Updated Agenda

13 June 2023 - Day 1	
13:00	Introduction
13:20	Conceptual framework
13:40	Universal connectivity indicators
15:30	Meaningful connectivity indicators
16:00	End of Day 1

14 June 2023 - Day 2	
13:00	Meaningful connectivity indicators (continued)
15:15	Universal connectivity indicators (continued), incl. fixed broadband penetration
16:15	End of Day 2

15 June 2023 - Day 3	
13:00	Country coverage, reference period, treatment of missing data and outliers
14:00	Normalization, aggregation, and weighting
15:15	Any other feedback on the document, including universal connectivity indicators and meaningful connectivity indicators
15:45	Conclusion and next steps
16:00	End of Day 3

Universal and meaningful connectivity indicators

Updated as per conclusions from DAY 2

Universal connectivity pillar	Meaningful connectivity pillar

Proportion of individuals who used the Internet (from any location) in the last 3 months (yHH7)

Proportion of households with Internet access at home (xHH6)

Active mobile-broadband subscriptions per 100 inhabitants (i911mw)

Fixed broadband penetration*

Mobile network coverage

> Percentage of the population covered by at least a 3G mobile network (i271G)

> Percentage of the population covered by at least an LTE/WiMAX mobile network (i271GA)

Mobile broadband Internet traffic per mobile broadband subscriptions (GB) (i136mwi_subs)*

Fixed broadband Internet traffic per fixed broadband subscriptions (GB) (i135tfb_subs)*

Mobile Data and voice high-consumption basket price (as % of GNI per capita) (i271mb_high_ts_GNI)

Fixed-broadband Internet basket price (as % of GNI per capita) (i154_FBB_ts_GNI)

Percentage of individuals who own a mobile phone (xHH18)

Skills*

Expected years of schooling
Mean years of schooling

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DEFERRED TO IDI2027

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Reference year

- To **assess data availability** for a country in 2023, SQ+LQ 2022 is used → data for 2021

- To maximize data availability and reduce the number of estimates, we accept data submitted by countries from the year preceding the reference year, 2020 in the present case

- Same approach will be used for assessing availability for the index in subsequent years:

  - Reference year for IDI 2023 will be 2021 (with some data from 2020)

  - Reference year for IDI 2024 will be 2022 (with some data from 2021)

  - Etc.

IDI T published in 1st Half of Year T

IDI T uses Data T-3–T-2

IDI T+1 uses Data T-2–T-1

DATA FOR T-2 | DATA FOR T-1 | DATA FOR T

YEAR T-1 | YEAR T | YEAR T+1

WTID – Dec/Jan
✓ validated *Data T-2*
✓ validated *estimates for T-2*

SQ *T* Mar-Apr
Collect *Data T-1*

ITU Validates SQ T

WTID - Jul
Publish SQ *Data T-1*

LQ *T* Sept
Collect Data *T-1*

ITU Validates LQ T; calculate *T-1* estimates

WTID – Dec/Jan
✓ validated *Data T*
✓ validated *estimates for T-1*

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Data availability for the indicators selected (without estimates)

Category/Code	Indicator	countries with data available	
		≥2021	≥2020
Universal connectivity			
1 yHH7	Proportion of individuals who used the Internet (from any location) in the last 3 months	81	94
2 xHH6	Proportion of households with Internet access at home	81	94
3 i911mw	Active mobile-broadband subscriptions per 100 inhabitants	160	170
4 ~~i992b[1]~~	~~Fixed broadband subscriptions penetration rate~~	~~161~~	~~170~~
Meaningful connectivity – Infrastructure			
5 i271G	Percentage of the population covered by at least a 3G mobile network	158	170
6 i271GA	Percentage of the population covered by at least an LTE/WiMAX mobile network.	156	168
7 i136mwi_subs	Mobile broadband Internet traffic per mobile broadband subscriptions (GB)	131	143
8 i135tfb_subs	Fixed broadband Internet traffic per fixed broadband subscriptions (GB)	109	115
Meaningful connectivity – Affordability			
9 i271mb_high_ts_GNI	Mobile data and voice high-consumption basket price (as % of GNI per capita)	182	185
10 i154_FBB_ts_GNI	Fixed-broadband Internet basket price (as % of GNI per capita)	171	175
Meaningful connectivity – Device			
11 xHH18	Percentage of individuals owning a mobile phone	47	59
Meaningful connectivity – Skills			
~~12 MYS~~	~~Mean years of schooling~~	~~190~~	~~190~~
~~13 EYS~~	~~Expected years of schooling~~	~~192~~	~~192~~

[1] The indicator code and data availability are for the indicator *Fixed broadband subscriptions per 100 inhabitants*. The outcome of the discussion at the IDI meeting may change this.

