ITU Regional Workshop on ICT Statistics for Africa

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The ICT Development Index (IDI)

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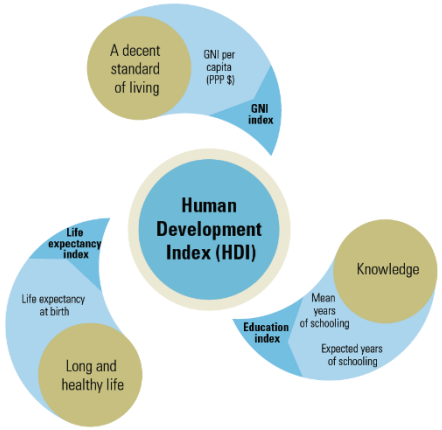
What is a composite index?

- Multiple indicators combined into single index
- Measures multi-dimensional concept which cannot be capture by a single indicator
- Growing number of composite indices being published worldwide.

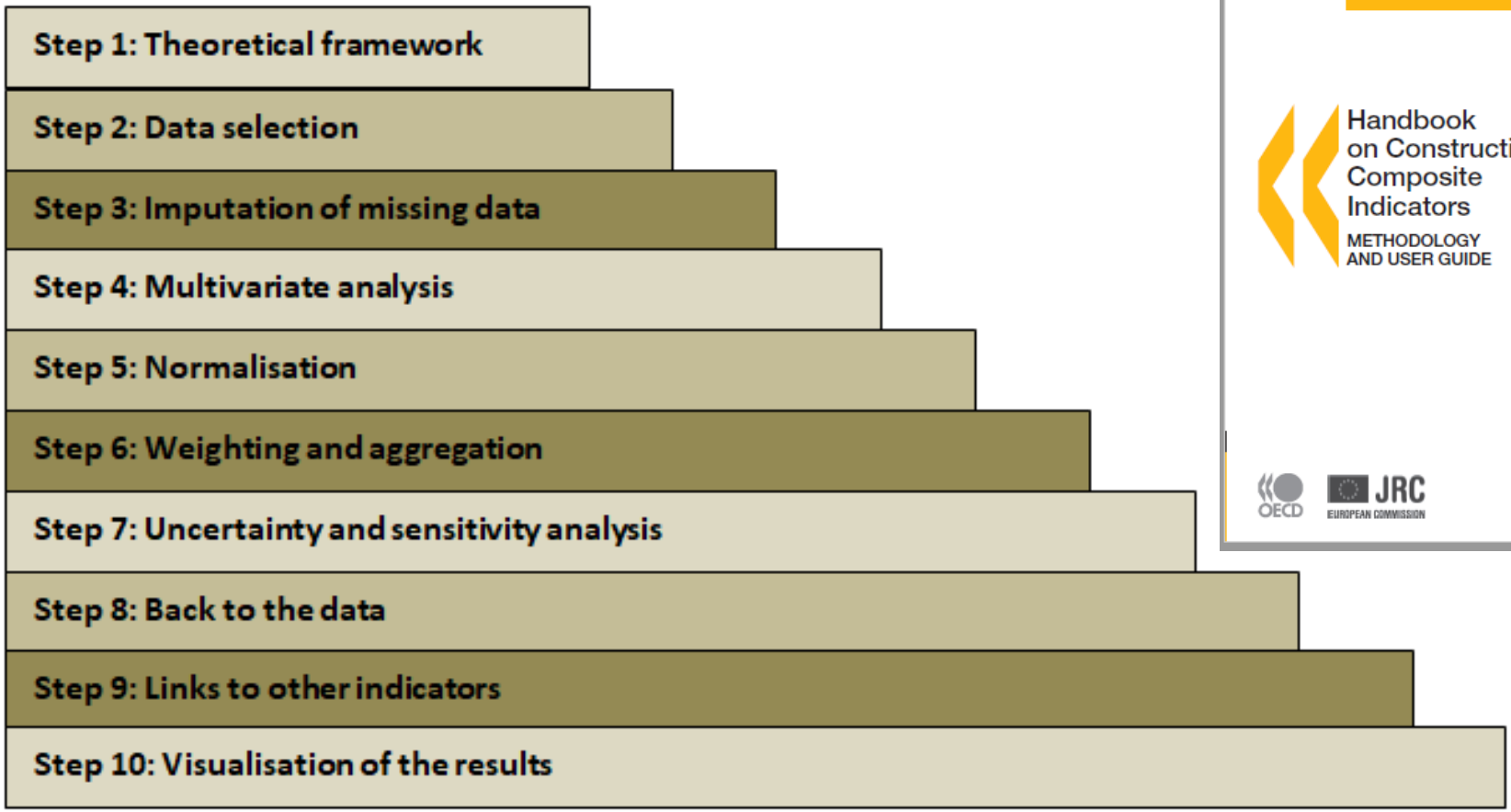


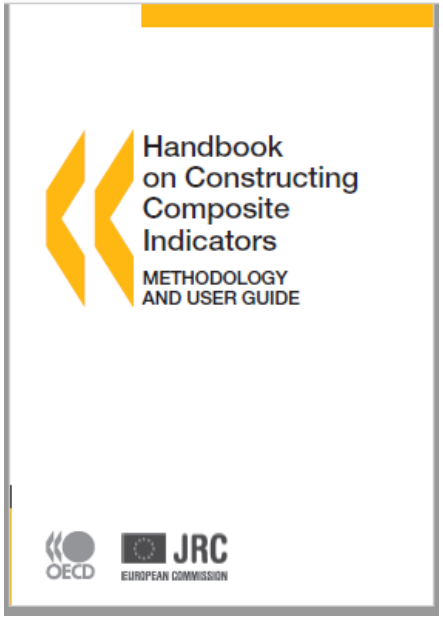
Pros and Cons

Pros	Cons
Summarize complex, multi-dimension realities into single value	Can be potentially misinterpreted and misused
Potentially easier to interpret and communicate to general public	May disguise serious failings in some dimensions
Spotlights country performance and progress for purposes of setting policy	Selection of indicators etc. may be subject to political dispute

