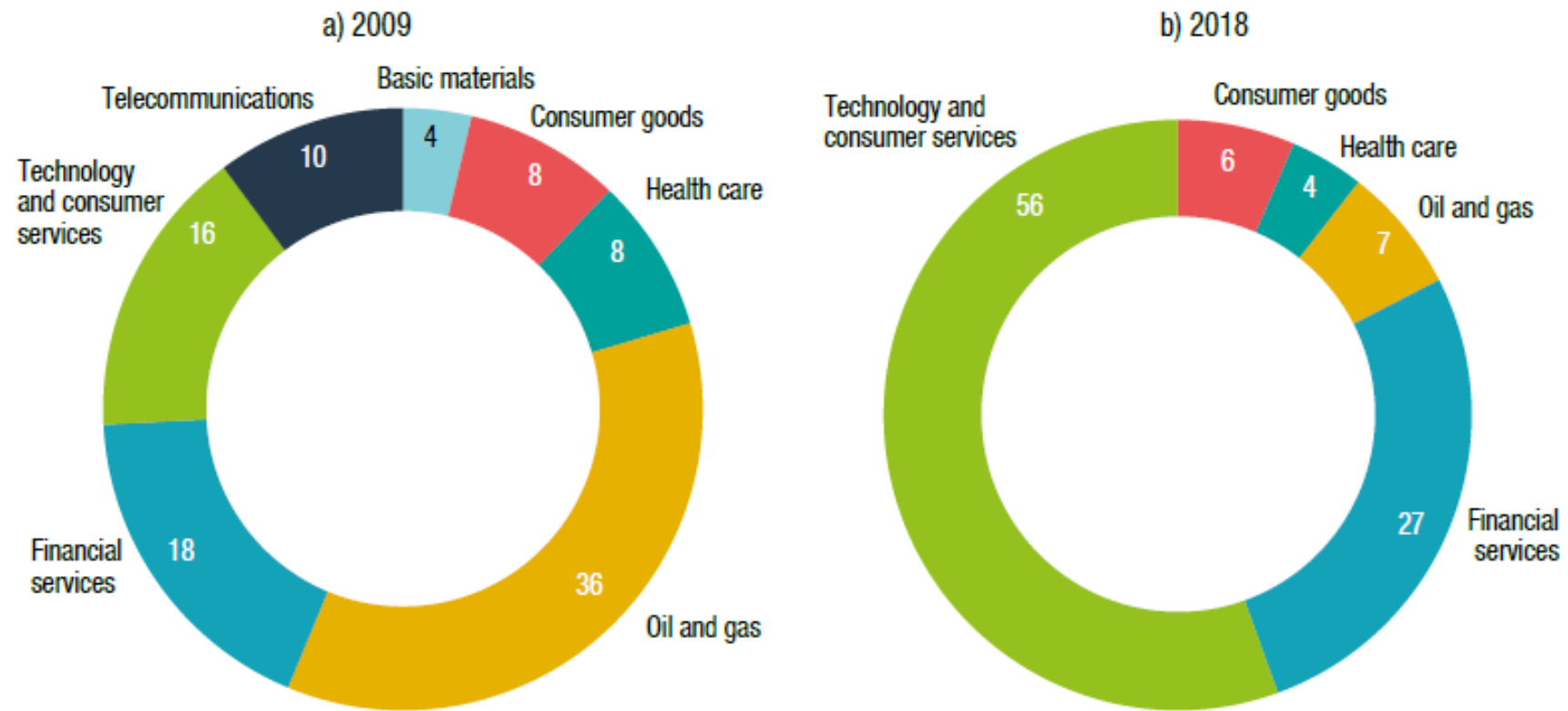
Figure I.8. Geographical distribution of colocation data centres, February 2019



Source: UNCTAD, based on Data Center Map (<https://www.datacentermap.com/datacenters.html>).

THE RISE OF TECHNOLOGY COMPANIES IN THE GLOBAL BUSINESS LANDSCAPE

Figure I.16. World's top 20 companies by market capitalization, by sector, 2009 versus 2018
(Per cent)



Source: UNCTAD, based on PwC, 2018b.



Value creation and capture in the digital economy

VALUE IN THE DIGITAL ECONOMY AND ROLES OF DIGITAL PLATFORMS



Data-driven global economy is expanding value creation powers

The new economy – digital economy is based on knowledge economy (Data), human capital and networks (Platforms)

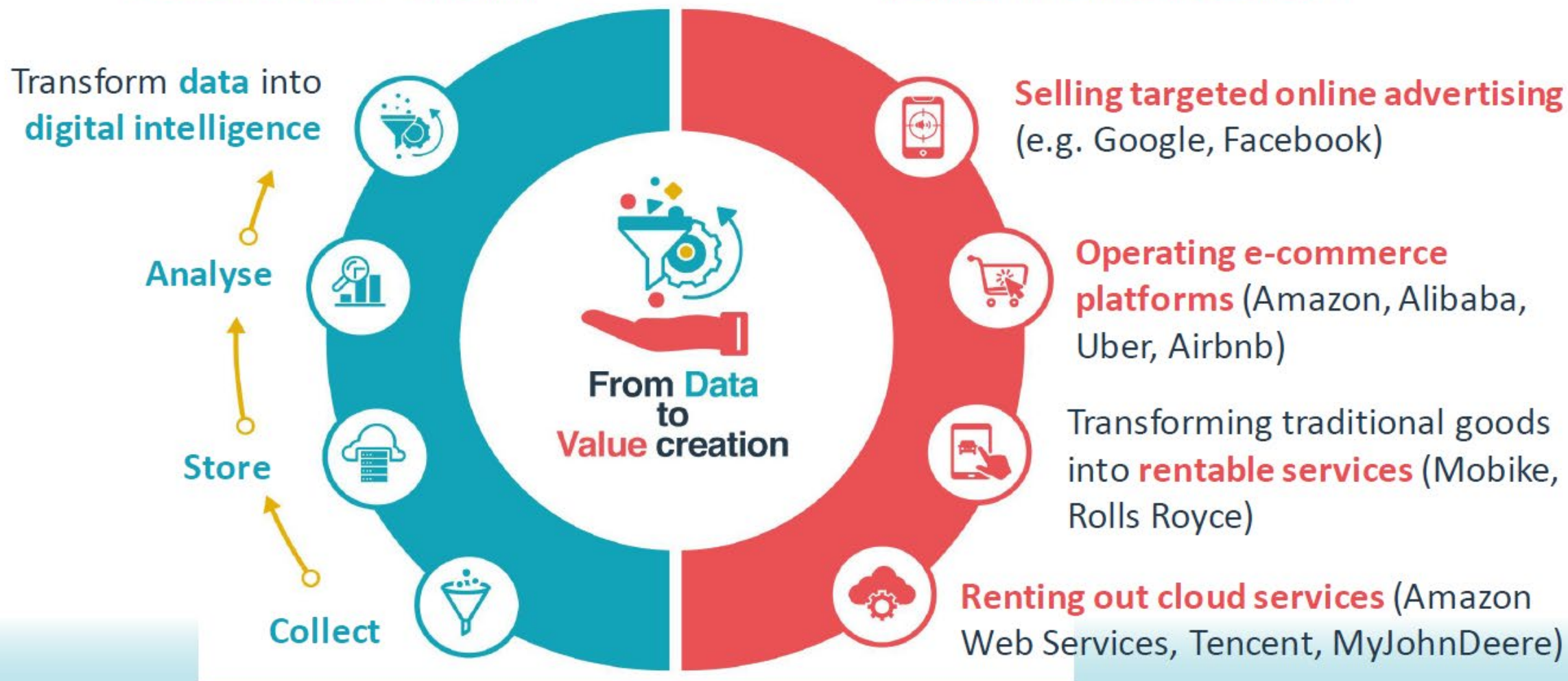
Data-driven
global
economy is
expanding
value creation
powers

While the ability to collect and use data in industrial and consumer markets has always existed, the ability to collect, store, and analyze data at the current scale has only emerged recently and will continue to increase in importance (Duke GVCC, December 2018)

In some cases, firms controlling “big data” can extract more consumer surplus through sophisticated algorithmic pricing and customization of offerings (Foda & Patel, 2018)

Economic value of data arises once data are refined into **digital intelligence** that can be monetized.

Data value chain → Data monetization

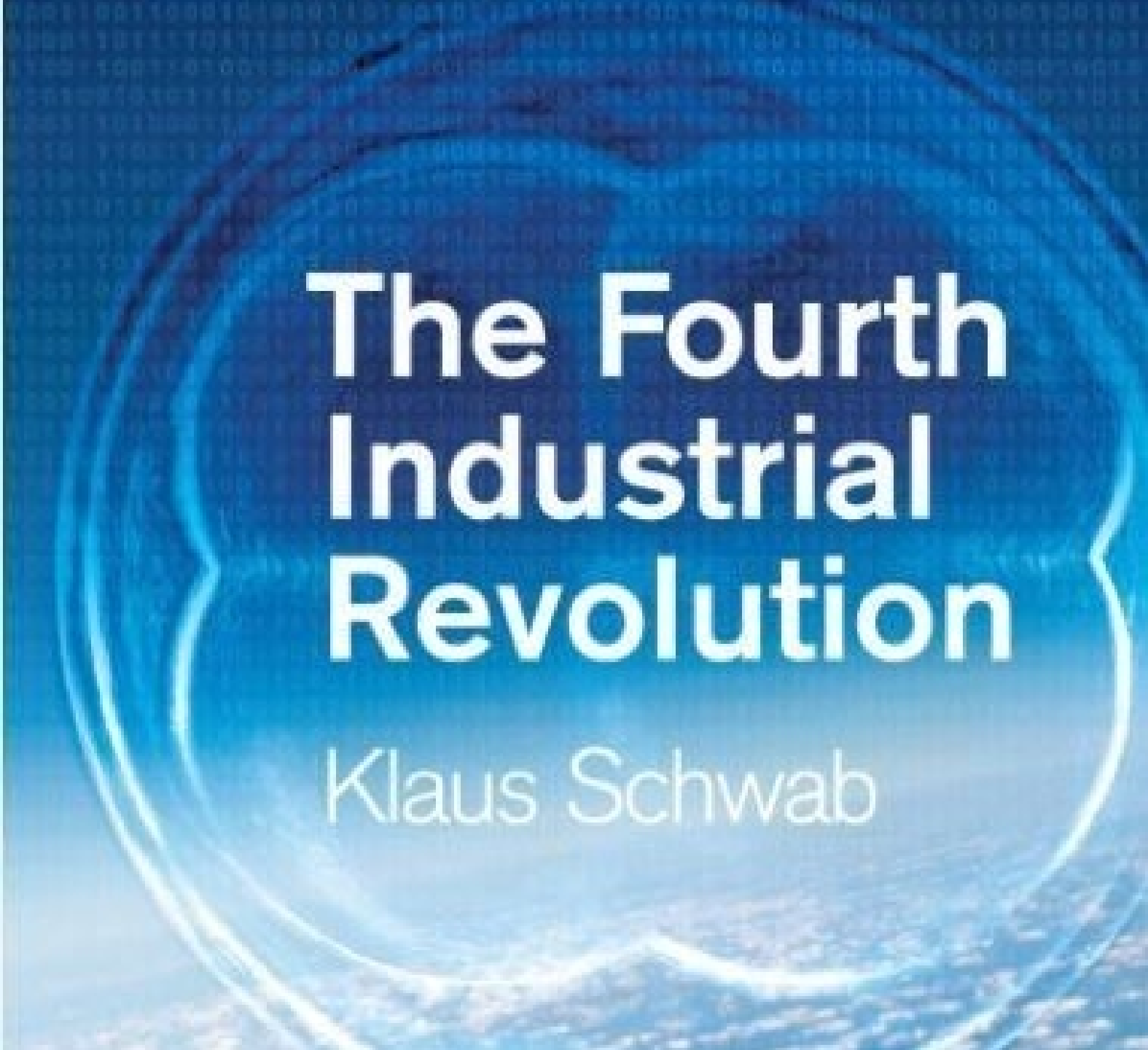




Countless interaction and its implications

"THESE COUNTLESS INTERACTIONS, WE CREATE A “HALO” OF DATA THAT IS EVERY BIT AS REAL — AND MORE MONETIZABLE, AND STEAL-ABLE — AS OUR PHYSICAL SELVES

AN UNFORTUNATE SIDE EFFECT IS THAT NOW, IF YOU HAVE A PASSWORD TO ANYTHING, YOU ARE A USER, A PRODUCT AND A TARGET."