Summary table (with published estimates)

For the following indicators, ITU has published estimates for 2020 and/or 2021:

Indicators with ITU estimates published	countries with data (incl. est's) available for ≥2020
Universal connectivity	
Proportion of individuals who used the Internet (from any location) in the last 3 months	187
Proportion of households with Internet access at home	166
Active mobile-broadband subscriptions per 100 inhabitants	191
Fixed broadband subscriptions penetration rate	193
Meaningful connectivity	
Percentage of the population covered by at least a 3G mobile network	193
Percentage of the population covered by at least an LTE/WiMAX mobile network.	192
Percentage of individuals owning a mobile phone *	183

* Estimates calculated but not yet published

Coverage & need for estimating missing data

Based on the original set of indicators proposed in V2

Economy inclusion threshold (% of 13 indicators available in the 2020-2021 reference period)	% of indicators available					
	50%	60%	70%	80%	90%	100%
Nr. of economies meeting the threshold requirement	168	163	130	89	75	42
Nr. of missing data points to be estimated	361	331	184	61	33	0
% of total data points to be estimated	17%	16%	11%	5%	3%	0%

Based on the updated set of indicators as of 14 June 2023

Economy inclusion threshold (% of 10 indicators available in the 2020-2021 reference period)	% of indicators available					
	50%	60%	70%	80%	90%	100%
Nr. of economies meeting the threshold requirement	165	149	130	89	75	40
Nr. of missing data points to be estimated	342	262	186	63	35	0
% of total data points to be estimated	21%	18%	14%	7%	5%	0%

Estimation procedures

- The models used to estimate missing values for indicators typically collected in ICT household surveys are based on a diverse range of widely available national indicators on mobile-broadband subscriptions, ICT affordability, GNI per capita, etc., and accounting for their changes over time. In addition to data submitted by Member States, other sources may be used to obtain data and/or cross-check estimates.

- In other cases, univariate time series models, such as autoregressive integrated moving average (ARIMA) models may be applied to historical data to predict missing recent values.

- ~~Missing data points for any indicators obtained from sources external to ITU will not be estimated by the ITU Secretariat. Instead, the estimates made by UNDP for the HDI would be used.~~ *[Skills dropped]*

- Estimates are **sent to countries** for information.

- It is very difficult to make high-quality estimates for missing **traffic data**. Instead, if these two indicators will be included in the index, missing data will not be modelled, but will be imputed using a hot deck imputation method. These estimates will be used to calculate the index, but the underlying estimates will not be published.

- Any comments?

Statistical issues and solutions

Updated as per conclusions from DAY 2

Indicator	Statistical issue	Outlier treatment
Universal connectivity		
Proportion of individuals who used the Internet		Not applicable
Proportion of households with Internet access at home		Not applicable
Active mobile-broadband subscriptions per 100 inhabitants	Outliers in high values	Winsorize above Mean + 2 x St.Dev
Fixed broadband penetration*		
Meaningful connectivity: infrastructure		
Percentage of the population covered by at least a 3G mobile network	Limited discriminatory power; some outliers in the low values	Combine with LTE/WiMAX
Percentage of the population covered by at least an LTE/WiMAX mobile network	Some outliers in the low values	Combine with 3G
Mobile broadband Internet traffic per mobile broadband subscriptions (GB)*	Outliers in high values; high annual growth	apply log transf. & winsorize above projected cap
Fixed broadband Internet traffic per fixed broadband subscriptions (GB)*		
Meaningful connectivity: affordability		
Mobile data & voice high consumption basket price (as % of GNI per capita)*	Outliers in high values; reverse direction;	Winsorize above Mean+2 x St.Dev
Fixed-broadband Internet basket price (as % of GNI per capita)		
Meaningful connectivity: device		
Percentage of individuals who own a mobile phone*		
Meaningful connectivity: skills*		
Mean years of schooling		
Expected years of schooling	Outliers in high values	May set a cap

Correlation analysis

Strong & positive correlation (green): indicators measure different aspects of the same phenomenon (preferred)

(very high correlation />0.92, collinearity/: double counting)

Low correlation or no association: significant compensation (to avoid)