Adapted from: Saisana and Tarantola, 2012

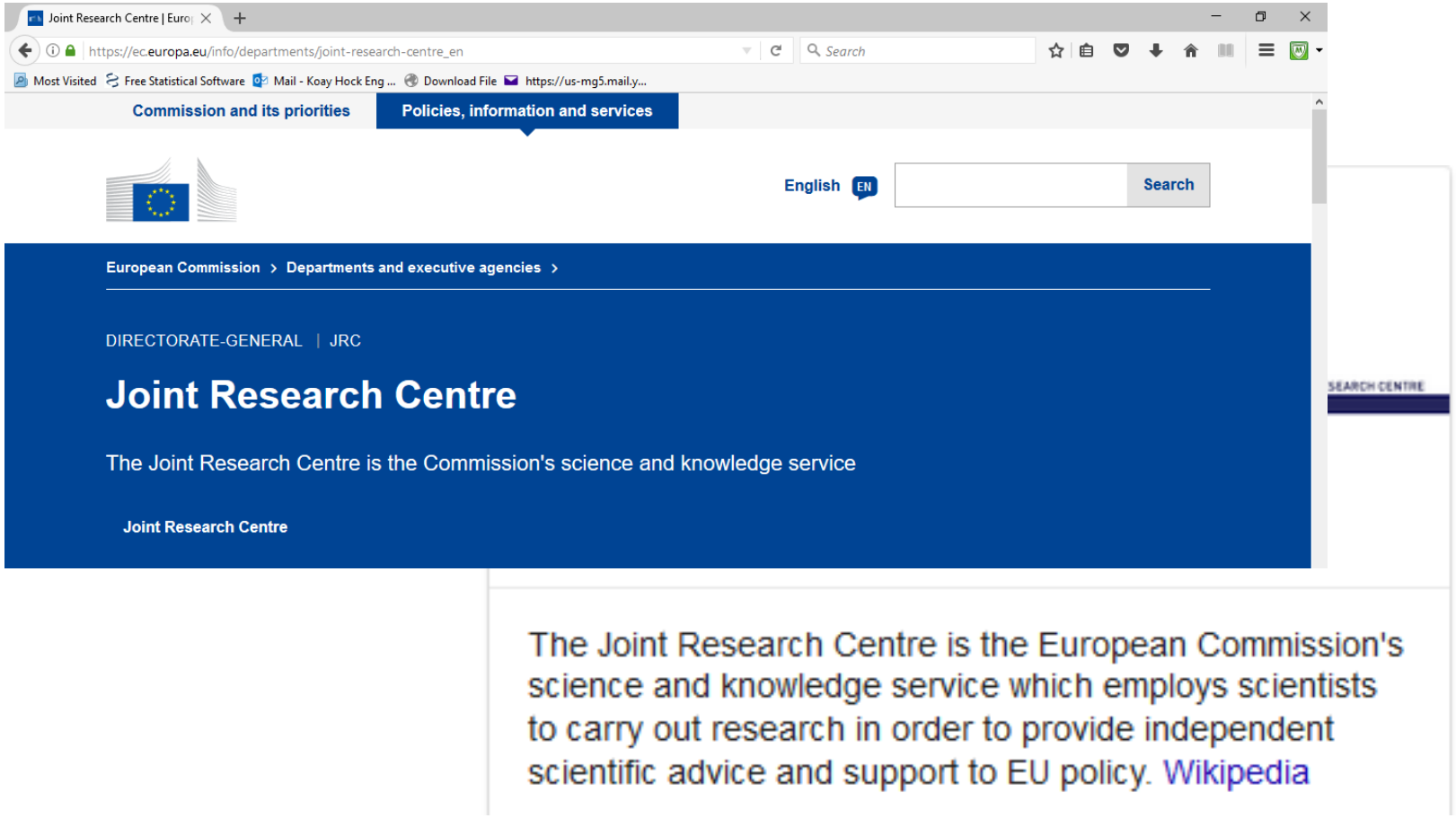
10 steps





https://composite-indicators.jrc.ec.europa.eu/?q=10-step-guide and realigned to Handbook on Constructing Composite Indicators, Methodology and User Guide , OECD 2008

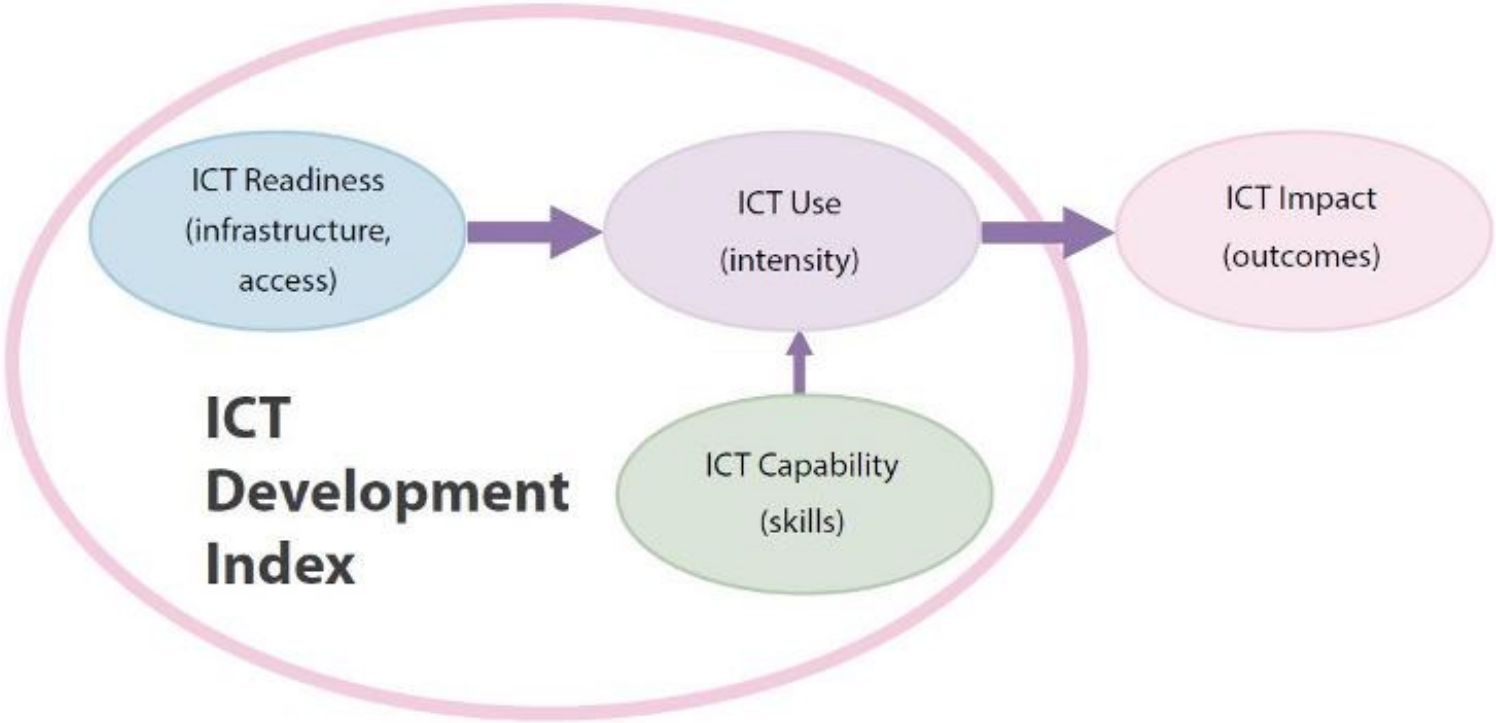
The Joint Research Centre



https://composite-indicators.jrc.ec.europa.eu/
https://ec.europa.eu/jrc/en/coin

IDI METHODOLOGY

Three stages in the evolution towards an information society



The ICT Development Index (IDI)