The image shows the front cover of the book 'The Fourth Industrial Revolution' by Klaus Schwab. The cover has a blue background with a subtle pattern of binary code (0s and 1s). A large, glowing, circular light effect is centered on the cover, creating a sense of depth and focus. The title 'The Fourth Industrial Revolution' is written in a large, white, sans-serif font, centered within the glowing circle. Below the title, the author's name 'Klaus Schwab' is written in a smaller, white, sans-serif font.

The Fourth Industrial Revolution

Klaus Schwab

Trust & privacy – the 4th industrial revolution

The best way to manage trust and privacy has been termed by World Economic Forum as the Fourth Industrial Revolution.



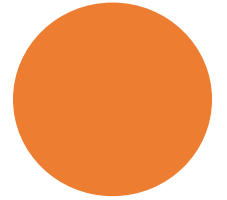
The growth in machine-readable information or 'digital' data.

- Accompanied by an expansion of big data analytics, artificial intelligence
- (AI), cloud computing and new business models (digital platforms).
- More devices are accessing the Internet, and an ever-increasing number of people are using digital services
- More value chains are being digitally connected and further expanding the role of digital data and technologies.



Turning data into digital intelligence is key to success and monetization in the digital economy

- Access to data and the ability to transform data into digital intelligence have become crucial for the competitiveness of companies.
- As business operations get more digitized producers (OEM) and exporters have become ever more dependent on data analytics

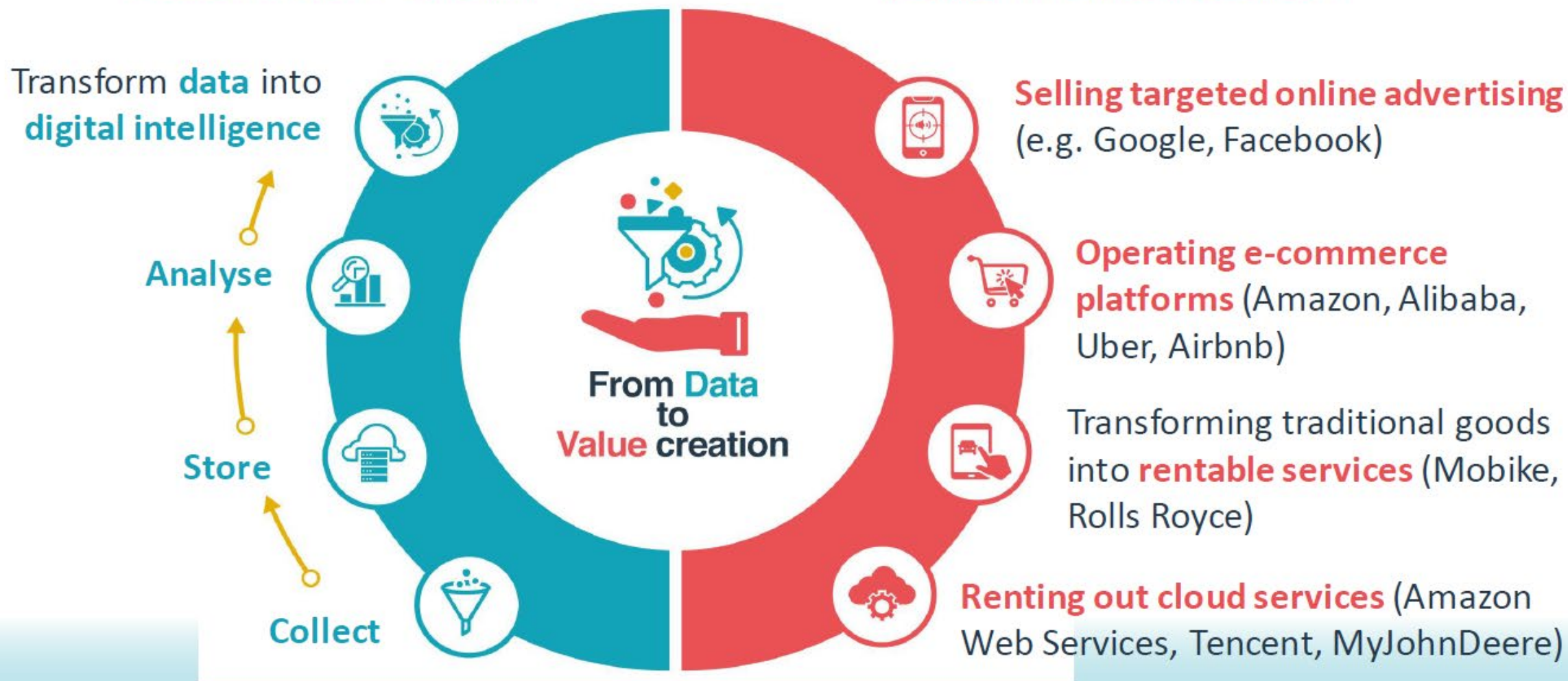


- Key technology in the digital economy is data analytics, sometimes dubbed as “big data”.
- This refers to the increasing capacity to analyze and process massive amounts of data.
- Digital data are one of the core elements of value creation in the digital economy.



Economic value of data arises once data are refined into **digital intelligence** that can be monetized.

Data value chain → Data monetization





Digital platforms and digital data

- Business models of the digital economy
 - Two emerging and related forces driving value creation in the digital economy:
 - **Platformization** and the **monetization** of the rapidly growing volume of digital data.
 - Digital platforms are central actors in the digital economy
 - and digital data have become a key resource in the economic and value creation process.





Digital platforms

- Digital platforms can be both intermediaries and infrastructures.
- They are intermediaries when they connect different groups of people (the different “sides” of multi-sided markets).
- For example, **Facebook connects users, advertisers, developers, companies and others, and Uber connects riders and drivers.**
- Many platforms also serve as **infrastructures** that different sides can build upon.
 - Eg., users can develop profile pages on Facebook, and software developers can build apps for Apple’s App Store.

- Platform-centred businesses have a major advantage in the data-driven economy.
- Platforms owners are positioned to record and extract all data related to events that occur between various users on the platform.
- Thus, the growth of digital platforms as a result of technological developments is strongly linked to their increasing capacity to collect and analyse digital data and their exploitation for financial benefits

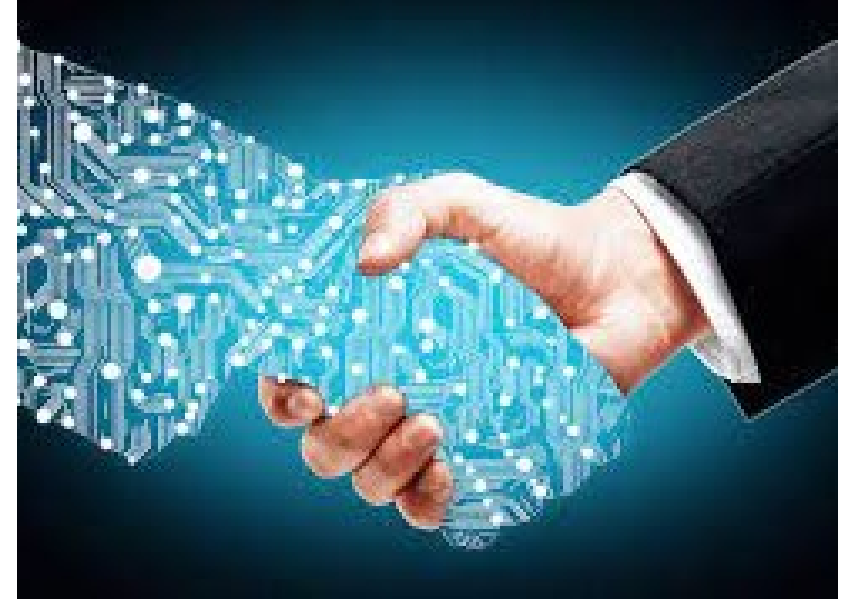


Data as power and competitive advantages

- Data has become a new economic resource for creating and capturing value.
- Control over data is strategically important in the transformation of data into digital intelligence.
- In virtually every value chain, the ability to collect, store, analyze and transform data brings added power and competitive advantages.



- Digital data are core to all fast-emerging digital technologies, such as data analytics, AI, blockchain, IoT, cloud computing and all Internet-based services.
- Unsurprisingly, data-centric business models are being adopted not only by digital platforms, but also, increasingly, by lead companies across various industry sectors.

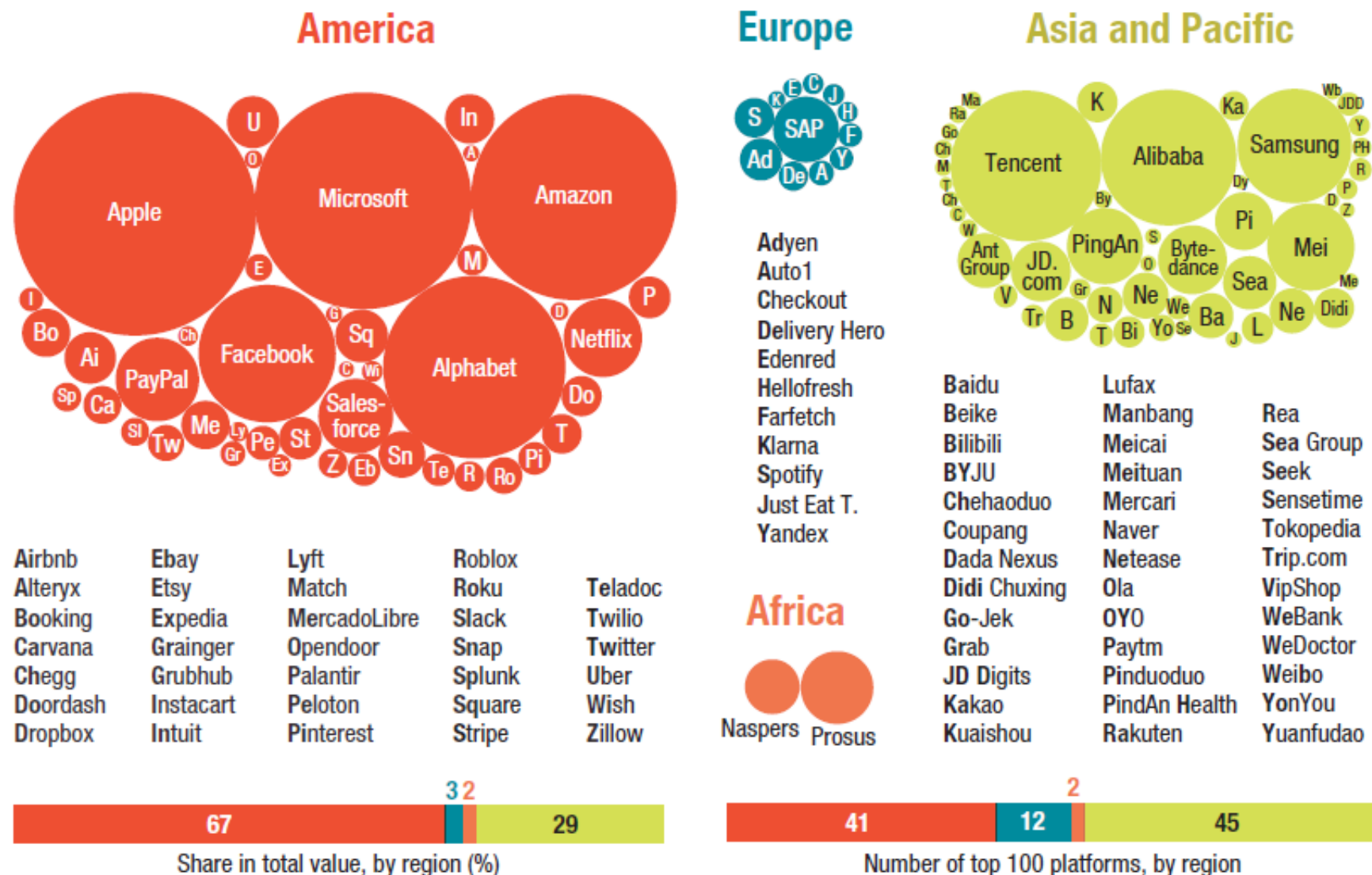


Data concentration and the risk of subordinate positions in data production and exploitation

- As value and data are being concentrated in few global platforms, It means in the global “**data value chain**”, many countries are in subordinate positions,
 - They are becoming mere providers of raw data to digital platforms while at the same time, having to pay for the digital intelligence produced with those data by platform owners.



Figure I.13. Geographical distribution of the top 100 global digital platforms, by market capitalization 2021



Source: Holger Schmidt, available at www.netzoekonom.de/vortraege/#tab-id-1 (data as of May 2021).

Note: As a reference, the market capitalization of Apple is \$2.22 trillion, while for Mercado Libre it is \$88.7 billion, \$80.2 billion for Baidu and \$59.7 billion for Spotify.