Affordability: scale will be reversed

Alternatives considered

	Universal					Infrastructure				Meaningful Affordability				Device	Skills	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**
yHH7 (1)	1.00	0.81	0.55	0.59	0.59	0.46	0.58	0.39	0.32	-0.55	-0.70	-0.69	-0.74	0.87	0.71	0.71
xHH6 (2)	0.81	1.00	0.58	0.59	0.57	0.52	0.51	0.30	0.31	-0.41	-0.62	-0.53	-0.66	0.79	0.55	0.56
i911mw (3)	0.55	0.58	1.00	0.54	0.54	0.44	0.59	0.28	0.35	-0.53	-0.52	-0.53	-0.38	0.54	0.60	0.55
i992b (4)	0.59	0.59	0.54	1.00	0.99	0.50	0.60	0.20	0.31	-0.53	-0.55	-0.55	-0.47	0.51	0.78	0.76
i992b_18+ (5)	0.59	0.57	0.54	0.99	1.00	0.52	0.62	0.21	0.29	-0.54	-0.56	-0.56	-0.48	0.50	0.79	0.76
i271G (6)	0.46	0.52	0.44	0.50	0.52	1.00	0.81	0.21	0.34	-0.55	-0.66	-0.64	-0.52	0.55	0.54	0.55
i271GA (7)	0.58	0.51	0.59	0.60	0.62	0.81	1.00	0.25	0.36	-0.62	-0.66	-0.66	-0.55	0.56	0.63	0.63
i136mwi_subs (8)	0.39	0.30	0.28	0.20	0.21	0.21	0.25	1.00	0.22	-0.25	-0.23	-0.22	-0.21	0.32	0.28	0.26
i135tfb_subs (9)	0.32	0.31	0.35	0.31	0.29	0.34	0.36	0.22	1.00	-0.29	-0.32	-0.32	-0.14	0.22	0.35	0.36
i271mb_ts_GNI (10)	-0.55	-0.41	-0.53	-0.53	-0.54	-0.55	-0.62	-0.25	-0.29	1.00	0.84	0.85	0.59	-0.47	-0.58	-0.59
i271mb_low_ts_GNI (11)	-0.70	-0.62	-0.52	-0.55	-0.56	-0.66	-0.66	-0.23	-0.32	0.84	1.00	0.93	0.70	-0.62	-0.63	-0.61
i271mb_high_ts_GNI (12)	-0.69	-0.53	-0.53	-0.55	-0.56	-0.64	-0.66	-0.22	-0.32	0.85	0.93	1.00	0.68	-0.54	-0.65	-0.60
i154_FBB_ts_GNI (13)	-0.74	-0.66	-0.38	-0.47	-0.48	-0.52	-0.55	-0.21	-0.14	0.59	0.70	0.68	1.00	-0.64	-0.54	-0.49
xHH18_IDI (14)	0.87	0.79	0.54	0.51	0.50	0.55	0.56	0.32	0.22	-0.47	-0.62	-0.54	-0.64	1.00	0.54	0.59
MYS (15)	0.71	0.55	0.60	0.78	0.79	0.54	0.63	0.28	0.35	-0.58	-0.63	-0.65	-0.54	0.54	1.00	0.78
EYS (16)	0.71	0.56	0.55	0.76	0.76	0.55	0.63	0.26	0.36	-0.59	-0.61	-0.60	-0.49	0.59	0.78	1.00

Row groups (left axis): Universal (1–5), Meaningful – Infrastruct. (6–9), Skills – Dev. – Afford. (10–16)

Country coverage, reference period, treatment of missing data and outliers

- Any comments?

Topic: Normalization, aggregation, and weighting
15 June 2023 | 14:00-15:15 (CET)

Virtual joint EGTI/EGH meeting on the ICT Development Index (IDI)

Normalisation

- Mostly a min-max approach → rescales indicators onto a common sale of 0 to 100 by subtracting the minimum value for the given indicator across all economies from each value and dividing by the range of the indicator values.