- The IDI is a composite index that combines 14 indicators
- Designed to be global and reflect changes taking in place in countries of different levels of development
- Was developed by ITU in 2008 in response to member states' request to establish an overall ICT index
- Results first reported in the Measuring the Information Society Report (MISR) 2009

Objectives of the IDI

To measure:

- the *level and evolution over time* of ICT developments in countries and the experience of those countries relative to other countries;
- progress in ICT development in *both developed and developing countries*;
- the *digital divide*, i.e. differences between countries in terms of their levels of ICT development; and
- the *development potential* of ICTs and the extent to which countries can make use of them to enhance growth and development.

Extraordinary meeting of EGTI/EGH

- Held in Geneva, Switzerland, on 1-3 March 2017
- Meeting was open to all ITU members and experts in the field of ICT statistics and data collection
- Objective - to discuss, debate and agree on a revised set of indicators to be included in the IDI
- Two input documents prepared by the sub-group and the independent group of experts
- Adopted a total of 14 indicators to be included in the IDI compared to the previous list of 11
- http://www.itu.int/en/ITU-D/Statistics/Pages/events/eghegti2017/default.aspx

Previous IDI: **Indicators dropped** in 2018

Access sub-index	Use sub-index	Skills sub-index
Fixed-telephone subscriptions (/100 inhabitants)	Individuals using the internet (%)	Mean years of schooling (years)
Mobile-cellular telephone subscriptions (/100 inhabitants)	**Fixed-broadband subscriptions (/100 inhabitants)**	Secondary gross enrollment ratio (%)
International Internet bandwidth (bit/s/Internet user)		Tertiary gross enrollment ratio (%)
Households with a computer (%)	Active mobile-broadband subscriptions (/100 inhabitants)	
Households with Internet access (%)		

Revised IDI: Indicators added in 2018

Access sub-index	Use sub-index	Skills sub-index
Households with a computer (%)	Individuals using the Internet (%)	Mean years of schooling
Households with Internet access (%)	Active mobile-broadband subscriptions (per 100 inhabitants)	Secondary gross enrollment ratio (%)
International Internet bandwidth (bit/s) per Internet user	**Mobile-broadband Internet traffic (per mobile-broadband subscription)**	Tertiary gross enrollment ratio (%)
Population covered by 3G mobile networks - At least 3G (%) - At least LTE/WiMAX (%)	**Fixed-broadband Internet traffic (per fixed-broadband subscription)**	**Individuals with ICT skills (%)** 1. Copying or moving a file or folder 2. Using copy and paste tools to duplicate or move information within a document 3. Sending e-mails with attached files 4. Using basic arithmetic formula in a spreadsheet 5. connecting and installing new devices 6. Creating electronic presentations with presentation software 7. Finding, downloading, installing and configuring software 8. Transferring files between a computer and other devices 9. Writing a computer program using a specialized programming language
Fixed-broadband subscriptions by speed tiers - 256 kbit/s to 2 Mbit/s (% of total) - 2 to 10 Mbit/s (% of total) - Equal to or above 10 Mbit/s (% of total)	**Mobile phone ownership (%)**	

Three data sources

- Telecommunication data
  - Usually collected by the regulator from operators
  - International data collection through the ITU WTI questionnaire
- Household/individual ICT data
  - Usually collected by the NSO through a household survey
  - International data collection through the ITU household questionnaire
- Education data
  - Usually collected by the education ministry
  - International data collection by the UNESCO Institute for Statistics (UIS)
  - ITU doesn’t collect data from countries, but uses data from UIS

The ICT Development Index
Sources

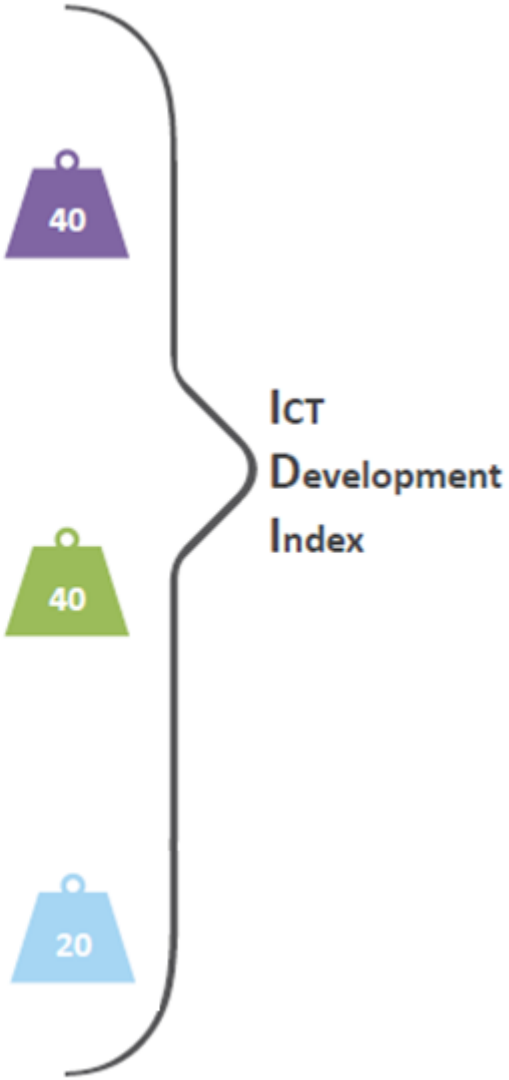
Access	Source	Use	Source	Skills	Source
1.1. Households with a computer (%)	HH	2.1 Individuals using the Internet (%)	HH	3.1 Mean years of schooling (years)	UIS
1.2 Households with Internet access (%)	HH	2.2 Active mobile-broadband subscriptions (/100 inhabitants)	WTI	3.2 Secondary gross enrollment ratio (%)	UIS
1.3 International Internet bandwidth (bit/s/Internet user)	WTI	2.3 Mobile-broadband Internet traffic (/subscription)	WTI	3.3 Tertiary gross enrollment ratio (%)	UIS
1.4 Population covered by mobile networks (%)	WTI	2.4 Fixed-broadband Internet traffic (/subscription)	WTI	3.4 Individuals with ICT skills (%)	HH
1.5 Fixed-broadband subscriptions by speed tiers (% of total)	WTI	2.5 Individuals who own a mobile phone (%)	HH		

