14ᵗʰ meeting of the Expert Group on Telecommunication/ICT Indicators (EGTI)
and 11ᵗʰ meeting of the Expert Group on ICT Household Indicators (EGH)
18-21 September 2023

Joint EGTI/EGH session on
the ICT Development Index

18-19 September 2023

Summary report

Contents

The joint EGTI/EGH session on the ICT Development Index (IDI session) was held on 18-19 September 2023, during the 14th meeting of the Expert Group on Telecommunication/ICT Indicators (EGTI) and the 11th meeting of the Expert Group on ICT Household Indicators (EGH), from 18 to 21 September. All sessions of the meetings were held in Geneva with full remote participation (hybrid format).

A total of 347 participants attended the meetings including experts from regulators, telecommunication operators, ministries and national statistical offices (NSOs) from 105 countries, as well as ITU-D Sector Members, other UN agencies and regional organizations. Women made up 46 per cent of participants and 39 per cent of participants attended physically.

The summary report of the EGTI meeting and the summary report of the EGH meeting are also available on the meetings' webpages (see above). A recording of the EGTI and EGH meetings, including the IDI session, is available to TIES account owners.

Background

PP Resolution 131 (Rev. Bucharest, 2022) describes, *inter alia*, the process for developing a new ICT Development Index (IDI). The process is transparent, inclusive, and allows for the development of a statistically sound and conceptually relevant tool. Since the beginning of the process, the ITU Secretariat has maintained a webpage about the ongoing process.

In February 2023, members of EGTI and EGH were invited to comment on a [Zero Draft](#) methodology prepared by the ITU Secretariat to facilitate the process. All consultations took place on a [dedicated Forum](#). Following this first phase, the ITU Secretariat compiled and responded to all the comments, and updated the methodology ([Version 1](#)). In April and May, Member States were in turn invited to comment on the updated methodology.

Following this consultation, the ITU Secretariat again compiled and responded to all comments, updated the methodology and produced [Version 2](#) of the IDI methodology. It also identified a list of outstanding methodological issues. To resolve these issues, [a joint EGTI/EGH meeting](#) was held on 13-15 June 2023, in accordance with Resolution 131 (see [report](#)). The ITU Secretariat incorporated the decisions of the meeting and produced [Version 3 of the IDI methodology](#), which was shared with members of EGTI/EGH and Member States in early August 2023 ([Circular letter BDT/DKH/IDA/014](#)).

During its 2023 session, ITU's Council noted developments and requested that an additional meeting be organized ahead of the final consultation of Member States. Accordingly, a joint EGTI/EGH session on the IDI was held on 18-19 September 2023 ([Circular letter BDT/DKH/IDA/013](#)).

Co-Chairs

The IDI session was co-chaired by [Mr Bernard Banda](#), Chair of EGTI, and [Ms Linah Ngumba](#), Chair of EGH. Each chaired specific segments of the session.

Session agenda

The [agenda](#) of the annual meetings was posted on the pages of the events (see above), which also featured an interactive version of the agenda. The portion covering the IDI session is reproduced in Annex 1, with some small adjustments for readability and conciseness.

The agenda of the IDI session broadly followed the structure of the Version 3 document. Accordingly, it was partitioned into seven segments, each covering specific aspects of the IDI methodology, and a final segment dedicated to next steps.

Submission

Following a call for submissions for agenda items for the IDI session ([circular BDT/DKH/IDA/013](#)), the ITU Secretariat received one submission, which came from India (see [submission](#)). The co-chairs invited the representative from India to present each specific proposal contained in the submission, after the topic to which the specific proposal related was introduced.

Summary

Opening of the annual meetings of EGTI and EGH

18 September, 09:30-10:00

This session, which preceded the IDI session, provided useful context and guidance for the IDI session. It is therefore included in this summary.

- The Director of the Telecommunication Development Bureau, Dr. Cosmas Luckyson Zavazava welcomed the participants to the annual meetings. He reminded them that after a six-year hiatus, this IDI session offered a final opportunity to elaborate on the methodology of the IDI so that it can be finalized. The focus had been on a fully inclusive process, with eyes on the objective to create a conceptually relevant and statistically robust tool that can help enrich

digital policies. He further mentioned that following the meeting, the final IDI methodology would be submitted for approval to the Member States in October, and in line with Resolution 131, it will be adopted if 70 per cent of responding Member States approve it. Furthermore, Member States can opt out from the 2023 edition even if the methodology is approved.