2000 2014 2023

Global digital platforms

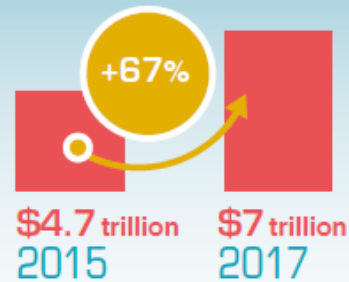


The dominance of global digital platforms and their capacity to create and capture the ensuing value, are set to accentuate global inequalities. Breaking this vicious circle to generate a fairer distribution of gains from data and digital intelligence requires out of the box thinking.

VALUE CREATION AND CAPTURE IN THE DIGITAL ECONOMY: A GLOBAL PERSPECTIVE

Global digital platforms have achieved very strong market positions

Combined value of the platform companies with a market capitalization of > \$100 million



Factors explaining the rapid rise to dominance



network effects



ability to extract, control & analyze data



high switching costs

Data capture and monetization

“Switching costs are the costs that a consumer incurs as a result of changing brands, suppliers, or products. Most prevalent switching costs are monetary in nature, there are also psychological, effort-based, and time-based switching costs. Switching costs can be classified as high switching costs or low switching costs.”

US and China giants share in the global digital services market

Internet search market



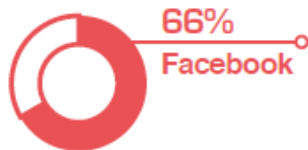
World's online retail activity



Global cloud infrastructure services



Global social media market



Mobile payment solution

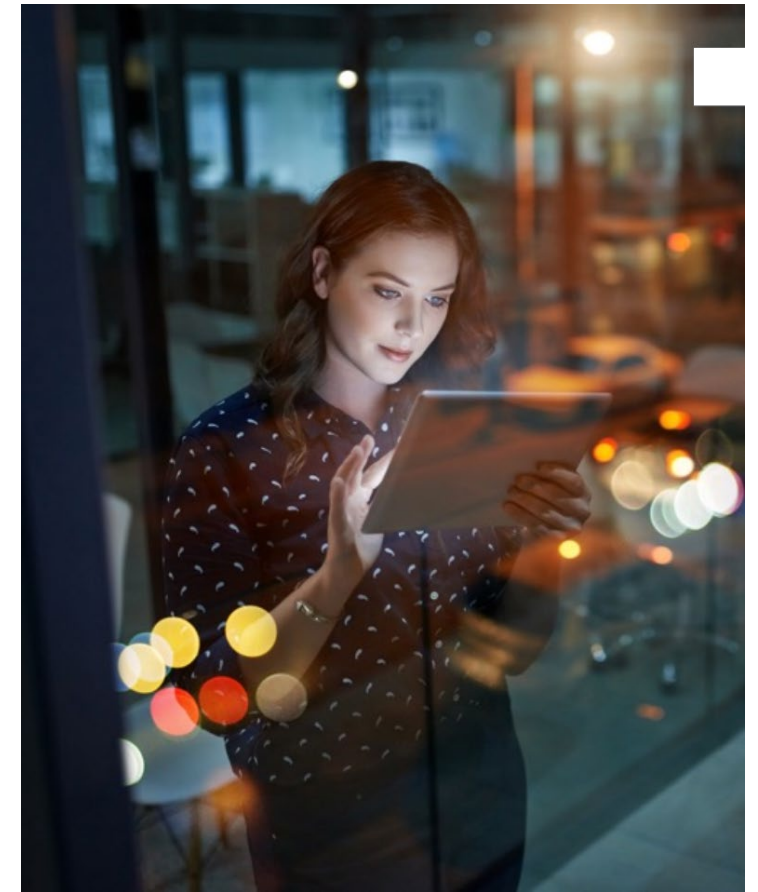


Active users



For individuals:

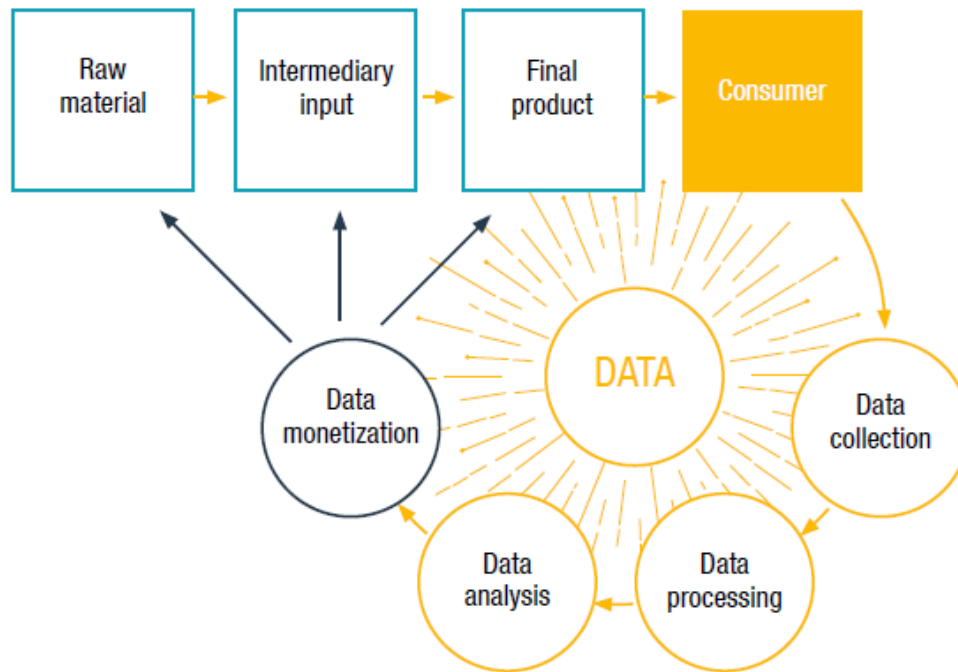
- Digital platforms allow access to more variety and choice of goods and services at lower costs.
- They also provide convenience as well as customized or personalized products and services.
- Consumers may further benefit by getting goods and services quicker due to fewer intermediaries.
- in terms of employment, an expanding digital economy can help generate new high-skilled jobs, especially in the core digital sector and in areas requiring relatively advanced technical and analytical skills.
- Also they can help generate employment in an under-employed sector of a local economy -> **see the case of food delivery in Finland and the employment of immigrants.**



“An unfortunate side effect is that now, if you have a password to anything, you are a user, a product and a target.”

The economy of digital data

Figure II.1. From linear production to feedback loops in the digital economy

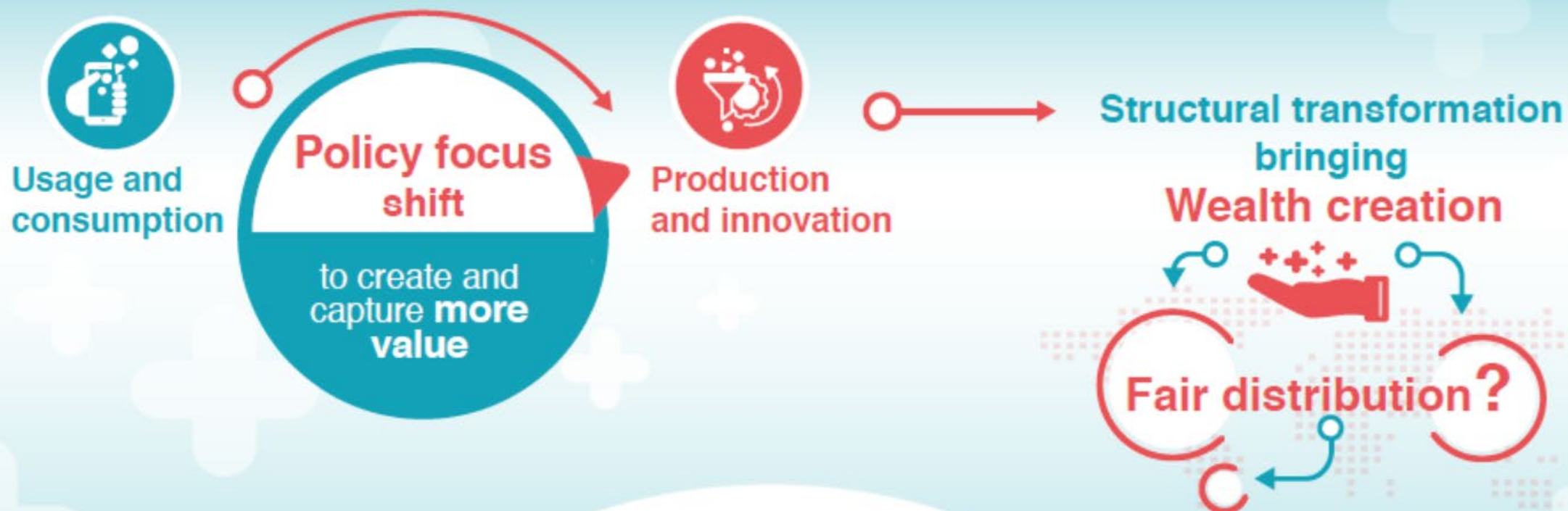


Source: UNCTAD.



How to create value from digital data?

Digital data are an increasingly valuable economic resource, but only once they are transformed into digital intelligence that can be monetized.



DIGITAL ECONOMY REPORT 2019

Data value chain

Data Monetization

Transform data into digital intelligence

Analyse

Store

Collect

From Data to Value creation

Selling targeted online advertising (e.g. Google, Facebook)

Operating e-commerce platforms (Amazon, Alibaba, Uber, Airbnb)

Transforming traditional goods into rentable services (Mobike, Rolls Royce)

Renting out cloud services (Amazon Web Services, Tencent, MyJohnDeere)

Four dimensions to consider

Distribution of value

Scope for upgrading

Governance of value creation

Value creation vs. capture

Different actors to consider

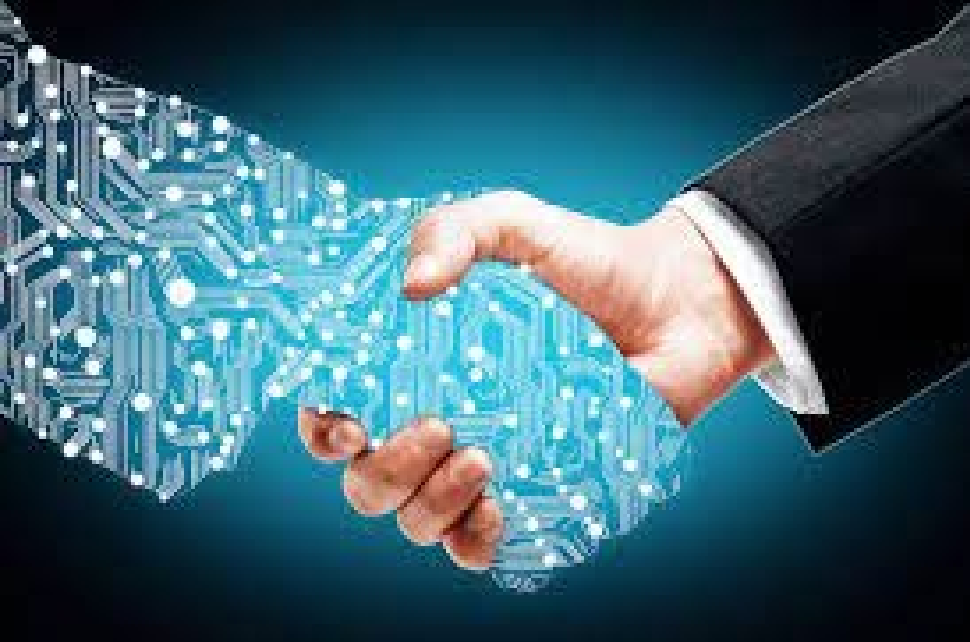
Assessing the scope for value creation needs to consider the **possible impacts** on different **actors**:

Individuals

Small and large businesses

Governments

Economy-wide effects



Digital data and digital platforms

- Digital platforms are often the main collectors or extractors of data, and therefore can better appropriate value from data.
- The data sources (i.e. the data producers or data subjects) are not able to capture any part of the economic value created with their data.
- Once the data have been extracted, users typically have limited or no control over how these are used.