IDI aggregation methodology

ICT access	Reference value	(%)
1. % households with a computer		20
2. % households with Internet		20
3. International Internet bandwidth per Internet user		20
4. % population covered by 3G / LTE mobile network [1,2,3]		20
5. Fixed-broadband subscriptions by speed [1,2,3] as a % total fbb		20

ICT use	Reference value	(%)
1. % individuals using the Internet		20
2. Active mobile-broadband subscriptions per 100 inhab		20
3. Mobile bbroadband Internet traffic per mobile-bb subs		20
4. Fixed-broadband Internet traffic per fixed-bb subs		20
5. % individuals who own a mobile phone		20

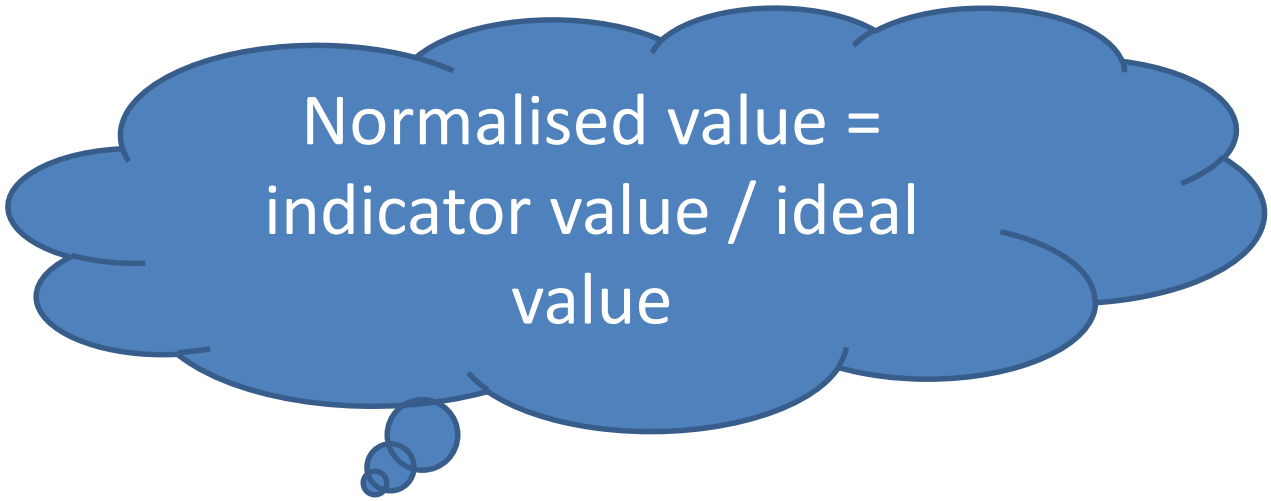
ICT skills	Reference value	(%)
1. Mean years of schooling		25
2. Gross enrollment ratio (secondary level)		25
3. Gross enrollment ratio (tertiary level)		25
4. Proportion of individuals with ICT skills [1,2,3]		25



1, 2, 3 : indicator composed of sub-indicators

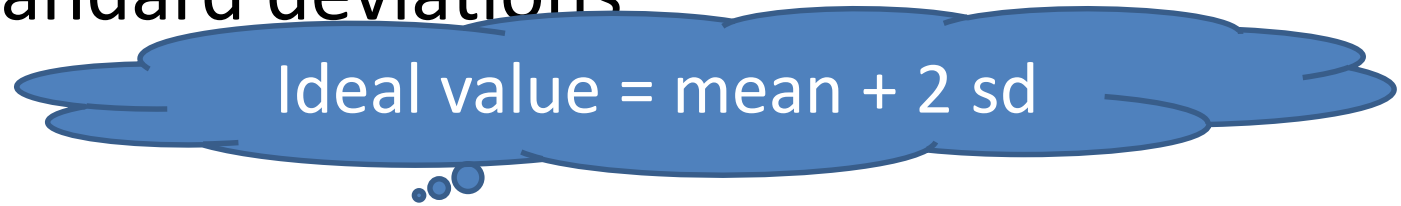
Normalised value

- Normalised value for an indicator= Value of that indicator / Ideal value for that indicator
- Normalised values have no units



Ideal value of an indicator

- Highest achievable value (i.e. 100 for use indicators)
- Ideal value of an indicator = mean value of that indicator across all economies + 2 standard deviations



- Ideal value may OR may not change every year

Normalising International Internet bandwidth (IIB)

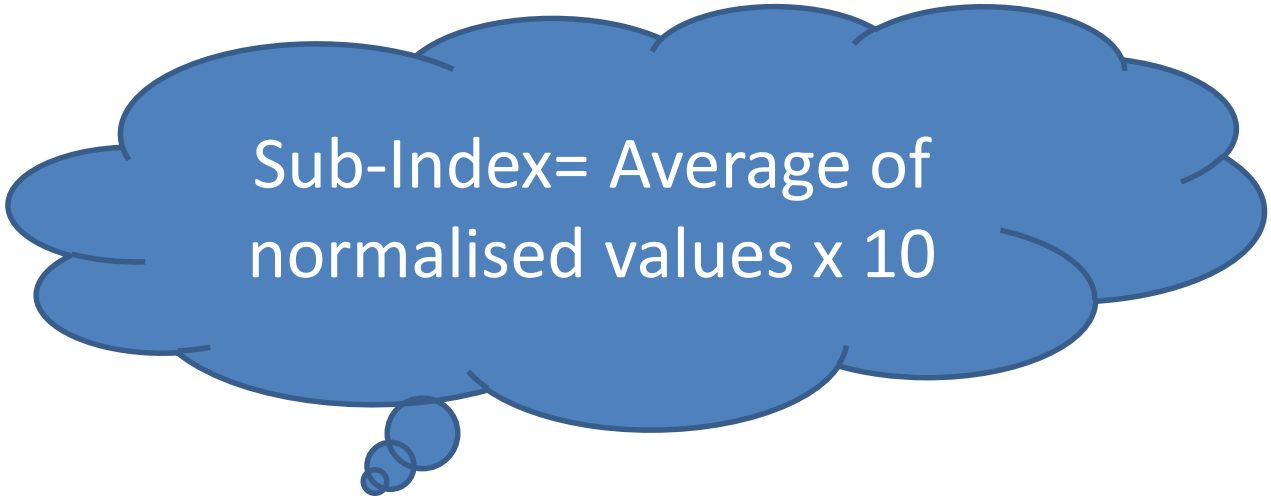
- Normalised value = log (IIB for economy) /log (ideal value for IIB)
- Log or Ln can be used. Same results.
- But not a mixture of Log and Ln