- Mr Banda, Chair of EGTI, said that he was very proud of the progress made so far, and that he was looking forward to moving forward with regard to the publication of the IDI.
- Ms Ngumba, Chair of EGH, echoed these words and reminded participants of the robust foundation that would guide the discussions over the next few days.

Segment 1: Remarks by Co-Chair, overview of process, overview of Version 3, and conceptual framework
18 September, 10:45-12:30

- Mr Banda, Co-Chair of the IDI session, opened the session by explaining that it would follow a similar structure as the one of the June meeting on the IDI and cover all the aspects of the IDI methodology. He reminded the audience that Version 3 of the IDI methodology had been shared in August, and the only submission received for the IDI session was from India. He acknowledged both physical and online participants and encouraged open discussion and consensus building.
- The ITU Secretariat presented an overview of the history of the IDI and described the process for developing a new IDI methodology, in accordance with PP Resolution 131 (Rev. Bucharest, 2022), and explained that Version 3 of the IDI methodology reflects the outcomes of the process. The next steps in the process involve finalizing the methodology after the current session, seeking approval from Member States, and potentially releasing the IDI by the end of 2023.
- The ITU Secretariat then provided an overview of the IDI methodology as described in the Version 3 document. The concept of universal and meaningful connectivity – defined as the possibility for everyone to enjoy a safe, satisfying, enriching, productive, and affordable online experience – was adopted as the foundation of the IDI. The ITU Secretariat then introduced: the methods to treat outliers and handle missing values; the goal posts and thresholds used to transform indicator values to a common 0-100 score; the weighting approach to aggregate the components of the IDI; the reference period for the data; and the likely country coverage (about 165 economies).
- The ITU Secretariat introduced the concept of universal and meaningful connectivity (UMC) used as the foundation for the IDI. The concept was formalized in 2021 as part of the UN Secretary General's Roadmap for Digital Cooperation. The UMC framework has two dimensions: use of connectivity and quality of connectivity. The UMC concept focuses on the actual state of meaningful connectivity. It is agnostic about the steps to improve connectivity (inputs) and the outcomes (applications and impact of connectivity). There was broad support for this concept during consultations.
- The Chair invited India to present its proposal to include the ICT Regulatory Tracker in the IDI. By way of introduction, the delegate from India highlighted the importance of universal and meaningful connectivity, emphasizing that the IDI should capture the essence of this connectivity. Accordingly, India proposed some changes to the methodology, through their submission. The first proposal, discussed in this segment, was to include the ICT Regulatory Tracker in the "Security" component of the "Meaningful connectivity" pillar. The regulatory environment nurtures balanced growth in the ICT sector, enabling countries to play a leading

role in the global information society. The ICT regulatory framework promotes security, protection, and control of ICT systems, which are most important factors of data security. The ICT Regulatory Tracker is an evidence-based tool that tracks the existence and features of ICT legal and regulatory frameworks, identifying gaps and making a case for further reform. Since connectivity is highly dependent on regulation, it is essential to include the ICT Regulatory Tracker, they argued. The representative concluded by highlighting the importance of regulation in achieving meaningful connectivity targets, especially with the sector being dominated by private players.

- The Chair invited the participants to share their views on India's proposal as well as seek clarification from the ITU Secretariat. Experts expressed some concerns about the proposal, including: the ICT Regulatory Tracker being outside the mandate of EGTI/EGH, the use of qualitative metrics in a quantitative index, the use of an input measure in an index aimed to focus on outputs, the challenge of having an index in another index (index of indices), and the need to keep the ICT Regulatory Tracker as a separate instrument.
- The Chair thanked all the experts for their contributions and concluded that several countries did not support this specific proposal, while others requested further engagement and discussion on it. Consequently, the ICT Regulatory Tracker will not be added to the IDI.