The value of digital data

- The value of data is unique in the sense that it cannot meaningfully ever be entirely separated or divested from the data subjects – whether individuals or groups/communities.
- Data's real – or at least greatest – value is in the intelligence

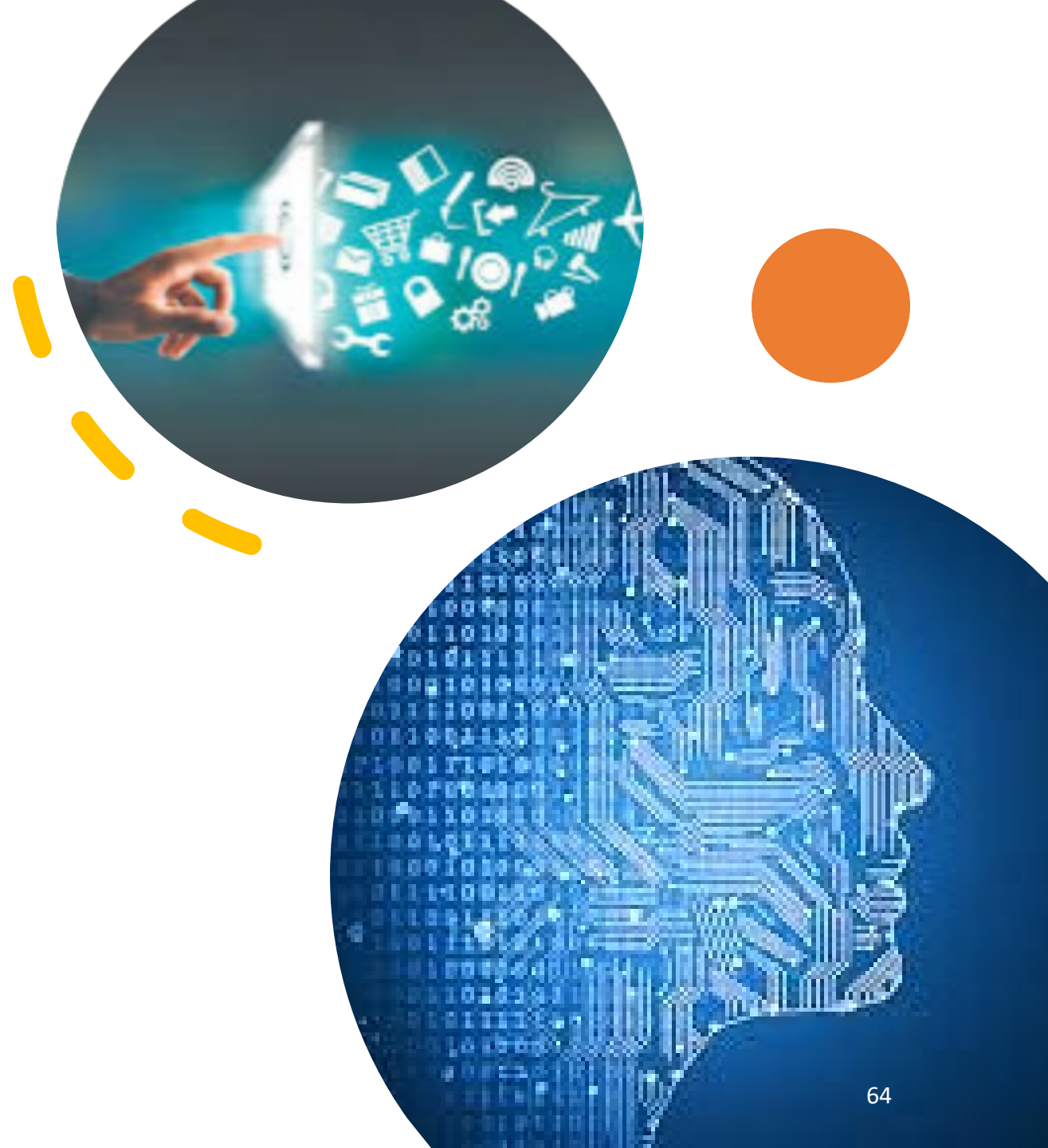


Table 13 Countries with the Most Cross-Border Data, 2001-2019

2001	Rank	2019
United States	1	China/Hong Kong
United Kingdom	2	United States
Germany	3	United Kingdom
France	4	India
Japan	5	Singapore
China/Hong Kong	6	Brazil
Brazil	7	Vietnam
Russia	8	Russia
Singapore	9	Germany
India	10	France

Source: Nikkei Asia, November 25, 2020, <https://vdata.nikkei.com/en/newsgraphics/splinternet/>.



Global data flows now contribute more to global growth than global trade in goods

Ordering a Pizza in 2022

CALLER:

Is this Pizza Hut?

GOOGLE:

No sir, it's Google Pizza.

CALLER:

I must have dialed a wrong number, sorry.

GOOGLE:

No sir, Google bought Pizza Hut last month.

CALLER:

OK. I would like to order a pizza.

GOOGLE:

Do you want your usual, sir?

CALLER:

My usual? You know me?

GOOGLE:

According to our caller ID data sheet, the last 12 times you called you ordered an extra-large pizza with three cheeses, sausage, pepperoni, mushrooms and meatballs on a thick crust.

CALLER:

Super! That's what I'll have.

GOOGLE:

May I suggest that this time you order a pizza with ricotta, arugula, sun-dried tomatoes and olives on a whole wheat gluten-free thin crust?

CALLER:

What? I don't want a vegetarian pizza!

GOOGLE:

Your cholesterol is not good, sir.

CALLER:

How the hell do you know that?

GOOGLE:

Well, we cross-referenced your home phone number with your medical records. We have the result of your blood tests for the last 7 years.

CALLER:

Okay, but I do not want your rotten vegetarian pizza! I already take medication for my cholesterol.

GOOGLE:

Excuse me sir, but you have not taken your medication regularly. According to our database, you purchased only a box of 30 cholesterol tablets once at Lloyds Pharmacy, 4 months ago.

CALLER:

I bought more from another Pharmacy.

GOOGLE:

That doesn't show on your credit card statement.

CALLER:

I paid in cash.

GOOGLE:

But you did not withdraw enough cash according to your bank statement.

CALLER:

I have other sources of cash.

GOOGLE:

That doesn't show on your latest tax returns, unless you bought them using an undeclared income source, which is against the law!

CALLER:

WHAT THE HELL!

GOOGLE:

I'm sorry sir, we use such information only with the sole intention of helping you.

CALLER:

Enough already! I'm sick to death of Google, Facebook, Twitter, WhatsApp and all the others. I'm going to an island without the internet, TV, where there is no phone service and no one to watch me or spy on me.

GOOGLE:

I understand sir, but you need to renew your passport first. It expired 6 weeks ago...

Welcome to the future 🤖

Ordering a Pizza in 2022

CALLER:

Is this Pizza Hut?

GOOGLE:

No sir, it's Google Pizza.

CALLER:

I must have dialed a wrong number, sorry.

GOOGLE:

No sir, Google bought Pizza Hut last month.

Platforms acquiring traditional companies

CALLER:

OK. I would like to order a pizza.

GOOGLE:

Do you want your usual, sir?

- Have access to our digital footprint & consumption behavior and more

CALLER:

My usual? You know me?

GOOGLE:

According to our caller ID data sheet, the last 12 times you called you ordered an extra-large pizza with three cheeses, sausage, pepperoni, mushrooms and meatballs on a thick crust.

- Knowledge of users preferences so personalizes

CALLER:

Super! That's what I'll have.

GOOGLE:

May I suggest that this time you order a pizza with ricotta, arugula, sun-dried tomatoes and olives on a whole wheat gluten-free thin crust? Personalized Value proposition

CALLER:

What? I don't want a vegetarian pizza!

GOOGLE:

Your cholesterol is not good, sir. (Knowledge health data)

CALLER:

How the hell do you know that?

GOOGLE:

Well, we cross-referenced your home phone number with your medical records. We have the result of your blood tests for the last 7 years. (Eureka!)

CALLER:

Okay, but I do not want your rotten vegetarian pizza! I already take medication for my cholesterol.

GOOGLE:

Excuse me sir, but you have not taken your medication regularly. According to our database, you purchased only a box of 30 cholesterol tablets once at Lloyds Pharmacy, 4 months ago. (purchasing and consumption behavior data)

CALLER:

I bought more from another Pharmacy.

GOOGLE:

That doesn't show on your credit card statement. (personal financial data & behavior)

CALLER:

I paid in cash.

GOOGLE:

But you did not withdraw enough cash according to your bank statement. . (personal financial data & behavior)

CALLER:

I have other sources of cash.

GOOGLE:

That doesn't show on your latest tax returns, unless you bought them using an undeclared income source, which is against the law! . (personal financial data & behavior)

CALLER:

WHAT THE HELL!

GOOGLE:

I'm sorry sir, we use such information only with the sole intention of helping you. (Automatic execution strategy; "allows companies to meet the needs of customers even before they've become aware of those needs.")

CALLER:

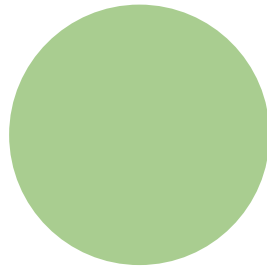
Enough already! I'm sick to death of Google, Facebook, Twitter, WhatsApp and all the others. I'm going to an island without the internet, TV, where there is no phone service and no one to watch me or spy on me.

GOOGLE:

I understand sir, but you need to renew your passport first. It expired 6 weeks ago...

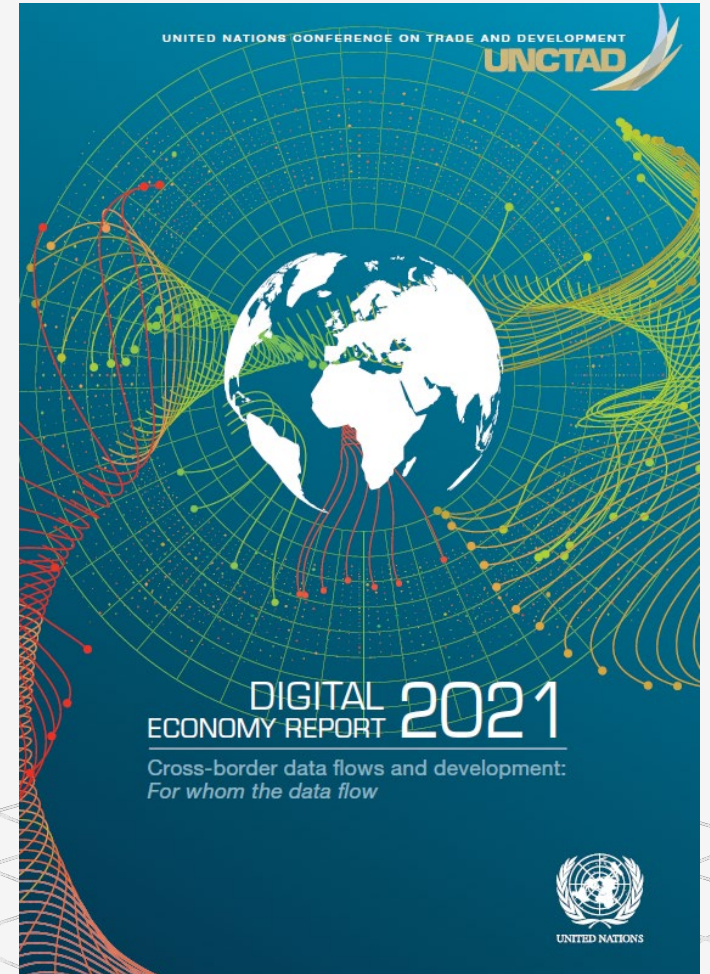
Welcome to the future 🤖

New trends in connectivity and the Emergence of a new Data Economy



Trends in the Global Digital Economy is driven by Trends in Data

This is well represented in the UNCTAD yearly report on the digital economy 



Revolution of Industry

Industry 1

Implementation of mechanical production facilities using water and steam power
Mechanical Weaving Loom

1765



Drivers

Quality of Life
Engineering
Sciences

Industry 2

Implementation of Work sharing Mass Production using electrical and method of communication