$$\text{score}_{i,c} = \frac{\text{value}_{i,c} - \text{threshold}_i}{\text{goalpost}_i - \text{threshold}_i} \times 100$$
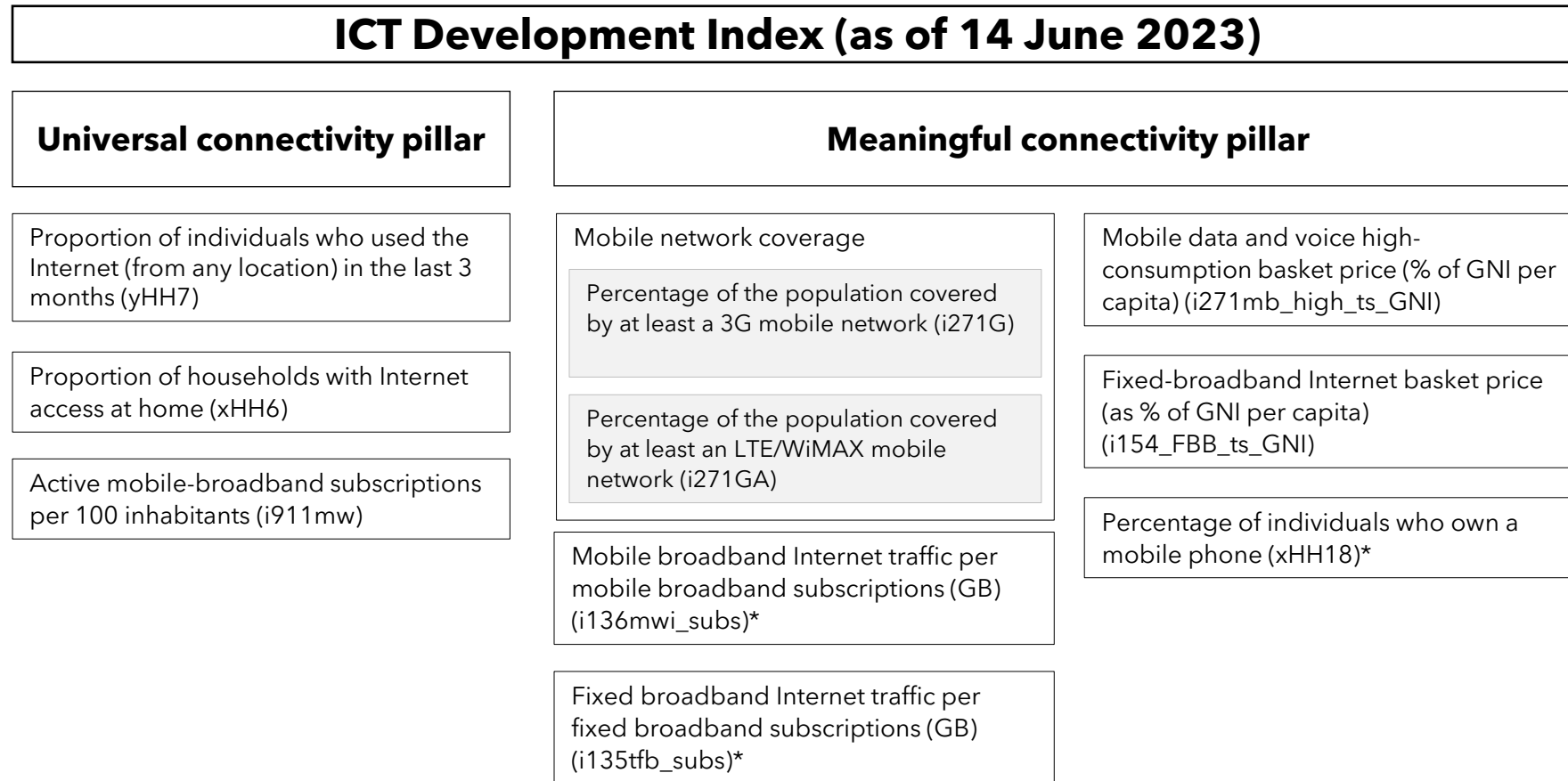
- For universality indicators (Internet use, households with Internet, mobile phone ownership) it is neither expected nor desirable that all children use the Internet. Furthermore, some individuals do not want to use the Internet, even if they have access to it and can afford it → goalpost to be set at 95%.

- For the two traffic indicators, values will be log-transformed and goalposts will be defined based on the projected values considering the double-digit annual growth of global median traffic.

- For the affordability indicators, goalposts will reflect the reverse directionality. In the case of the affordability indicators, where a higher cost corresponds to a worse outcome, the same min-max formula applies, but the minimum value is the goalpost, and the maximum value is the threshold.