Segment 2: Universal connectivity indicators
18 September, 14:30-15:30

- The segment's Chair, Linah Ngumba opened the session and invited the ITU Secretariat to present the universal connectivity indicators.
- In its presentation, the ITU Secretariat explained that indicators to be included in the IDI need to comply to six criteria: relevant; easy to interpret; from an official source; reliable and collected using clear definitions; measuring country performance; and with high availability and timeliness.
- Universal connectivity indicators speak to the use of connectivity by people, households, communities, and businesses. Applying the selection criteria and based on the consultations EGTI/EGH members and Member States, three indicators were retained: the proportion of individuals using the Internet; the proportion of households with Internet access; and mobile broadband subscriptions per 100 inhabitants. The ITU Secretariat explained that during the consultations, other indicators were considered but not included. For the percentage of businesses using the Internet, and the percentage of schools using the Internet for educational purposes, data availability was too low for these indicators to be included in this version of the IDI. Regarding fixed broadband subscriptions, the preferred denominator is households. However, because harmonized data on the number of households is not globally available, currently the indicator cannot be included in the IDI. Alternatives considered, including a survey-based measure of adult population only, did not gain sufficient support.
- Following the presentation, participants sought clarification from the ITU Secretariat, mostly on the choice indicators and how they would be treated in the construction of the index.

Segment 3: Meaningful connectivity indicators
18 September, 16:00-17:30

- The segment's Chair, Bernard Banda opened the session and invited the ITU Secretariat to provide an overview of the indicators that were included in the Version 3 Document on meaningful connectivity.
- In its presentation, the ITU Secretariat reminded participants that, as described in Version 1, 2 and 3 Documents, various indicators were considered to measure infrastructure, device, safety and security as well as affordability and ICT skills aspects of meaningful connectivity. Lack of available, timely data was the typical reason why indicators were not retained in the framework (such as households with a computer), but some failed to meet some of the other selection criteria, such as lack of official data (e.g., speed of Internet connections or middle-mile connectivity indicators), or the quality or reliability of data (international bandwidth usage).
- The ITU Secretariat also recalled why the discussion in June concluded that no indicator would be retained for measuring the safety and security aspect. The Global Cybersecurity Index was considered, but eventually rejected because it measures policy commitments, rather than actual implementation, and because of the principle to avoid having an index within an index, especially one that undergoes methodological changes which may create comparability issues over time.
- Regarding the affordability indicators, the ITU Secretariat recalled the conclusion in June to include the mobile data and voice high-consumption basket (140 min, 70 SMS, 2 GB data) as the best fit for the framework which represents typical mobile broadband usage patterns alongside the fixed broadband basket. The presentation also recalled the prior agreement to define the indicator by dividing basket prices by Gross National Income (GNI) per capita, a measure of affordability of a service for the average earner.
- With respect to ICT skills, the ITU Secretariat reminded the audience of the discussion in June, which concluded that while it was an important aspect of meaningful connectivity, the indicator would be deferred to the next IDI revision. It was recalled that while the most direct measure and best fit indicator would be individuals with ICT skills, but that the low data availability and the lack of an established methodology for combining multiple skill measures prevented this indicator being included in the IDI. Furthermore, proxy measures such as expected or mean years of schooling, even if widely available, proved not to be good predictors of ICT skills.
- India proposed to include as a new indicator "Fixed Broadband Subscription with speed greater than 10Mbps as % of fixed broadband subscriptions". This would not only fill a gap caused by the inability to agree on a denominator for the fixed broadband penetration indicator, but also add an indicator considered as an aspirational Universal and Meaningful Connectivity target.
- While a few experts expressed support for the actual proposal, and others agreed with the general idea that a measure of speed was relevant, several experts raised concerns. First, it was highlighted that using total fixed-broadband subscriptions in the denominator would result in an excessive focus on quality at the detriment of availability or universality. Second, that there was a lack of international agreement on what constitutes "fast" or high-speed connections, and that the 10 Mbit/s threshold may not be sufficiently high. While the ITU also collects statistics using other breakdowns (such as 30 and 100 Mbit/s), as the ITU Secretariat clarified, data availability gradually declines above the 10 Mbit/s threshold. Third, recalling that as per the definition, the indicator measures subscriptions based on advertised rather than actual speeds, and some participants too raised concerns that it has implications that require further analysis.