Example (2017):

- IIB Iceland = 997’830, ideal value = 2’158’212
- Normalised value = log 997’830 / log 2’158’212 = 0.95
- Or ln 997’830/ln 2’158’212 also = 0.95

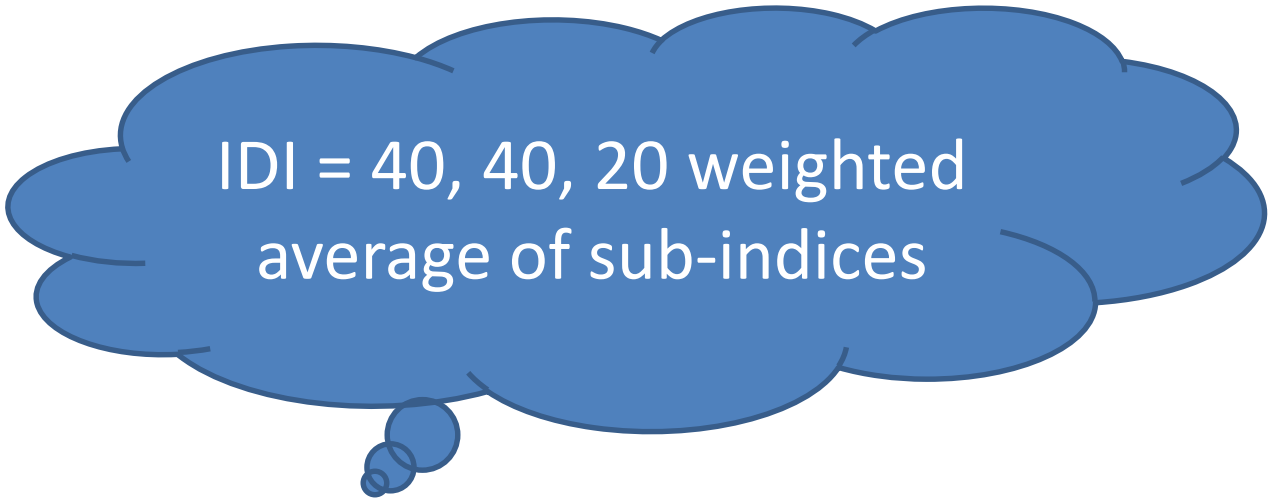
Sub-index

- Sub-index = simple average of normalised values of indicators within that sub-index
- Also known as equi-weighted average of normalised values within that sub-index



ICT Development Index

- IDI = weighted average of all 3 sub-indices
- Sub-indices: Access, Use, Skills
- Weights: 40, 40, 20 in that order



Pointers

- Normalised values are between 0 and 1.
- Normalised value > 1 is set to 1
- All sub-indices are between 0 and 10
- IDI is also between 0 and 10

(Non-)availability IDI supply side data, 2017 (2018) (1)

	Bandwidth	Mobile network coverage		Fixed bb subscr.			Active mobile bb subscr.	Fixed bb traffic	Mobile bb traffic
		- at least 3G	- at least LTE/WiMAX	256 kbit/s to 2Mbit/s	2-10 Mbit/s	>=10Mbit/s			
Angola									
Benin								n.a.	
Botswana									
Burkina Faso									
Burundi									
Cabo Verde			n.a.	n.a.	n.a.				
Cameroon					n.a.	n.a.		n.a.	
Central African Rep.	n.a.	n.a.	n.a.				n.a.	n.a.	
Chad					n.a.	n.a.		n.a.	
Congo (Rep. of the)			n.a.	n.a.	n.a.	n.a.		n.a.	
Côte d'Ivoire									
Dem. Rep. of the Congo				n.a.	n.a.	n.a.		n.a.	
Equatorial Guinea			n.a.			n.a.		n.a.	n.a.
Eritrea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eswatini	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(Non-)availability IDI supply side data, 2017 (2018) (2)

	Bandwidth	Mobile network coverage		Fixed bb subscr.			Active mobile bb subscr.	Fixed bb traffic	Mobile bb traffic
		- at least 3G	- at least LTE/WiMAX	256 kbit/s to 2Mbit/s	2-10 Mbit/s	>=10Mbit/s			
Ethiopia								n.a.	n.a.
Gabon	n.a.			n.a.	n.a.			n.a.	n.a.
Gambia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ghana				n.a.	n.a.	n.a.		n.a.	
Guinea		n.a.		n.a.	n.a.	n.a.		n.a.	n.a.
Guinea-Bissau					n.a.	n.a.		n.a.	n.a.
Kenya						n.a.		n.a.	
Lesotho				n.a.	n.a.	n.a.			
Liberia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Madagascar									
Malawi									
Mali	n.a.		n.a.						
Mauritius									
Mozambique									
Namibia								n.a.	n.a.

(Non-)availability IDI supply side data, 2017 (2018) (3)

	Bandwidth	Mobile network coverage		Fixed bb subscr.			Active mobile bb subscr.	Fixed bb traffic	Mobile bb traffic
		- at least 3G	- at least LTE/WiMAX	256 kbit/s to 2Mbit/s	2-10 Mbit/s	>=10Mbit/s			
Niger									
Nigeria									
Rwanda									
Sao Tome and Principe								n.a.	n.a.
Senegal	n.a.							n.a.	n.a.
Seychelles				n.a.	n.a.	n.a.		n.a.	n.a.
Sierra Leone	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
South Africa									
South Sudan									n.a.
Tanzania	n.a.			n.a.	n.a.	n.a.		n.a.	n.a.
Togo			n.a.						
Uganda								n.a.	n.a.
Zambia									n.a.
Zimbabwe									

(Non)-availability IDI household data, 2016 or 2017 (1)

	% of hh with computer		% of hh with Internet		% of Internet users		% individuals with mobile phone		ICT skills	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Angola	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Benin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Botswana	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Burkina Faso	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.			n.a.	n.a.
Burundi	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cabo Verde									n.a.	n.a.
Cameroon	n.a.		n.a.		n.a.		n.a.	n.a.	n.a.	n.a.
Central African Rep.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Chad	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Congo (Rep. of the)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Côte d'Ivoire										
Dem. Rep. of the Congo	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Equatorial Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eritrea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Eswatini	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: not taking into account household short questionnaire 2019 submissions