Goal posts for retained indicators (as of 14 June)

| Indicator	Indicative threshold	Indicative goalpost
Proportion of individuals who used the Internet	0%	95%*
Proportion of households with Internet access at home	0%	95%*
Active mobile-broadband subscriptions per 100 inhabitants	0	95th percentile
% of the population covered by at least a 3G mobile network	0%	100%
% of the population covered by at least an LTE/WiMAX mobile network.	0%	100%
Mobile broadband Internet traffic per mobile broadband subscriptions (GB)**	Min. value	95th percentile, projected
Fixed broadband Internet traffic per fixed broadband subscriptions (GB)**	Min. value	95th percentile, projected
Mobile data and voice high-consumption basket price (as % of GNI per capita)*,**	2%	95th percentile
Fixed-broadband Internet basket price (as % of GNI per capita)	2%	95th percentile
Percentage of individuals owning a mobile phone**	0%	95%*

* for discussion

Aggregation

ICT Development Index (as of 14 June 2023)

Universal connectivity pillar	Meaningful connectivity pillar

Proportion of individuals who used the Internet (from any location) in the last 3 months (yHH7)

Proportion of households with Internet access at home (xHH6)

Active mobile-broadband subscriptions per 100 inhabitants (i911mw)

Mobile network coverage

> Percentage of the population covered by at least a 3G mobile network (i271G)

> Percentage of the population covered by at least an LTE/WiMAX mobile network (i271GA)

Mobile broadband Internet traffic per mobile broadband subscriptions (GB) (i136mwi_subs)*

Fixed broadband Internet traffic per fixed broadband subscriptions (GB) (i135tfb_subs)*

Mobile data and voice high-consumption basket price (% of GNI per capita) (i271mb_high_ts_GNI)

Fixed-broadband Internet basket price (as % of GNI per capita) (i154_FBB_ts_GNI)

Percentage of individuals who own a mobile phone (xHH18)*

Weighting

- In the absence of clear conceptual and statistical justifications, neutral approach consisting in applying equal weights at each level of aggregation is preferred.

- Weighting scheme mirrors the two dimensions of the UMC concept

- Pillar scores are the average of the indicator scores in each pillar (step 1)

- IDI score is the average of the scores of the Universal connectivity pillar and the Meaningful connectivity pillar (step 2)

- Each pillar weighs 50% in the IDI score

- Pillar scores are a balanced summary of the information contained in the indicators of each pillar – each indicator contributes equally to the concept of the pillar

- Statistical analysis does not reject this neutral and intuitive approach
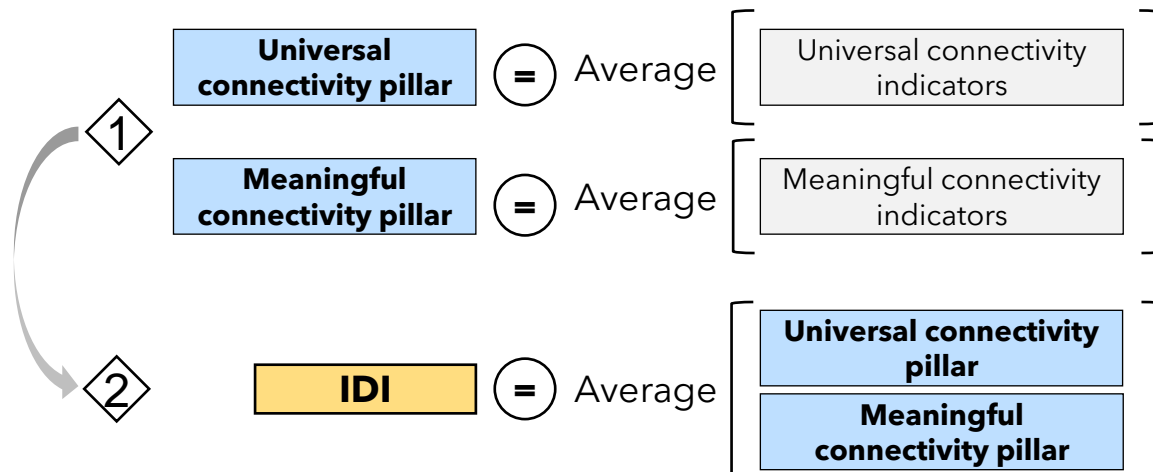
Weighting

- **Possible alternative:** the IDI score is the average of individual IDI indicator scores.

→ All individual indicators contribute equally (i.e, same weight) to the overall the IDI score

→ The two dimensions of connectivity have different weights in the index. The Meaningful connectivity dimension weighs more than the Universal connectivity dimension, since the former contains more indicators than the latter.