Conveyor Belt

1870



Drivers

Mobility

Industry 3

Use of Electronics and IT for further Automation of production

Programable Logical Controller (PLC), NC, Computers

1954



Drivers

Micro Electronics

Industry 4

Based on Cyber Physical System

AI, IoT, ML, Big Data, IloT

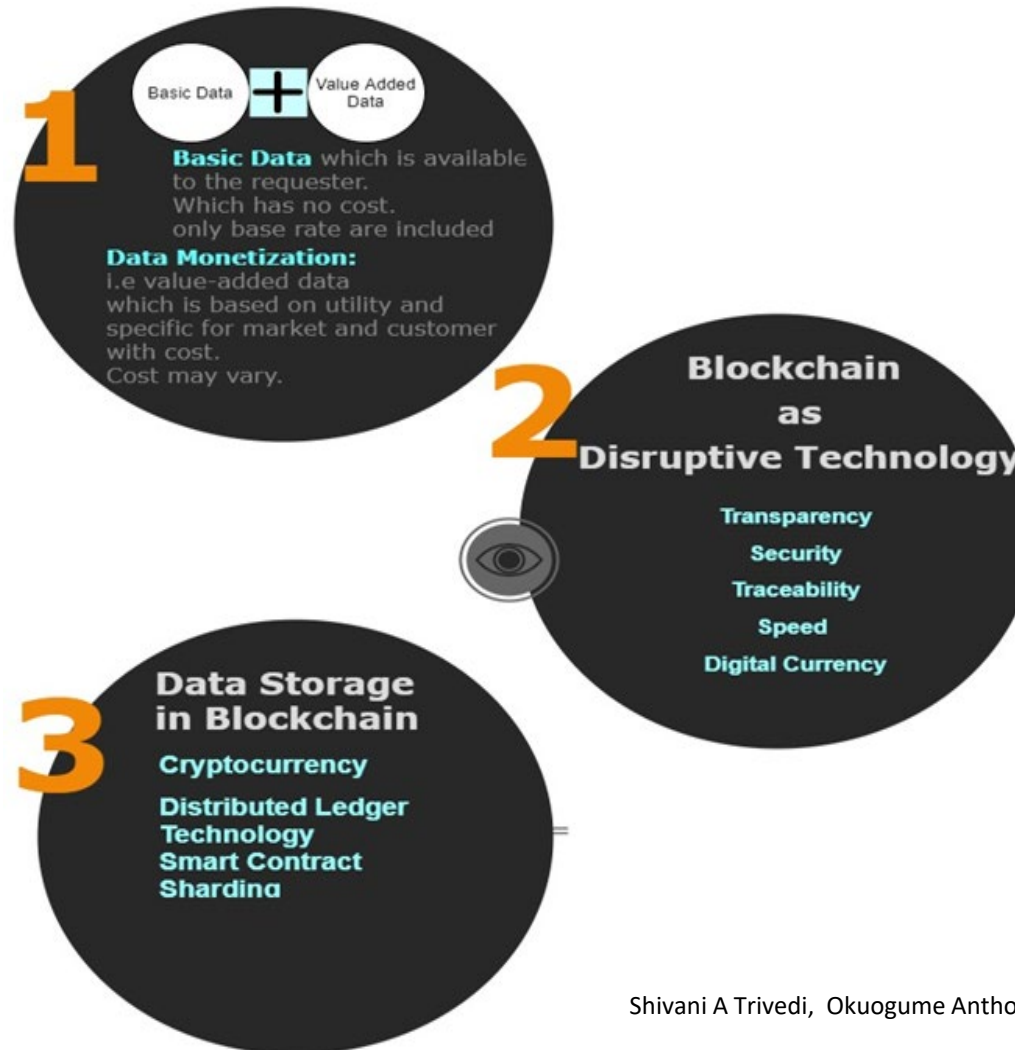
2015



Drivers

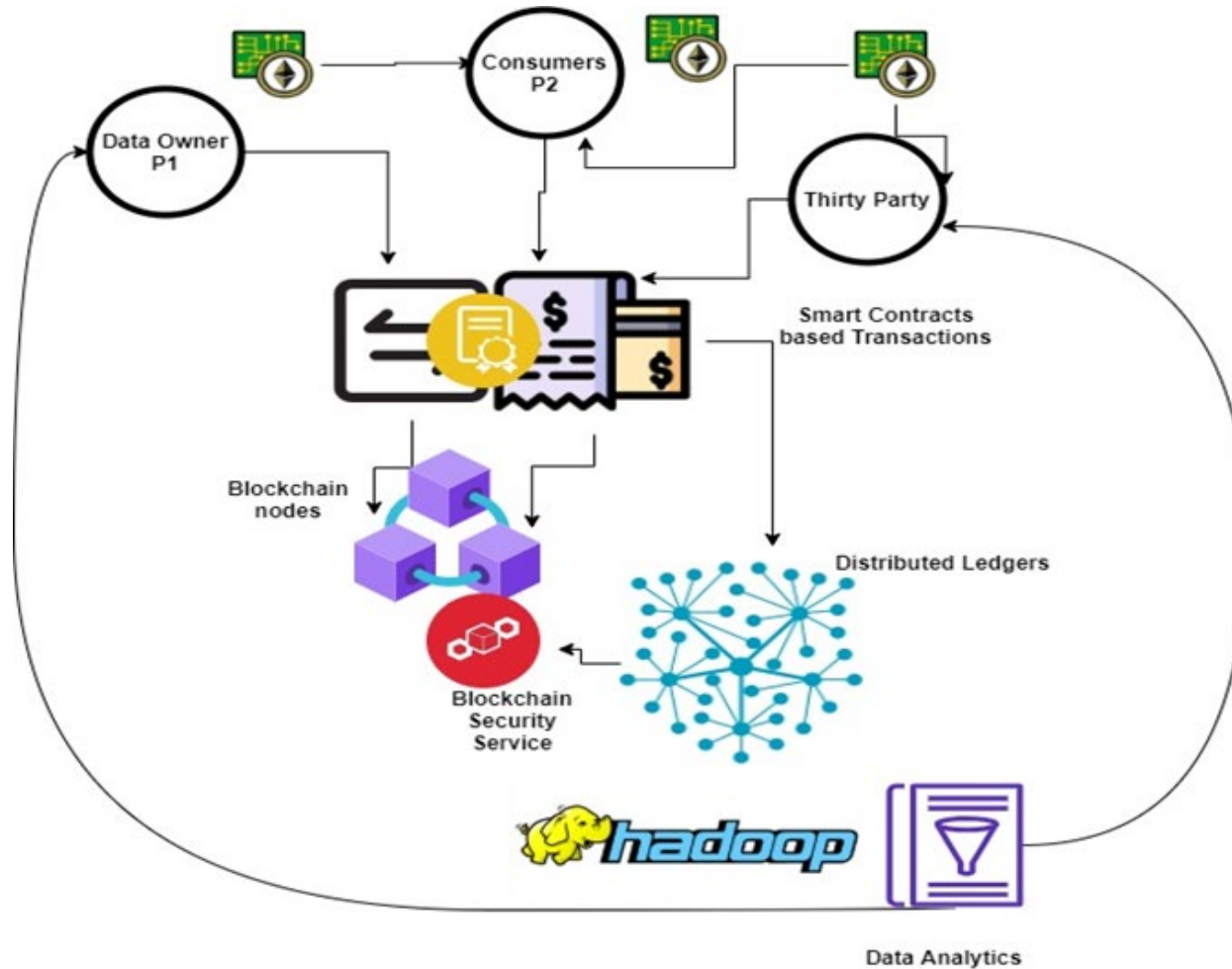
ICT

Objectives of Proposed Architecture for Industry IIoT



Shivani A Trivedi, Okuogume Anthony (20**)

Data utilization using smart contract and distributed ledger in Block Chain Technology



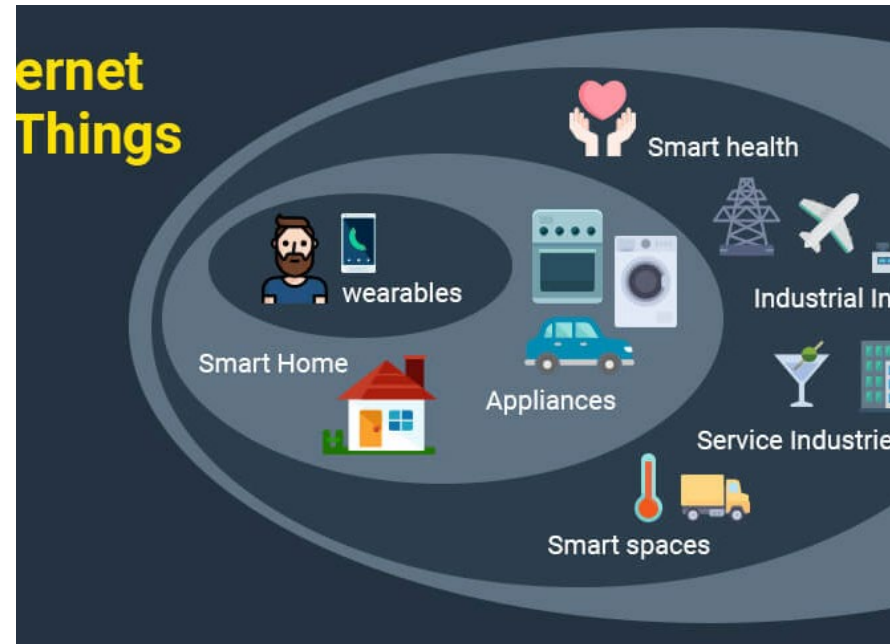
In this framework, data owners are the device manufacturer, and consumers are data authentication end and granting permission to use the third party. Both owner and authenticator gets cost defined in the smart contract.

Value-added data are used by a third party in the same interest. In this case, it also uses blockchain technology using smart contract and as value to define data monetization. The selection of blockchain technology in data management is compatible with these characteristics; like transparency, security, traceability, speed, and digital currency.

Other benefits are data storage mechanisms such as; cryptocurrency, distributed ledger technology, smart contract, and sharing.

In Industry 4.0, blockchain technology's decentralized nature plays a vital role in the communication between two untrusted devices and also, to keep device information about their interactions, state, and condensation of exchanged data.

Blockchain can significantly reduce the risks that customers face and save the cost in business transactions.



New trends in connectivity



New Trends in connectivity

- Smart devices are not new. Laptops, mobile devices, and wearable smart devices are not new.
- They have been with us for decades. However, in the modern times smart devices are different. They are different because they are empowered with connectivity and the birth of IoT based devices.
- The advancements in artificial intelligence and blockchain technologies has amplified the powers of IoT and is transforming everyday physical objects.
- The development in wireless communication (Sinha, 2018) amplified connectivity, and IoT technologies took connectivity to whole new levels beyond connecting places and people (Perwej & Sheta et al., 2019).

New trends in connectivity

- The number of physical objects that connect via the IoT has increased at a tearing speed.
- Gartner, Inc. estimates that 8.4 billion connected things will be in use worldwide by the end of 2017, up 31 percent from 2016. And that number will reach 20.4 billion by 2020.
- Dell's CEO estimates that as many as 70 billion connected devices will exist by 2020" (Lampropoulos, Siakas &Anastasiadis, 2019).
- The "growth of IOT is credited to these factors; development of wireless networking methods, the emergence of advanced data analytics, reduction in the cost of connected devices along with an enhanced adoption of cloud platform." (Alcácer & Cruz-Machado, 2019)



New trends in connectivity

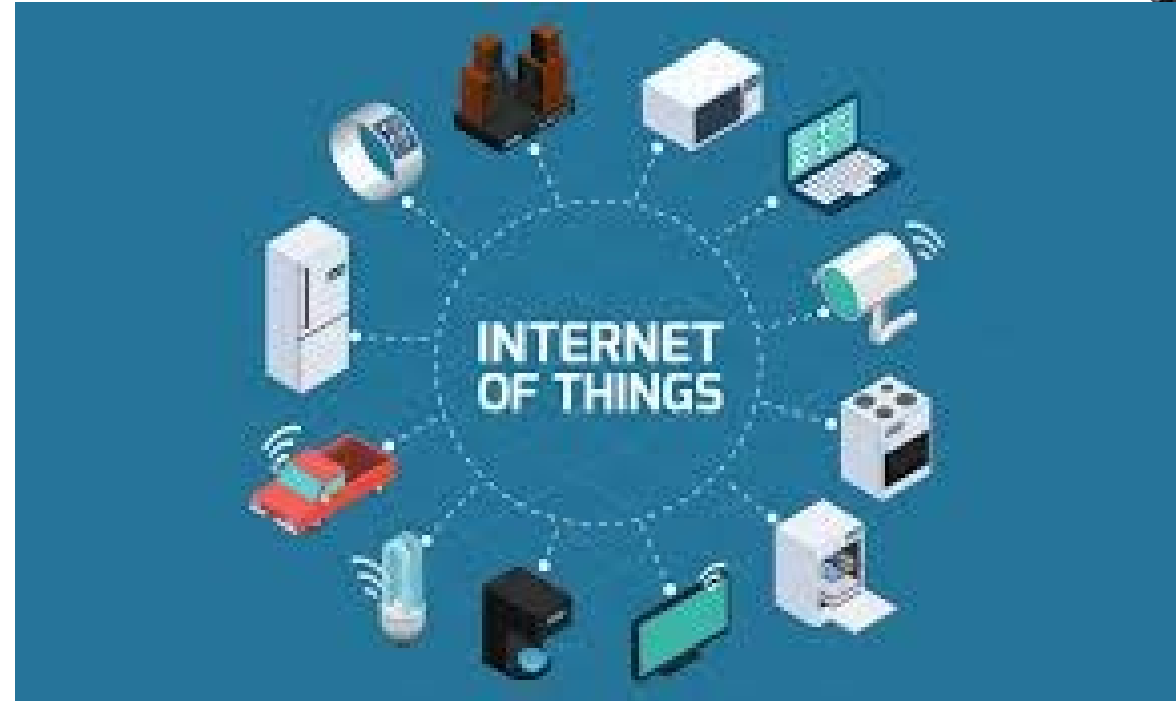
- The Internet of Things is also bringing more into the digital economy because it creates new data assets and value capture
(Zhao & Yao, 2019).
- So the Internet of Things is striving into a multi-trillion-dollar industry, according to report, "linking the physical and digital worlds could generate up to \$11.1 trillion a year in economic value by 2025."
(Kumar, Tiwari, & Zymbler, 2019)



Types of IoT



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Types of IoT

- IoT have two types cellular and noncellular
 - In Cellular IoT, the device or sensor would use a mobile modem or eSIM to connect to the Internet over wireless technologies from 2G-5G.
 - In Noncellular IoT, the Internet connection made using a Low-Power Wide-Area Network-enabled device or wearable to connect to wifi, Bluetooth, Zigbee, etc.
 - Like a sensor or a wearable or a car or a home appliance, each device would have its IP to enable Internet connectivity. They would traverse over an unlicensed spectrum to tap into the wifi, Bluetooth, Zigbee network, connecting to a Private Area Network or Local Area Network, and finally aggregate over a gateway to fiber cellular network.