(Non)-availability IDI household data, 2016 or 2017 (2)

	% of hh with computer		% of hh with Internet		% of Internet users		% individuals with mobile phone		ICT skills	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Ethiopia		n.a.		n.a.		n.a.		n.a.	n.a.	n.a.
Gabon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gambia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ghana	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guinea	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guinea-Bissau	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kenya		n.a.		n.a.		n.a.		n.a.	n.a.	n.a.
Lesotho	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.
Liberia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Madagascar	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.
Malawi		n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.
Mali					n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mauritius		n.a.		n.a.		n.a.		n.a.	n.a.	n.a.
Mozambique	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Namibia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: not taking into account household short questionnaire 2019 submissions

(Non)-availability IDI household data, 2016 or 2017 (3)

	% of hh with computer		% of hh with Internet		% of Internet users		% individuals with mobile phone		ICT skills	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Niger	n.a.		n.a.		n.a.				n.a.	
Nigeria			n.a.		n.a.		n.a.		n.a.	n.a.
Rwanda					n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sao Tome and Principe	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Senegal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Seychelles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sierra Leone	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
South Africa					n.a.	n.a.		n.a.	n.a.	n.a.
South Sudan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tanzania		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Togo	n.a.		n.a.		n.a.		n.a.		n.a.	
Uganda	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zambia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zimbabwe	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: not taking into account household short questionnaire 2019 submissions

Summary availability

Supply-side data

	Bandwidth	Mobile network coverage		Fixed bb subscr.			Active mobile bb subscr.	Fixed bb traffic	Mobile bb traffic
		- at least 3G	- at least LTE/WiMAX	256 kbit/s to 2Mbit/s	2-10 Mbit/s	>=10Mbit/s			
Number of countries (44)	34	37	33	30	27	27	38	20	26
% of countries	77%	84%	75%	68%	61%	61%	86%	45%	59%

Household data

	% of hh with computer		% of hh with Internet		% of Internet users		% individuals with mobile phone		ICT skills	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Number of countries (44)	11	9	8	9	7	6	8	7	1	3
% of countries	25%	20%	18%	20%	16%	14%	18%	16%	2%	7%

Data gaps

- More on demand-side
- Data gaps can lead to non-official data
- Need to coordinate data production and work with governments and data users

2018 challenge: missingness

- 58% of revised IDI data are estimates (28% for 2017 IDI)
- 77% of revised IDI missing for (6) new IDI indicators (34% for (8) old indicators)
- More than 80 countries have ≥ 50% estimated data
- Minimum threshold (50%) for indicator coverage not met

Challenge: Newness

- Some data submitted not in line with ITU definitions
- Selected countries did not agree with estimates; some requested more time
- PP-18 calls for use of country data
- Concerns were confirmed by index results

New IDI: Indicators added in 2018

Access sub-index

Households with a computer (%)

Households with Internet access (%)

International Internet bandwidth (bit/s/Internet user)

Population covered by 3G mobile networks

- At least 3G (%)
- At least LTE/WiMAX (%)

Fixed-broadband subscriptions by speed tiers

- 256 kbit/s to 2Mbit/s (% of total)
- 2 to 10 Mbit/s (% of total)
- Equal to or above 10 Mbit/s (% of total)

Use sub-index

Individuals using the Internet (%)

Active mobile-broadband subscriptions (/100 inhabitants)

Mobile-broadband Internet traffic (/subscription)

Fixed-broadband Internet traffic (/subscription)

Mobile phone ownership (%)

Skills sub-index

Mean years of schooling

Secondary gross enrollment ratio (%)

Tertiary gross enrollment ratio (%)

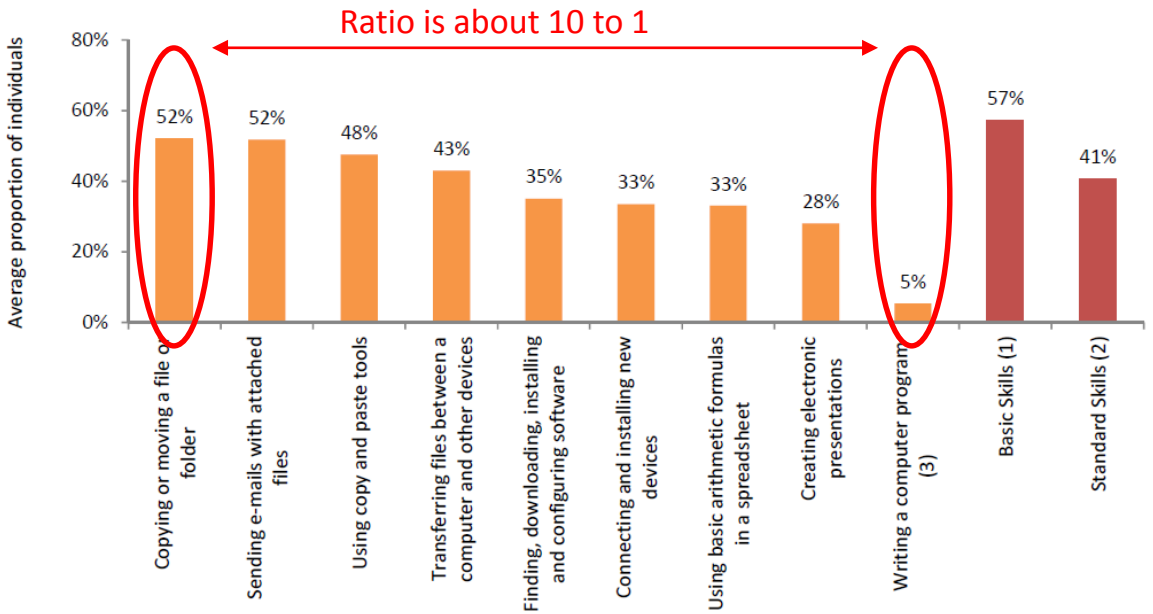
Individuals with ICT skills (%)

1. Copying or moving a file or folder
2. Using copy and paste tools to duplicate or move information within a document
3. Sending e-mails with attached files
4. Using basic arithmetic formula in a spreadsheet
5. connecting and installing new devices
6. Creating electronic presentations with presentation software
7. Finding, downloading, installing and configuring software
8. Transferring files between a computer and other devices
9. Writing a computer program using a specialized programming language