→ The pillar scores could still be computed and reported (but the average score of the two pillars would obviously not match the overall IDI score)

| **IDI** | (=) Average | Universal connectivity indicators |
| | | Meaningful connectivity indicators |
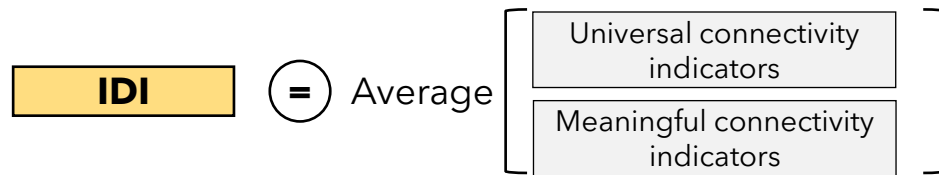
Issue for discussion: Normalisation

- Do experts agree with setting the goalpost for universality indicators (Internet use, households with Internet, mobile phone ownership) at 95%?

Issue for discussion: Weighting & aggregation

- **Do experts agree with the proposed weighting scheme?**
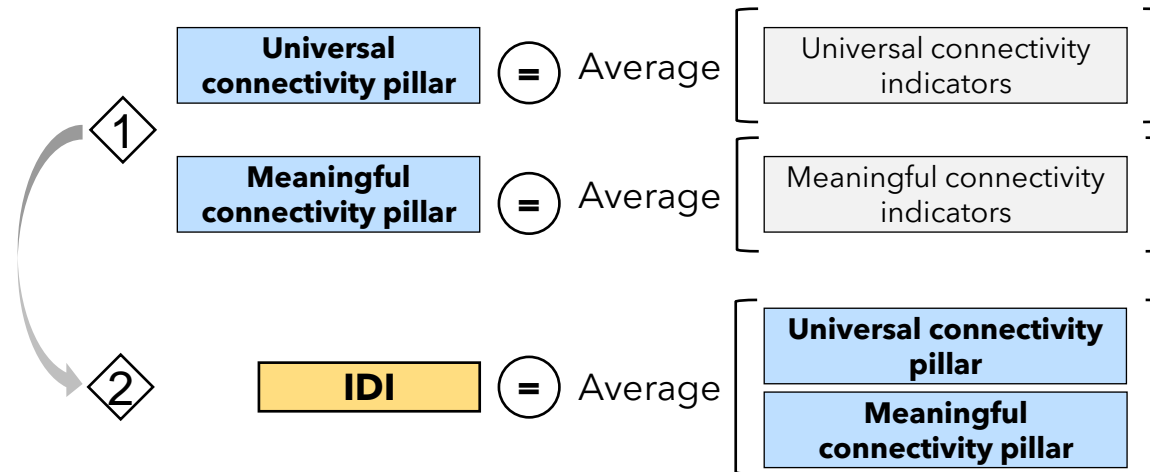
Normalisation, aggregation and weighting

- Any other comments?

Any other feedback on the document
15 June 2023 | 15:15-15:45 (CET)

Virtual joint EGTI/EGH meeting on the ICT Development Index (IDI)

Safety and security

- Safety and security is an important enabler of meaningful connectivity.

- ITU's Global Cybersecurity Index was considered as a candidate indicator for measuring this important aspect.

- However, the GCI assesses countries' commitments to cybersecurity. As such, it does not fit the framework, which focuses on outputs rather than inputs.

- In addition, the GCI's methodology is still evolving and is not stable yet. Introducing it in the IDI would affect comparability over time, as a change in this indicator may be due to a change in the methodology rather than a change in the performance.

Conclusions and next steps
15 June 2023 | 15:45-16:00 (CET)

Virtual joint EGTI/EGH meeting on the ICT Development Index (IDI)

Next steps

- Secretariat to post the report of the meeting

- Secretariat to produce final version of the IDI methodology (Version 3)

- Statistical assessment by Joint Research Centre

- Consultation of Member States in August-September:

    1) if they approve the index methodology as presented in Version 3; and

    2) if they want to opt out from the 2023 edition of the index (in which case, they will be able to join in subsequent editions)

- If at least 70 per cent of responding Member States approve the methodology, the Secretariat will prepare the IDI for publication in November

- If methodology approved: Data for use in IDI sent to countries for information in early October

End of day 3

ITU Expert Group on Telecommunication/ICT Indicators &
ITU Expert Group on Household ICT Indicators