(Perwej & Sheta et al., 2019).



Connectivity and the emergence of IoT data

- IoT is such a game-changer for many things, but the most notable is the opportunities for capturing value from linking the physical and digital world.
- IoT technology takes inputs from the physical world, uses digital technologies to derive insights from those inputs, and then makes outputs available for use back in the world.
- Traditional physical products create value for customers only under their performance: **A standard lightbulb is valuable based on its brightness, efficiency, and lifespan.**
 - With connected objects, information also becomes a key determinant of value: **A smart lightbulb is valuable not just because it can brighten a room but because it can enable automation, scheduling, remote controlling, and other abilities".**



New Trends in connectivity and the emergence of IoT data

- The opening of this new universe of data opportunity is why the internet search engine company **Google has acquired Fitbit, a fitness monitor device company, for \$2.1 billion.**

Deloitte Review, 2015

- IoT user intelligent data is a unique source of new value creation opportunities in the digital economy
 - It lies in effectively ingesting, aggregating, analyzing, trading, and harvesting user's data.



New Trends in connectivity and the emergence of IoT data

- IoT technology connecting the physical and the digital world is not only connecting places and people.
 - Its is now extended to the human body which has "long operated largely in the "dark" **with location, position, and functional state unknown or even unknowable.**"
- With IoT technologies such as smart wearable devices and mobile devices and with its "associated business processes," the human body can now be tracked and counted, observed, and identify, evaluate and act in circumstances that were earlier invisible and beyond reach.





Value of IoT data and monetization

- IoT devices generate massive data.
- People's extensive use of wearable devices generates the Internet of Things growth
- With the advancement in 5G technology, semantic intelligence, blockchain technology, and artificial intelligence, the scale and scope of data is set to increase in the future to unprecedented levels
- The merging of Artificial Intelligence and semantic web technologies have made data more intelligent and useful
- These data flows are enabling IoT operators to exploit new business models and revenue sources.
- In the data economy, information is the primary source of value; it means that new business models expand the scope for data monetization by enabling companies to sell and exchange data.
- Greater monetization will take place with a parallel increase in the value of analytics.
- Companies like uber and fitbit exploits customer's data like position and electronic health records.
- They can aggregate huge user data and monetize them through their various business models.



IOT DATA TYPES

Event 	Point at which an affair or occurrence transpired	As sports fans move through future stadiums, they will be greeted with incentives from nearby stores that are customized to each specific fan's interests. With offers that appeal to each individual fan, sports franchises will have the opportunity to sell more products and increase revenues.
Attribute 	Characteristic of an object that can be categorized and/or counted	A TV manufacturer wants to ensure that display units are properly calibrated to reduce after-sale support and warranty repair. By measuring color quality and luminosity of display units while still on the production line, the manufacturer can ensure its products are within benchmarks.
Motion 	Movement or position of an object or human being	Companies measure forms of movement in 3D space and compare it against the ideal model. For example, an instrumented cyclist may be compared against a professional cyclist and an accompanying real-time virtual coach could provide feedback to improve form and speed.
Orientation 	Relative position of an object	The orientation of a smartphone determines specific actions. For example, if a smart phone is face down, it can be switched to do-not-disturb mode.

Shivani & Okuogume, 2021



IOT DATA TYPES



Common IoT data types	Description	Examples
 Location	Where a particular thing is positioned geospatially. Typically identifies a location based upon GPS, wi-fi, beacon, or simply asking a user for their location.	Uber knows the location of its users based upon their pick-up and drop-off locations. With the users' permission, Uber may sell this data to other businesses. Businesses use this data to provide promotions that encourage consumers to spend money with their company. Uber launched a service that lets its customers connect their Uber account to their Starwood Preferred Guest Account. When a Starwood customer is traveling and they don't choose Starwood, they can receive promotions. ²
 Environment	Based on the measurement of environmental variables (i.e. the state of the environment)	A wind farm company is looking to expand into new areas. By utilizing wind sensors, the company is able to identify the locations that have the greatest energy generation potential and maximize their return on investment. After identifying their future locations, the wind farm company can continue to monetize its wind sensors by selling the data to weather companies looking to supplement their own sensors.
 Machine	Data that is automatically created from a computer process, piece of equipment, application, or other machine without the intervention of a human	IoT devices that interface with a vehicle's computer can sense driving speed, braking force, acceleration, engine problems, and a variety of other diagnostic information. This data can be used by insurance companies and can also be packaged and resold to a variety of other industries. For example, engine and diagnostic information are valuable to automotive companies that want to prevent systemic mechanical issues on vehicles or automotive repair shops looking to improve their marketing campaigns.
 Living	Data collected from sensors that monitor vitals (e.g. blood pressure, heart rate, temperature)	Pharmaceutical companies looking to improve sales can purchase anonymized health data that is generated by IoT sensors in order to find new customers and more effectively target their product marketing.

Shivani & Okuogume, 2021





IoT data value chain and value creation

- Data generation – recording and capturing data;
- In here, value is created in the data generation stage through an industry operator's ability to capture and record the sourced data on a scale of usefulness, and economical.
- Hierarchy and exclusiveness of data are said to be a source of competitive advantage.

IoT data value chain and value creation

Data collection – collecting data, validating and storage;

- At the data collection stage, value creation ties with the "ability to connect and transmit data between devices and storage locations is a vital function in the operation of the data value chain."
- Key-value drives at the stage are; "network reach, reliability, security and performance."





IoT data value chain and value creation

- Data analytics – processing and analyzing the data to generate new insights and knowledge;
 - The stage with the most potential for value creation and monetization of data.
- The place where data intelligence is converted into innovations and deployable intellectual property and competitive advantage.



GO DIGITAL

IoT data value chain and value creation

- Data Exchange – putting the outputs to use, whether internally or by trading them.
- At this stage, data insights are exploited for their use or sales of the data and insights to outside buyers.
 - From its use, a company can exploit the insights to develop commercially attractive offerings that could boost profit potentials and competitive advantage.
- Value is derived from the quantity, volume, and uniqueness of the data service provided.

IoT Smart devices and the concern of data privacy

- In data-driven business models, data privacy is a crucial concern that inescapably may shape the competitive landscape and monetization in the data economy.
-
- Data privacy concerns have centered around the threat of technology and the power it bestows on data-based business operators, digital service providers, and organizations for whom data has become an economic resource for creating and capturing value through the transformation of data into digital intelligence.



IoT Smart devices and the concern of data privacy

- The ability of companies operating in the data value chain to extract, control, analyze and monetize data is relatively unlimited
- There is also the emergent fears that value realized through the conversion of data into monetary value is not adequately regulated in terms of data protection or equitably distributed in terms of a fairer data economy.
- This argument has a strong point. More needs to be done to address data privacy concerns and build a more equitable data economy, especially when we shift our focus down to IoT data.
- For example, information is of a higher value when it is a detail information about the individual user [Sinha, 2018].
- According to the GSMA research, having "detailed information about 90% of potential customers are more valuable in many contexts. Companies offer a complete set of services to consumers. And then persuade them to share data with the service.



IoT Smart devices and the concern of data privacy

- Smart devices will interact with each other's over IoT and automatically execute transaction decisions on behalf of the service providers and users.
- Smart devices with blockchain technology autonomously perform IoT transactions and will instigate data tracking and usage.
- This will also give users an empowering insight into their data usage pathway and better estimate the value of their data.
- This will empower user's control over their data and increase their bargaining power to negotiate compensations for the use of their data (PwC, 2019).
- This will redefine trust, transparency, privacy, and data ownership and monetization of data.





DIGITAL TRUST

FUTURE OF DIGITAL TRUST



•“The Future of Digital Trust” study, European consumers’ trust in organisations to hold and manage their personal data has eroded over the last year.



•lack of trusted ways of finding out about personal data management and protection online



•there is a perceived imbalance within the data-sharing relationship, with two thirds (67%) of consumers believing that organisations benefit the most from sharing of data

"HACKED" WHAT DOES IT MEAN?



It means a cybersecurity breach or any other violation of personal data stewardship and governance that results in a breakdown of trust or privacy.



These trust events are within the realm of cybersecurity but are also related to ethics, consumer attitudes, legislation, industry regulation and much more"



We use the internet-enabled digital platforms to handle bank matters, manage our health, buy everything from real estate to communicating socially to the consumption of various digital contents (Netflix+Amazon+FB+Triller+Tiktok+Instagram+Apple+HBO).



These has eventually created countless complex interactions in the digital landscapes

MACHINE LEARNING AND AI-FUELED CONCERNS

New machine learning — Internet-enabled, AI-fueled — are at the center of redefining trust, transparency and privacy.



COUNTLESS INTERACTION AND ITS IMPLICATIONS

"THESE COUNTLESS INTERACTIONS, WE CREATE A "HALO" OF DATA THAT IS EVERY BIT AS REAL — AND MORE MONETIZABLE, AND STEAL-ABLE — AS OUR PHYSICAL SELVES

AN UNFORTUNATE SIDE EFFECT IS THAT NOW, IF YOU HAVE A PASSWORD TO ANYTHING, YOU ARE A USER, A PRODUCT AND A TARGET."

DATA HAS A VALUE



- The value of particular types of personal data depend on the 'usefulness' to the organisation in terms of matching their target market, but it also depends on the 'type' of data in question



-



- the level of 'value' a consumer assigns to each of these data types seems at odds with the risk commonly associated with sharing such important data.



- For instance, information about 'third parties' or 'private income' is perceived as the most valuable, above critical personal demographic data, and also above behavioral data such as purchase history and location.

THE STAGGERING REALITY OF OUR ONLINE LIVES



" Countless mega-hacks, data breaches and — now — incidents of personal data misuse every year, and this is eroding our collective sense of privacy and trust in technology, the organizations with which we interact and even each other. "



Case: Facebook



Facebook is facing a multi-billion-dollar fine due to privacy violations associated with Cambridge Analytica

THE NUMBERS



Facebook has 1.28 billion active daily users.



2 Twitter hosts over 500 million tweets per day.



3 YouTube's popular T-Series channel, featuring Indian music, has more subscribers than the entire population of Germany.