- The Chair acknowledged the well-motivated submission but based on the interventions and considering the potential biases with the proposed speed indicator, concluded that the proposed indicator needs further refinement before eventual inclusion in a next iteration of the IDI.
- Concerning the affordability indicators, in its proposal, India argued that since purchasing power parity (PPP) was a well-established economic principle and a globally accepted measure of affordability, used by several International Organizations, including The World Bank (WB), the International Monetary Fund (IMF) and the Organisation for Economic Co-operation and Development (OECD), and also used as a scaling denominator in international indices. It therefore recommended using PPP$ as the dominator for the affordability indicators of the ICT Development Index.
- In the ensuing debate, experts expressed concerns with the appropriateness of the proposed approach, highlighting the conceptual difference between the PPP that measures the value of a currency and that is used for a global comparison of price levels and the relative measure that compares prices to the average income. Some experts acknowledged that PPP was an established economic principle for the internationally comparison of price levels, especially those of non-tradable goods and services, as it takes into consideration the cost of living. However, the affordability indicator should not compare either currencies or price levels, which would be relevant for operators or equipment providers, but rather how big a share of the average income is dedicated to ICT services, seen from the perspective of consumers.
- The Chair concluded that based on the interventions, there was a general agreement to continue measuring affordability by using prices expressed a share of GNI per capita, retaining the approach adopted in the Version 3 of the IDI methodology.

Segment 4: Assessing the statistical validity of the IDI methodology
19 September, 09:30-10:45

- The purpose of the session was to present the results of the pre-audit by the Competence Centre on Composite Indicators and Scoreboards of the Joint Research Centre (JRC-COIN) of the European Commission of Version 3 of the IDI methodology, using the freely data available from the ITU website. The segment's Chair, Linah Ngumba, invited Mr Giulio Caperna from JRC-COIN to deliver his presentation.
- During his presentation Mr Caperna pointed out that this assessment requested by ITU and was carried out *pro bono*. He highlighted that the pre-audit had two objectives: 1) to check the characteristics of the data and any potential limitations due to missing data and outliers; and 2) to check the statistical properties of aggregating indicators into the two pillars and into the overall ICT Development Index.
- Mr Caperna described the 10 steps to build a composite indicator, as follows: 1) Conceptual framework; 2) Indicator selection; 3) Data treatment; 4) Normalisation; 5) Weighting; 6) Aggregation; 7) Statistical coherence; 8) Robustness and sensitivity; 9) Data sensemaking; and 10) Visualization. He also pointed out that the pre-audit focused on steps 3 to 8 because these are the statistical steps.
- On the conceptual framework (step 1) it was found that the structure of the IDI is intuitive, clear and well explained in the Version 3 document. The small number of indicators makes it easy to interpret. It is sensible to have a small number of focused indicators; the number of indicators is not a measure of quality by itself. Furthermore, regarding the selection of

indicators (step 2), the conclusion was that the selected indicators are relevant, clear, reliable, useful as measure, and timely available from high quality sources.

- For data treatment (step 3), the presentation covered treatment of missing values and outliers. For missing values, Mr Caperna noted that imputation of missing data is often unreliable if the data set contains more than 1/3 of missing values. In the case of the IDI, the assessment concluded that none of the indicators have a critical number of missing values.
- Two indicators in the IDI have outliers and are adequately dealt with.
- As for weighting (step 5), the Mr Caperna explained that the IDI structure is well balanced: there are two pillars that are highly correlated to each other, and both are represented in a balanced way. Therefore, equal weights, in this case represent also equal representation.
- Regarding the aggregation methods (step 6), the recommendation was to choose the arithmetic method because it is simple and intuitive. The correlation analysis between the two pillars and the overall IDI revealed that the correlation of the pillars within the index is very high and balanced (step 7): 0.98 for universal connectivity and 0.96 for meaningful connectivity. Mr Caperna concluded that they are both extremely well represented in the final index. The last part of the presentation showed several statistical analyses for testing robustness and sensitivity. Based on this assessment, JRC-COIN determined that Version 3 of the IDI methodology is statistically robust.
- IMs Ngumba thanked Mr Caperna and JRC-COIN for their work. She appreciated that some of the key aspects considered by their audit, such as reliability, relevance, timeliness and transparency, fall under the UN fundamentals principles of official statistics. She said that the IDI embodies these essential principles, ensuring its credibility and trustworthiness.
- A rich discussion ensued, with participants expressing their gratitude for the work of JRC-COIN which contributed to increasing confidence in the methodology. Questions and comments touched upon the number of indicators, data availability and data presentation, among other topics.
- Mr Caperna responded to the questions, while the ITU Secretariat provided clarification on data presentation.