Individuals with ICT skills: data estimated for 145 countries

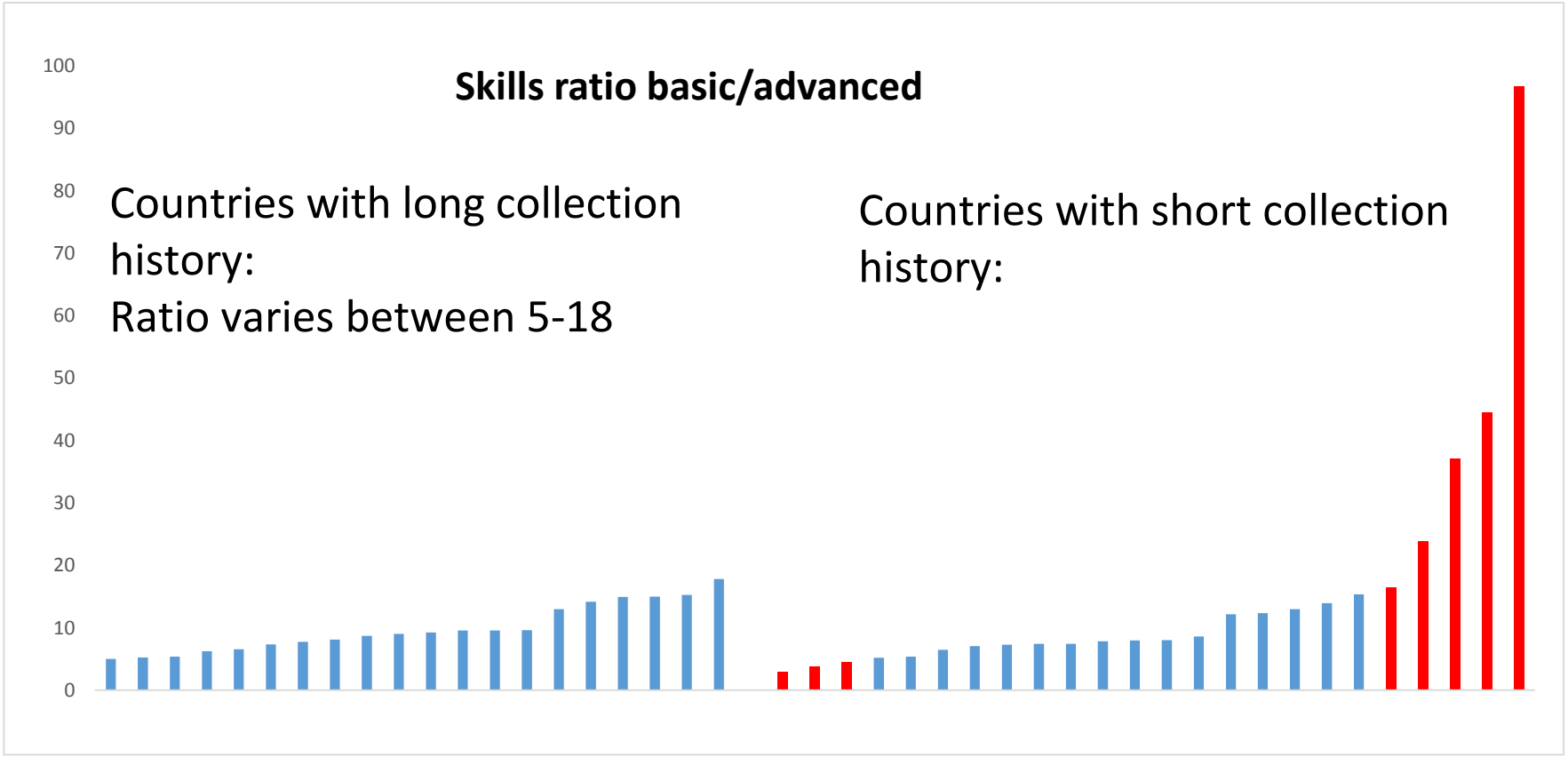
- More people can copy/paste than write a computer program:
  Ratio of 10 to 1

Chart 2.1: Distribution of specific digital skills among individuals, 2017



Source: Adapted from MISR 2018

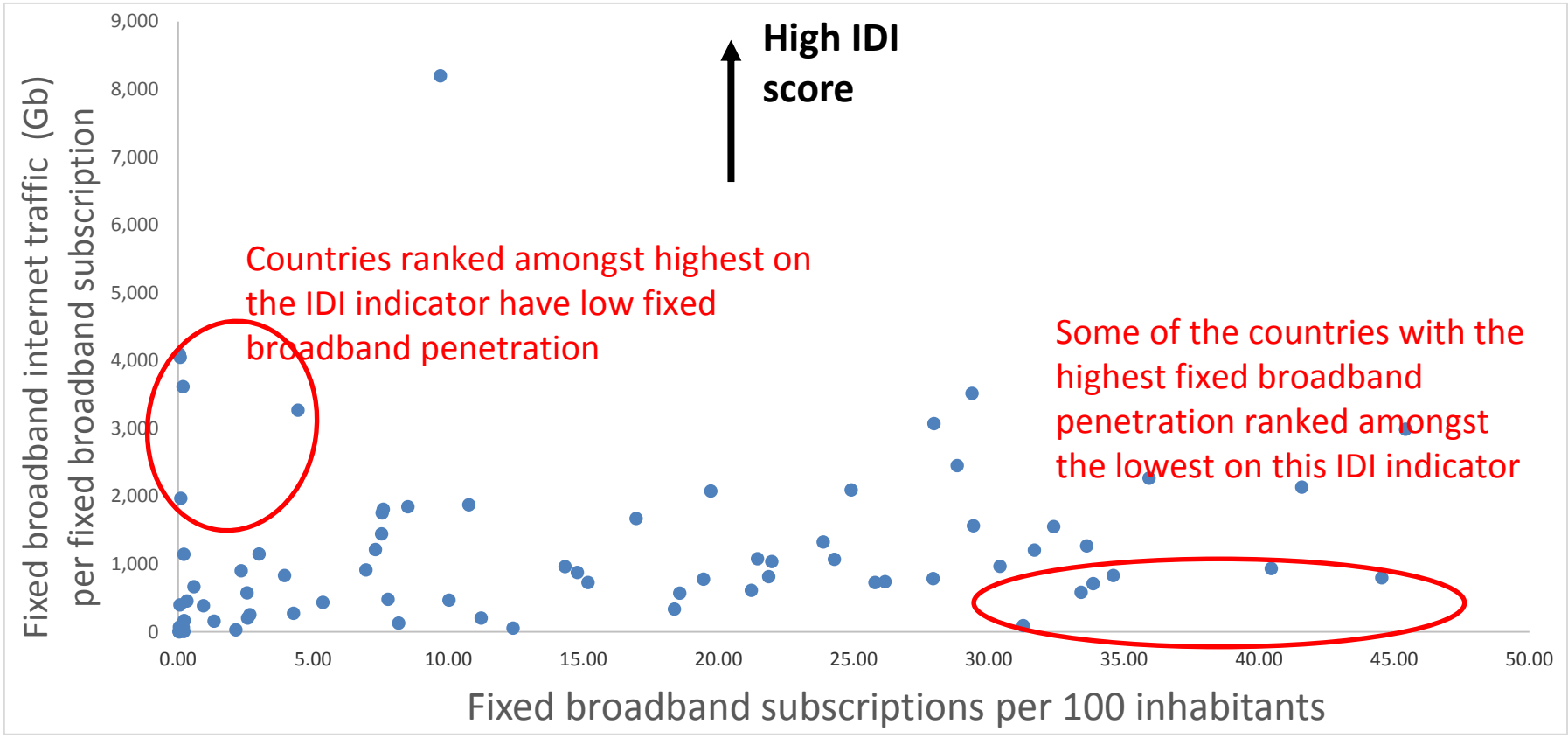
Skills ratio – concerns about data quality but also estimates