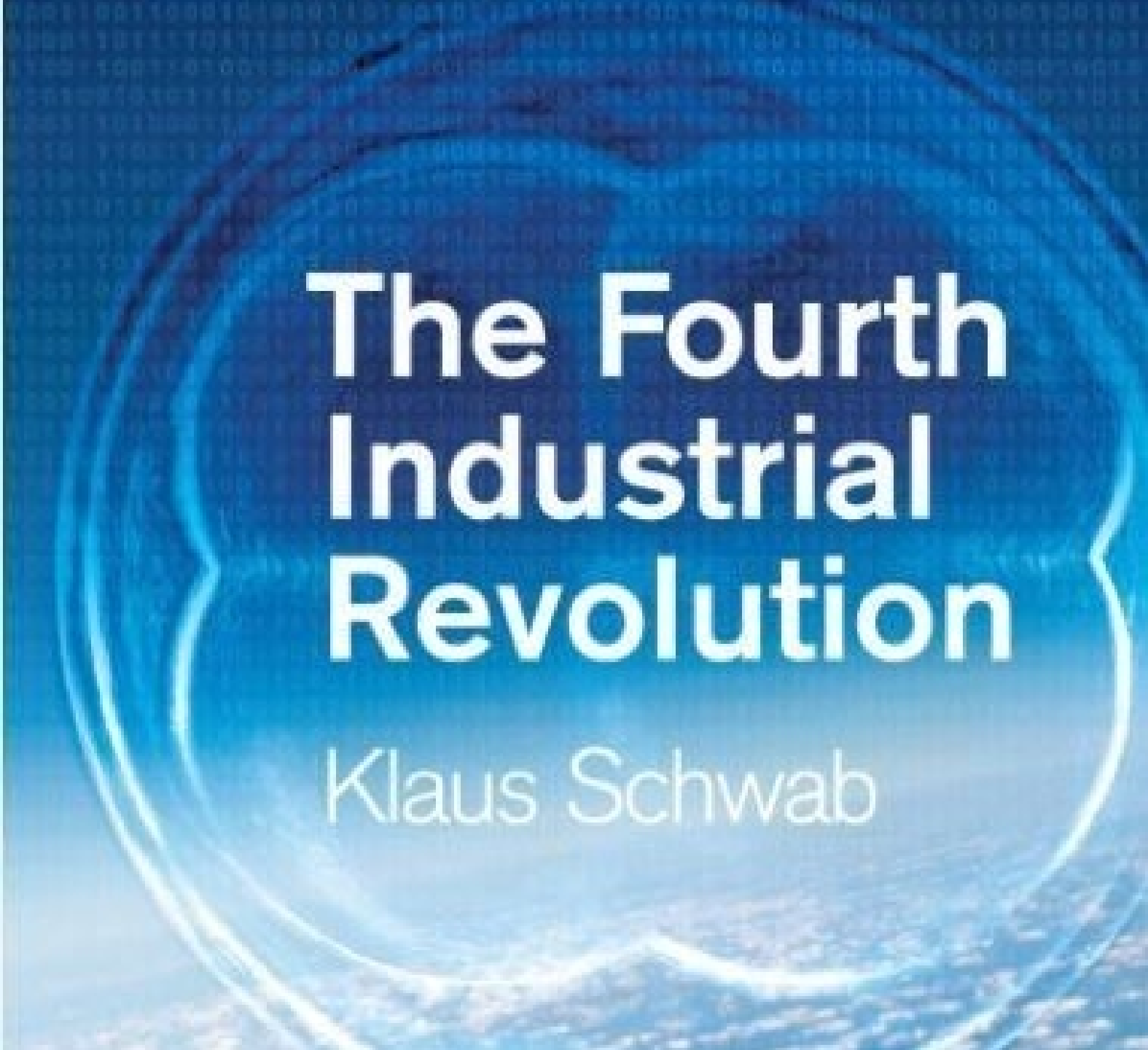
4 All that money and information in transit makes attacking privacy and trust a profitable business

TYPES OF DATA

1. third party/financial: data relating to friends and other contacts such as their preferences or email addresses, or to private information (such as their own personal income);

2. behavioral: the second refers to behavioural data, including information such as location or purchase history;

3. demographic: finally, basic demographic data, such as name, date of birth, mobile number or marital status.



The Fourth Industrial Revolution

Klaus Schwab

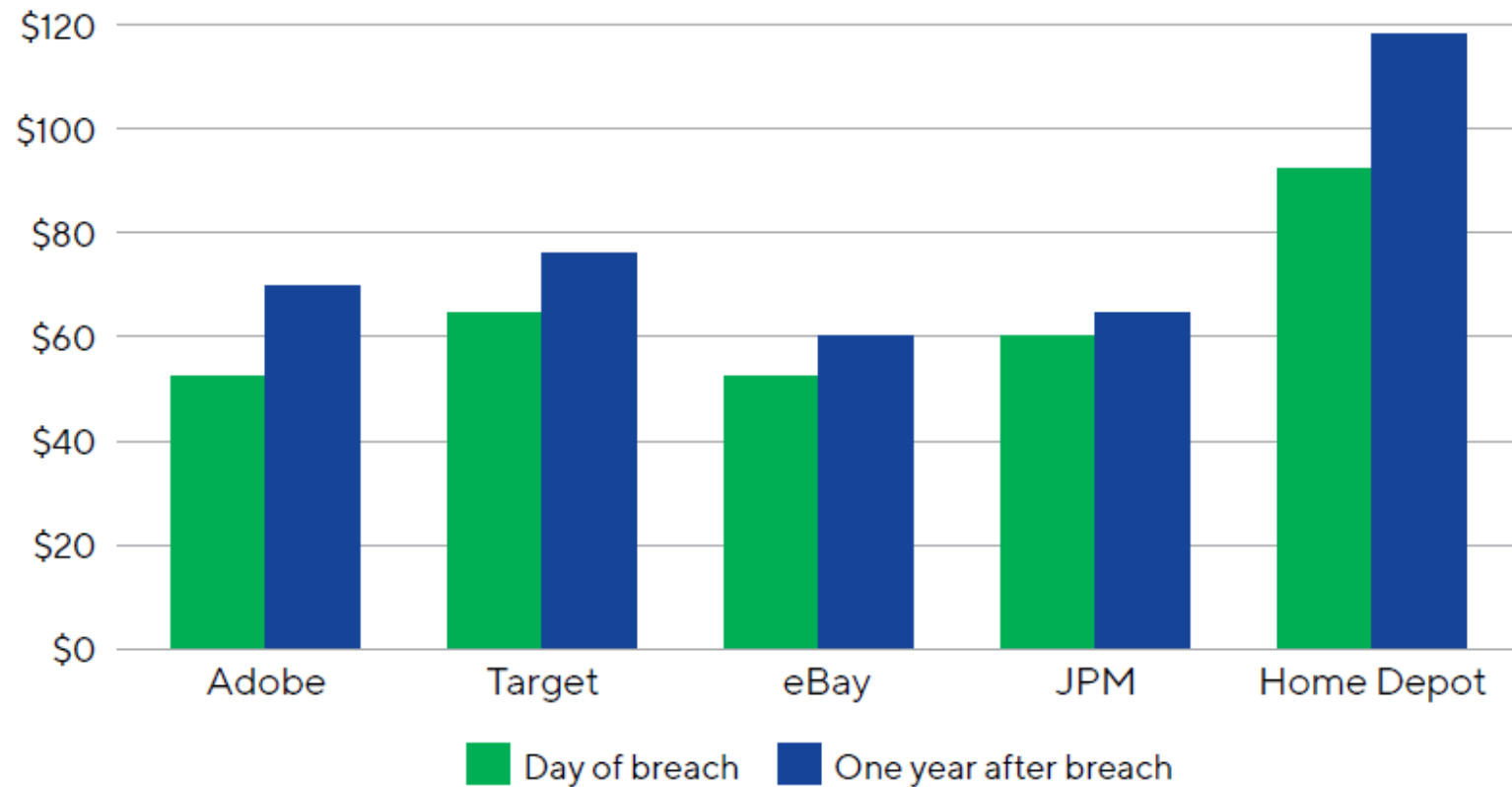
TRUST & PRIVACY – THE 4TH INDUSTRIAL REVOLUTION

The best way to manage trust and privacy has been termed by World Economic Forum as the Fourth Industrial Revolution.

A LACK OF CONFIDENCE IN TECHNOLOGY

- **The real downstream impact of a lack of confidence in technology is that we're now facing a period of reckoning where..**
 - **We must wrestle with these fundamental questions:**
 - **What is true?**
 - **Who can we trust?**
 - **Who owns the digital me?**
 - **Is privacy a right or a commodity?**

Per share price after data breaches



Source: CSO magazine
Figure 1



“Digital trust as the confidence placed in an organization to collect, store, and use the digital information of others in a manner that benefits and protects those to whom the information pertains”.



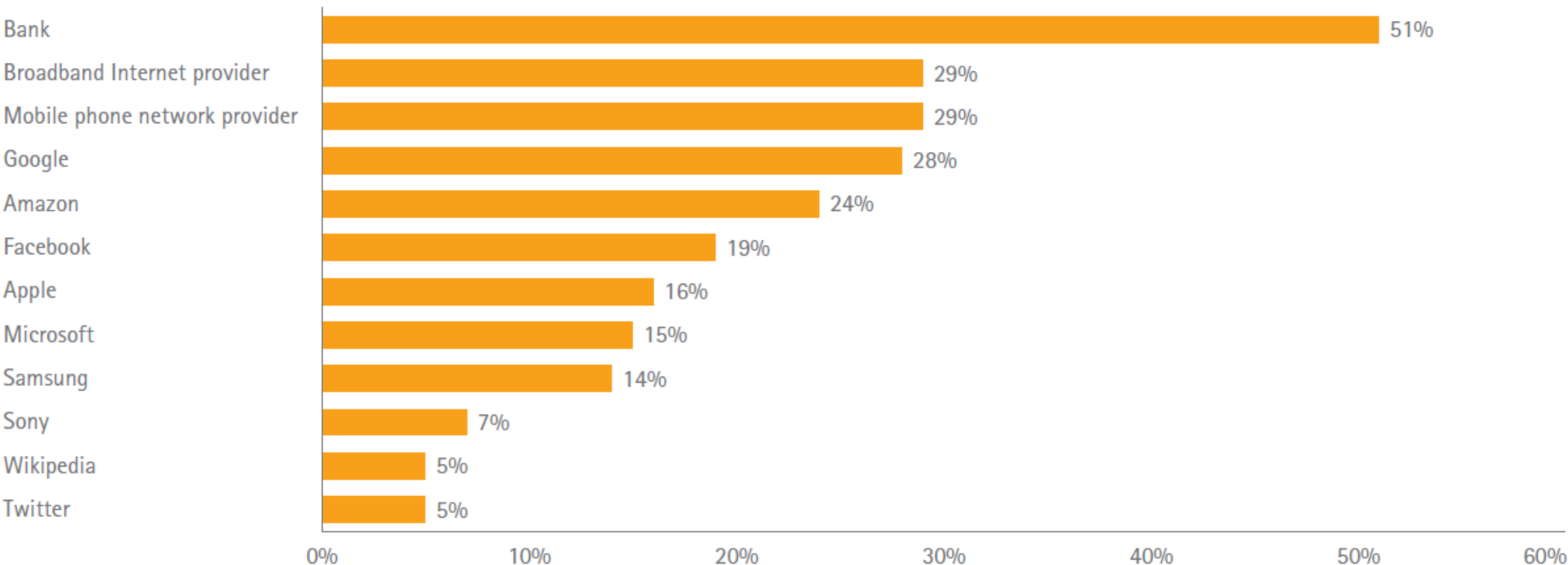
DIGITAL TRUST

"Fundamental to building digital trust is gaining clarity of its discrete components.

In the context of information technology and the business use of consumer data"

Figure 4: Digital Trust: Brands Trusted with Personal Data

Percentage of Respondents in India, U.K. and U.S. Identifying Each Brand (Up to 3 Brands Allowed)



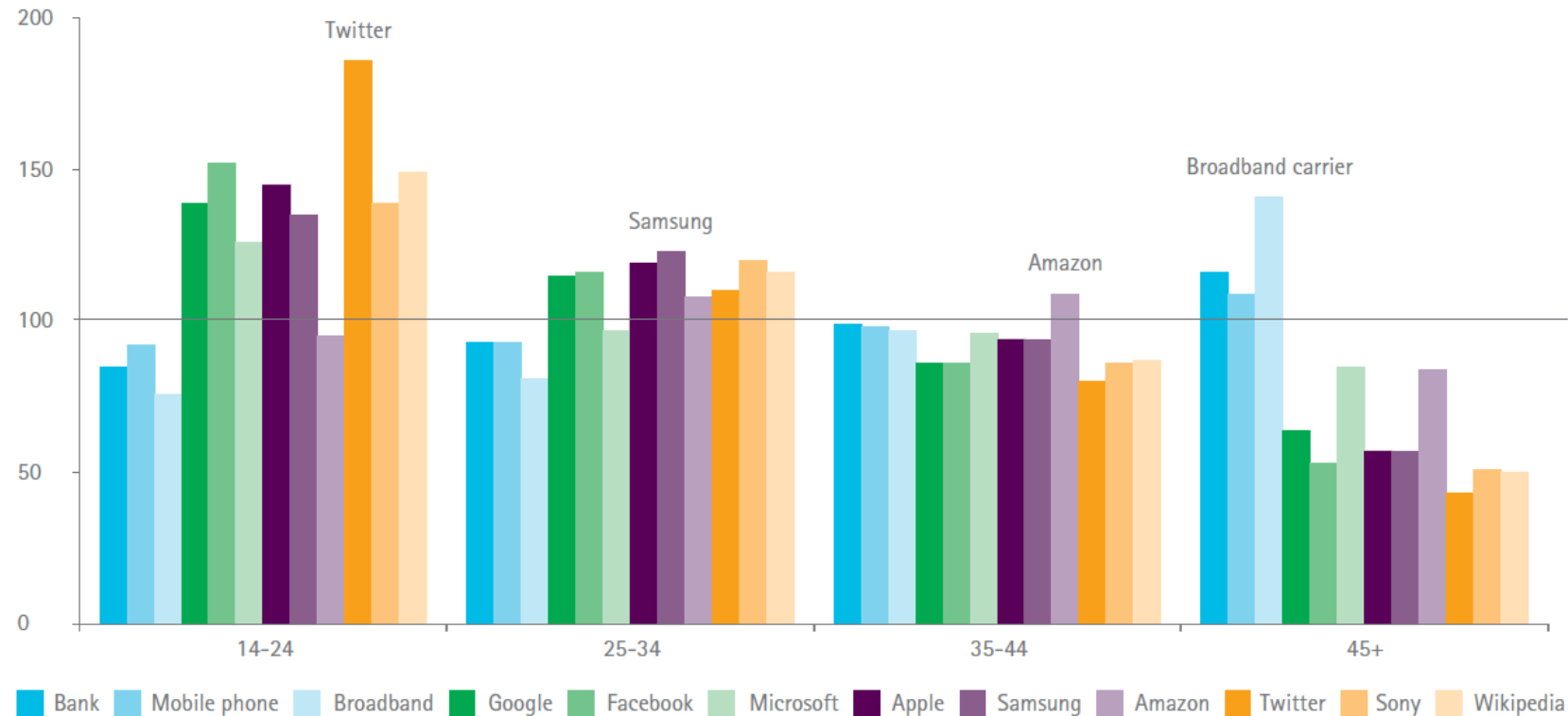
Sample base: N=3,000 "Don't know" and "None of these" not shown

Source: 2014 CMT Digital Consumer Survey

Digital trust also varies by age and gender.