Segment 5: Meaningful connectivity indicators (continued) and reference period
19 September, 11:15-12:30

- As The segment's Chair, Bernard Banda, opened this second segment dedicated to meaningful connectivity indicators and invited India to present their proposal to include the Global Cybersecurity Index (GCI) in the IDI.
- The Indian delegate highlighted that cybersecurity is important and should be included in the meaningful connectivity pillar of the IDI. India contested the arguments not to include the GCI in Version 3 of the IDI methodology by arguing that while secure Internet can be considered as an input parameter for universal connectivity, it can be viewed as an output parameter for meaningful connectivity. India also emphasized that the GCI has been published for five years, includes data for all Member States, and that it is common to include other indices as indicators in an index. Mr Banda opened the floor for comments on the proposal from India.
- While emphasizing the importance of cybersecurity, many experts did not support India's proposal to include the GCI in this iteration of the IDI. Several experts did not find it appropriate to include another index as an indicator into the IDI. Some experts challenged India´s interpretation that the GCI could be considered an output parameter. Many questions in the GCI questionnaire refer to the availability of legislation, which suggests that the GCI

would be better referred to as an input parameter than as an output parameter. Furthermore, the GCI focuses on the commitment of countries in providing policy measures in addressing cybersecurity threats and incidents and not on measuring their effectiveness. The Cybersecurity Index is also beyond the scope of the EGTI and EGH.

- Mr Banda concluded the discussion by thanking India and highlighting the need for additional work to find an appropriate indicator to measure cybersecurity for the next iteration of the IDI. Mr Banda then moved to the next agenda item: the issue of the reference period for the IDI.
- The ITU Secretariat introduced the topic by presenting the timeline for the reference data. The focus for 2023 is to develop the IDI methodology and publish the index. Using 2021 as the reference year in 2023 would allow the ITU Secretariat to publish the IDI with a harmonized dataset. It also explained that most data points in the IDI would be for the same year, which will make it possible to measure progress over time.
- India presented its proposal to include five-year growth rates as weight factors for the indicators in the IDI. The overall aim is to motivate countries, which have yet to reach the targets, to accelerate progress.
- Several experts expressed appreciation for the aim but argued that it would be more appropriate to include trend analysis as an accompaniment to the IDI. In addition, a growth factor in the IDI could discriminate countries with already high levels of ICT development. Several experts asked for clarification on the timeline of the data to be used in the IDI. The ITU Secretariat clarified that there would always be a time lag between the year of the data and the year of their inclusion in the IDI, because of the time it takes to collect and verify the data and produce estimates for missing official data.
- Mr Banda concluded the session by highlighting the importance of motivating and encouraging countries lagging to leap forward in terms of ICT development. He acknowledged, however, that there was no support for the inclusion of a growth factor in the IDI itself, and that it would be more suitable to include supplementary analysis on country progress as part of the IDI report.

Segment 6: Normalization and estimation
19 September, 14:30-15:30

- The segment's Chair, Linah Ngumba, invited the ITU Secretariat to introduce the topic of normalization.
- The ITU Secretariat presented a detailed overview of the methods and processes used by the ITU to fill data gaps through estimation. The presentation focused on household indicators as these data are missing more frequently than data that can be collected through administrative sources.
- Ms Ngumba invited India to present their proposal whereupon India asked clarifying questions on the possibility of countries to provide alternative estimates when estimates are sent to countries for consultation and how data provided after the deadline for submission of new data would be treated.
- The Secretariat responded that new data from primary sources (i.e., household surveys) could be considered at the time of consultation with countries and that clear deadlines should be set to avoid a cycle of last-minute updates. Data not included in the current edition of the IDI would be included in the next year's edition.
- The subsequent discussion largely focused on the timeline for approval of the IDI methodology as well as the consultation with countries on data to be used. The secretariat

explained that according to the process described during the June meeting on the IDI and in introduction of the IDI session, the goal is to submit the IDI methodology to Member States for approval and to submit the data to Member States for information (and validation in the case of estimates) after the formal consultation.