New IDI: Indicators added in 2018

Access sub-index	Use sub-index	Skills sub-index
Households with a computer (%)	Individuals using the Internet (%)	Mean years of schooling
Households with Internet access (%)	Active mobile-broadband subscriptions (/100 inhabitants)	Secondary gross enrollment ratio (%)
International Internet bandwidth (bit/s/Internet user)	**Mobile-broadband Internet traffic (/subscription)**	Tertiary gross enrollment ratio (%)
Population covered by 3G mobile networks - At least 3G (%) - At least LTE/WiMAX (%)	**Fixed-broadband Internet traffic (/subscription)**	**Individuals with ICT skills (%)** 1. Copying or moving a file or folder 2. Using copy and paste tools to duplicate or move information within a document 3. Sending e-mails with attached files 4. Using basic arithmetic formula in a spreadsheet 5. connecting and installing new devices 6. Creating electronic presentations with presentation software 7. Finding, downloading, installing and configuring software 8. Transferring files between a computer and other devices 9. Writing a computer program using a specialized programming language
Fixed-broadband subscriptions by speed tiers - 256 kbit/s to 2Mbit/s (% of total) - 2 to 10 Mbit/s (% of total) - Equal to or above 10 Mbit/s (% of total)	**Mobile phone ownership (%)**	

Fixed-broadband traffic per subscription: data estimated for 116 countries



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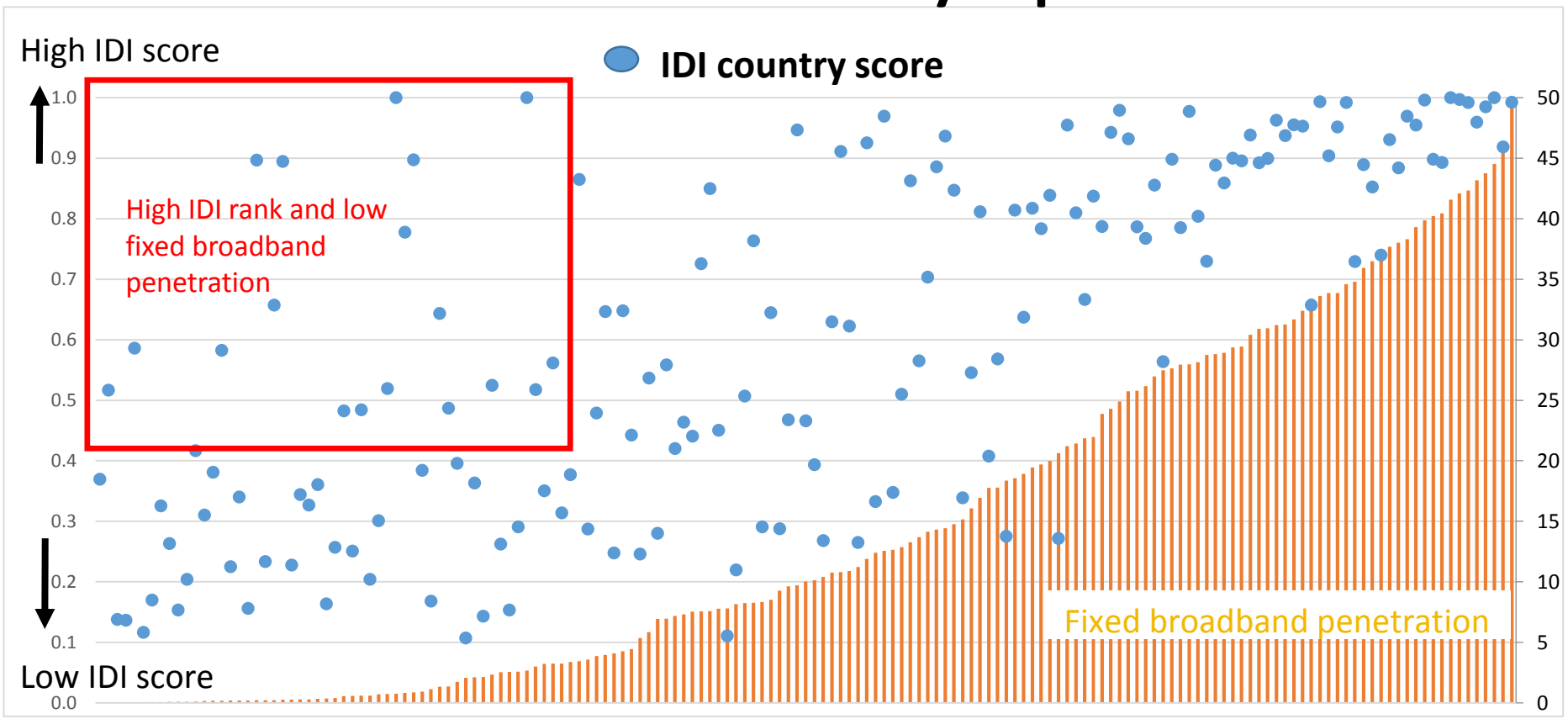
Fixed broadband by speed tiers



Way forward

- Possible short-term solutions:
  - Limit the number of countries included in IDI to those with minimum data availability (but keep current list of indicators)
  - Limit the list of indicators and only include those indicators with minimum data availability (but include large number of countries)
  - Agree on minimum thresholds
- Improve data availability and quality
  - Capacity building workshops and technical assistance
  - Inform countries about data gaps

Thank you

For more information
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