Figure 6: Digital Trust by Age

Brands Trusted with Personal Data – Indexed by Age

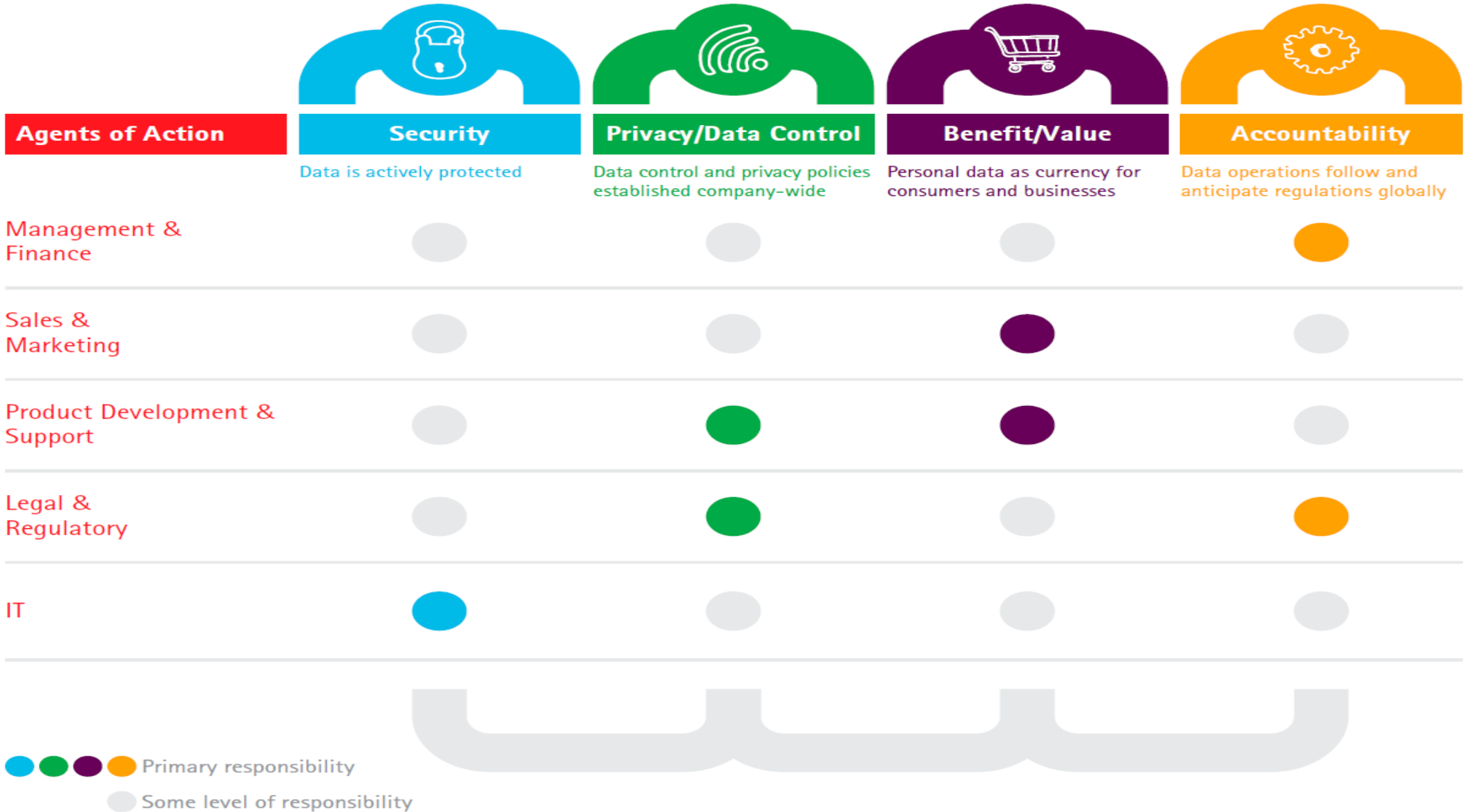


Sample base: N=3,000 "Don't know" and "None of these" not shown

Data for each brand is indexed against that brand's overall trust in Figure 4. For example, among consumers who trust Twitter, there is a far greater likelihood that those consumers are 14-24 compared to the overall sample.

Source: 2014 CMT Digital Consumer Survey

Figure 7: Digital Trust Impacts the Entire Business



Source: Accenture analysis

Security

- Malware/Virus protection
- Proactive data integrity/
Hacking prevention
- Data permissions & User identity
- Data encryption standards
- Data access logs &
Key storage standards
- Data connections (VPN, SSL, etc.)
- Architecting resiliency

Self-governance

- Reactive data integrity/
Legal resource
- Global & regional
data standards
- Government requisition

Accountability

Source: Accenture analysis

Privacy/Data Control

- Company data policies
- Third-party data sharing
- M2M data sharing
- Regional cultural expectations
- Government access
(e.g. NSA Prism)

- Customer value
- Services in-kind
- Revenue
- Brand value/Loyalty
- Customer service

Benefit/Value



SECURITY



Information about me is being protected against theft or unauthorized use.
Security must go beyond a password that is both a burden and often falls short of providing sufficient protection.



Security Information about me is being protected against theft or unauthorized use. Security must go beyond a password that is both a burden and often falls short of providing sufficient protection.

PRIVACY/DATA CONTROL



I have control over who gains legal access to my personal information, when they get access, and what they can do with it.



This not only includes online behavior, but also extends to privacy and control over personal and household data collected and shared by various devices via the Internet of Things.

BENEFIT/VALUE



My data is not being used for the exclusive benefit of the business holding the data.



The business is offering me reciprocal benefits that are directly relevant to the data the business is collecting and storing, which means the information is clearly necessary to the service being provided.

ACCOUNTABILITY

When I grant access to my information, I know that this access will be used responsibly and in my best interests. If it is not, someone will take the responsibility for the misuse or for the presence of incorrect information about me and promptly take corrective action.

CONSUMERS

Consumers must continuously make a series of context-dependent decisions about how and where they share personal data in order to fully protect themselves.



This goes beyond basic anti-virus measures and spam filters.

It now includes concerns around social networking identity theft, location tracking, mobile commerce, and personal and behavioral data tracking.

BUSINESSES



Businesses must build and maintain trust in order to position themselves to offer and deliver new products and services.



Data is at the core of what many communications, media and technology companies provide to the market, and thus they are at the forefront on the issues of ensuring digital trust through security, privacy, value, and accountability .

GOVERNMENT



Government must strive to stimulate innovation and economic growth while simultaneously protecting individuals from harmful uses of personal data.



Meanwhile, governments are also in the precarious position to reserve the right to access the data for their own benefits, while continuing to respect the privacy of individuals.



However, this is and has remained a paradox.

INTERNET OF THINGS AND DIGITAL TRUST



Surge of big data and the Internet of Things, security and privacy risks will increase substantially



Installed base of Internet of Things units to grow from 9.1 billion in 2013 to more than 28 billion in 2020 at 17.5 percent annually.



With the rise of the Internet of Things, digital businesses are increasingly positioning themselves to leverage the data these devices produce to offer a wide range of new services for their customers.



Vast amounts of data about consumers will be collected, stored, monitored, analyzed and, if possible, monetized. Everything from connected cars that track how fast consumers drive, where they drive, and when they drive, to connected TVs tracking what consumers watch, record, and skip, means that data will generate exponentially.

INTERNET OF THINGS AND DIGITAL TRUST

- **Data, comes great responsibility.**
- **With increasing volumes of personal data being transported across the Internet and between devices, trust is a greater cause for concern. Aside from issues of data ownership and transport, there are challenges defining who is responsible for ensuring that data is accessed, delivered and stored securely.**

GOOGLE'S QUANTUM COMPUTER.

- The company said in a paper published on Wednesday that the machine needed only a few minutes to perform a task that would take a supercomputer at least 10,000 years!



Personal data canvas		Name		Date
Identity data Demographic (sex,age,address, profession) Identifiers (user name, email,phone number, nick names) Device ID (bluetooth Id, IMEI,SIM) Interest (declared, likes, favorites, preferences)	Communications Social Media (photos, podcast videos, likes, links,bookmarks) , Speech (voice call,voice email), Text (email, body, attachments statusupdates)	Context People (copresent in digital world, interact with), Location (past,planed future, current), Events calendar data,event calendar web service)	Health data Personal (tracking, devices, acitivity records, genetic code) , Patient prescription, diagnosis	Relationships Contacts (adress books, call logs messaging logs) Social networks
		 Content Private documents (Word, spreadsheets,projects, presentations) Consumed media (books, photos, videos, podcast,music, audio books, games , software apps)		
Asset data Finantial data (Income, expenses, transactions, accounts,insureance, credir rate) , Identifiers (Domain names, handlers twitter etc) Academic (Exams,degrees,badges)		Activity Browser (Clicks, sites visited,Queties,Bookmarks) Client Apps		
				

DIFFERENT SECURITY CONTEXTS



ComputerHope.com



COULD THERE BE A TECHNOLOGY MOTIVATED FAIR USES OF DATA?

(SOURCE:ANTHONY OKUOGUME . TECHNOLOGY MOTIVATED FAIR USES OF DATA A PROPOSAL MADE TO MYDATA.ORG, 2020)

- The above question touches on an important discussion on the data of Web of things (WoT) and its implications on
 - data privacy and in building a fairer data economy and allied with the larger narratives promoted by public bodies.
 - So far, the concerns of data privacy has been addressed both at the ethical and legislative levels with promising successes.
 - However, these discussions have centered around the threat of technology and the power it bestows on digital platforms, digital service providers and organizations for whom data has become an economic resource for creating and capturing value through the transformation of data into digital intelligence.
 - With these, digital platforms' ability to extract, control, analyze and monetize data is relatively unlimited and the emergent fears that value realized through the conversion of data into monetary value is not equitably distributed. This is true and argument has a strong point.

COULD THERE BE A TECHNOLOGY MOTIVATED FAIR USES OF DATA?

- However, there is still more to be done to improve data privacy and a fairer data economy.
- There is still a lot to be learnt especially when we shift our focus down on VVoT and Artificial Intelligence and blockchain technology.
- WoT and smart devices generates huge data and which is set to increase in the future to an unprecedented level with the advancement of 5G technology. Smart devices will interact with each other's over IOT and execute transaction decisions automatically on behalf of the service providers and users.

COULD THERE BE A TECHNOLOGY MOTIVATED FAIR USES OF DATA?

- Data and metadata captured WoT and Artificial Intelligence is a game changer because it tremendously influences the scale and scope of data generation and the intelligence that can be exploited from those data.
- In addition, IoT transactions autonomously performed by smart devices with blockchain technology will instigate data tracking and usage and will give users an empowering insight to how their data are being used and a better estimation of the value of their personal data.
- This will empower users control over the use of their personal data and increases their bargaining power to negotiate compensations for the use of their personal data.
- It is believed that this will redefine trust, transparency, privacy and data ownership and monetization and lays the ground for the core argument of a technology motivated fair uses of data in the data economy.

The new trust dynamic: Opportunity + Trust = Growth

By building trust you will be able to maximise your growth potential and manage the risks in the opportunities available in the digital age.



*Thank
you!*



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