- The Secretariat then provided an overview of the approach agreed in Version 3 for the normalization of data. The approach is to set goalposts and thresholds, so countries scoring or reaching the goalposts will get a full score of 100, while those below or at the threshold will get the minimum score. This is done using a simple formula to transform raw values into scores. The affordability indicators use a reversed operation, as lower prices relative to GNI per capita are considered better.
- Discussion on the topic of normalization highlighted concerns of transparency with the Secretariat clarifying that both raw values and normalized scores will always be reported, allowing to differentiate among those countries that achieve the maximum scores based on their raw values.

To complement the presentation made during this segment, Annex 2 contains provisional detailed documentation on estimation methods.

Segment 7: Weighting and reporting results
19 September: 16:00-17:15

- The segment's Chair, Bernard Banda, invited the ITU Secretariat to give a presentation on the weighting of the indicators in Version 3 of the IDI methodology.
- In presenting the topic, the ITU Secretariat explained that the conceptual framework of the IDI suggests a two-step approach to aggregate the different components of the IDI. In the first step, the pillar scores are computed for both the universal connectivity pillar and the meaningful connectivity pillar. The pillar score is obtained by averaging the normalized scores of the comprising indicators. This ensures that each indicator contributes equally to the pillar score. In the second step, the overall IDI score is calculated by averaging the scores of the two pillars, giving each pillar a 50 per cent weight in the IDI. This approach is considered statistically sound as explained by the expert from the European Commission's Joint Research Centre (JRC) in his presentation. It is intuitive and consistent with the overall framework of the two dimensions of connectivity.
- The Segment's Chair invited India to make its proposal regarding the alternate weighting scheme for the IDI. India suggested that more indicators could be added to the universal connectivity pillar, but if the indicators remain the same, equal weights should be assigned to all of them.
- The experts who commented on India's proposal indicated their preference for the approach adopted in Version 3 of the IDI methodology, in which the two main pillars have the same weight in the IDI score. They did not support the approach of giving equal weight to each individual indicator. Reasons included the need to have the two main dimensions of connectivity (universal and meaningful) weighted equally to retain the spirit of the framework; the fact that individual indicators add information about their respective pillars; the fact that adding indicators to the meaningful pillar in the future would dilute the weight of the universal pillar; the fact that JRC confirmed the statistical validity of the approach adopted in Version 3; and the fact that it would amount to having no pillar at all.
- Based on the interventions, the Chair concluded that the weighting scheme for the IDI would place equal weight on the two pillars.

- The Chair then invited the ITU Secretariat to introduce the last topic of the session, related to the presentation of the results. The ITU Secretariat presented Resolution 131, which says that the IDI is to be published without rankings. It explained that this approach focuses on how close a country is to universal and meaningful connectivity rather than ranking countries against each other. It then illustrated how the IDI results could be presented, with countries sorted alphabetically and a progress bar to indicate their proximity to the ideal state. Benchmarks and historical information could also be included. The ITU Secretariat then discussed alternative approaches, such as cluster ranking, which sorts countries into bands based on their scores. This approach may not comply with Resolution 131 and could lead to misinterpretation, as the distance between countries' scores is lost. Another approach is percentile ranking, where countries are sorted into bands based on their percentile rank. This method also poses challenges, as it forces countries into different bands and doesn't allow all countries to be in the top tier, making it a zero-sum game. The ITU Secretariat highlighted the merits of the score-based approach which allows for meaningful analysis, without the need for ranking, and provides valuable insights for Member States.
- The Chair invited to India to present their proposal. The delegate from India clarified that their intention was not to revert to a ranking system, but instead to present the results in regional groupings and bands based on socioeconomic profiles, considering factors like similar histories, geographies, and income levels. She emphasized their support for Resolution 131 and confirms they do not want to return to a ranking system.
- Participants who took the floor welcomed the no-ranking approach and expressed support for a meaningful presentation of the results and analysis of the IDI results, based on certain socio-economic features.
- The ITU Secretariat subsequently clarified that detailed country profiles with raw data for all individual indicators would be published, in addition to the overall IDI results. It also confirmed that presentation and analysis of the results by region, special country groups, and income groups would be part of the analysis. It also explained that if the index is launched, the tool for presenting the results of the IDI will necessarily be very basic the first year, and that – resources permitting – more sophisticated tools will be developed for future editions.
- The Chair concluded that many participants who commented agreed with the proposal that the analysis and presentation of the results around regions and other factors, such as income, would enrich the presentation of the results and would also recognize certain unique characteristics.

Closing and next steps
19 September: 17:15-17:30

- IDI session's Co-Chair, Linah Ngumba, concluded the IDI session by expressing gratitude for the shared experiences, insights, and collaborative spirit that have enriched the discussions. She emphasized that the journey would continue, and the knowledge gained will serve as a foundation for future work. She acknowledged the active participation and feedback that contributed to the credibility and relevance of the IDI. She emphasized the challenges faced by Member States, particularly in data collection and limited resources, and stressed the importance of accurate, relevant, and coherent statistics. Ms Ngumba highlighted the positive audit results from the JRC, which affirmed the IDI's robustness and adherence to best practices. She also noted the support for Version 3 and the desire to move forward with the IDI.

- In his closing remarks, the BDT Director, Dr Cosmas Luckyson Zavazava, acknowledged the participants' dedication, commitment, and hard work in the meeting, and expressed gratitude for their contributions. He highlighted the importance of inclusivity and the challenges faced by different countries. He emphasized the role of digital technology in achieving the Sustainable Development Goals and encouraged participants to continue sharing knowledge and information. He explained that a document containing the IDI methodology would now be prepared and shared with Member States for final approval. If at least 70 per cent of responding Member States approve the methodology, the IDI will be launched in 2023. He also reassured that the ITU is committed to supporting membership in data collection and quality improvement.
- IDI session's Co-Chair, Bernard Banda, closed the IDI session. He thanked the BDT Director for his support and expressed gratitude to the experts for their valuable contributions, which have helped move the IDI development process forward.

Annex 1: Detailed agenda of the IDI session

All times in Central European Summer Time (CEST).

Day 1 – Monday 18 September 2023

09h30-10h00	Opening of the annual meetings of EGTI and EGH • Welcome and opening remarks by **Cosmas Luckyson Zavazava**, Director of BDT, ITU • Opening remarks by **Bernard Banda**, Chair of EGTI • Opening remarks by **Linah Ngumba**, Chair of EGH
10h00-10h45	Group picture, followed by coffee break
	Joint EGTI/EGH session on the IDI

10h45-12h30	**Segment 1 (chaired by Bernard Banda)**
	• Remarks by segment's Chair Bernard Banda
	• Adoption of the agenda
	• Overview of process for developing the IDI by ITU Secretariat
	• Overview of Version 3 of the IDI methodology by ITU Secretariat
	• Conceptual framework of the IDI
	    o Presentation of the topic by ITU Secretariat
	    o Submission from India to include the ICT Regulatory Tracker
	    o Discussion led by segment's Chair

12h30-14h30	Lunch break

14h30-15h30	**Segment 2 (chaired by Linah Ngumba)**
	• Universal connectivity indicators
	    o Presentation of the topic by ITU Secretariat
	    o Q&A for clarification

15h30-16h00	Coffee break

16h00-17h30	**Segment 3 (chaired by Bernard Banda)**
	• Meaningful connectivity indicators
	    o Presentation of the topic by ITU Secretariat
	    o Submission from India to include the Global Cybersecurity Index; to use prices in PPP$ as a measure of affordability; to include share of fast-speed fixed broadband subscriptions
	    o Discussion led by segment's Chair

Day 2 – Tuesday 19 September 2023

09h30-10h45	**Segment 4 (chaired by Linah Ngumba)**
	• Assessing the statistical validity of the IDI methodology
	    o Presentation of the topic by Giulio Caperna, European Commission's Joint Research Centre (JRC), on the results of JRC's pre-audit of Version 3 of the IDI methodology
	    o Q&A for clarification

10h45-11h15	Coffee break

11h15-12h30	**Segment 5 (chaired by Bernard Banda)**
	• Meaningful connectivity indicators (continued if needed)
	• Reference period:
	    o Presentation of the topic by ITU Secretariat
	    o Submission from India to include five-year growth rates for all indicators in the IDI
	    o Discussion led by segment's Chair

	Lunch break
14h30-15h30	**Segment 6 (chaired by Linah Ngumba)**

- Estimation methods
  - Presentation of the topic by ITU Secretariat
  - Submission from India on the validation of estimation methods by Member States
  - Discussion led by segment's Chair
- Normalization
  - Presentation by ITU Secretariat
  - Q&A for clarification

15h30-16h00	Coffee break

16h00-17h15	**Segment 7 (chaired by Bernard Banda)**
	• Aggregation
	  o Presentation of the topic by ITU Secretariat
	  o Submission from India on the use of an alternate weighting scheme
	  o Discussion led by segment's Chair
	• Presentation of results:
	  o Introduction by ITU Secretariat
	  o Submission from India on the use of cluster rankings
	  o Discussion led by segment's Chair

17h15-17h30	**Closing and next steps**
	End of the IDI session

Annex 2: Estimation of missing data and imputation of missing data for traffic indicators

Estimation of missing data

As a complement to the [presentation](#) by the ITU Secretariat on the topic "Estimation methods", the latest version of the document "[Estimation methods for selected ICT indicators](#)", which details the estimation methods employed by the ICT Data and Analytics Division, can be downloaded [here](#). The documentation is also available in the section "[Definitions, standards and methodology](#)" of the Division's website. Estimates will be shared with the concerned countries for information prior to the release of the ICT Development Index, provided that the methodology is approved by Member States.

Imputation of missing data for traffic indicators

The rest of this annex describes the method to be employed to impute the missing values for two indicators included in the IDI: *fixed-broadband traffic* and *mobile-broadband traffic* (Table 1).

Table 1 Countries that did not submit data, 2020-2022

	Data years		
Count/Share of membership (out of 196)	2020	2021	2022
Fixed broadband Internet traffic per mobile broadband subscriptions (GB)	87/44%	85/43%	87/44%
Mobile broadband Internet traffic per mobile broadband subscriptions (GB)	58/30%	54/28%	67/35%

Note: WTI database, as of 2 Oct 2023

As explained in [Version 3](#) of the IDI methodology (p.24), unlike the other indicators included in the IDI, the two indicators do not lend themselves to model-based estimation. Instead, a "hot deck" imputation is employed to allow for the calculation of the IDI, which requires a complete dataset. As explained in Version 3 of the IDI methodology, imputed values are shared with the concerned countries and used for calculating the IDI scores but are not published.

Data imputation in the context of the IDI calculation aims to facilitate the assessment of overall ICT development in a country as a means to representing multiple indicators. Importantly, the value of a missing individual indicator in the dataset is not the main interest (and will not be reported). Therefore, the objective of imputation is to fill missing values with plausible values in order to exploit the information provided in the available indicators in the incomplete cases for making inference about overall country performance.

"Hot deck" imputation is a common method for imputing missing data: an unobserved or missing item is replaced with an observed item from a "similar" unit. This method is typically used when model-based estimation results prove too sensitive to model (mis-)specification. One limitation of the method is that it relies on both the number of variables and observations as well as the completeness of the entire dataset, and the proximity of the matches between non-respondents and respondents based on the available information.

Practically, the imputation is carried out by assessing similarity scores (or the distance) between a unit (country) with a missing value and other units with (more) complete information and select the unit (country) value for the specific indicator to assign it to the country. As illustrated in Figure 1, *Unit*

2 has a missing value for *Indicator 3*, and *Unit 4* is found to be the "nearest neighbor" of *Unit 2*, so the value observed for *Indicator 3* for *Unit 4* will be used for *Unit 2*.
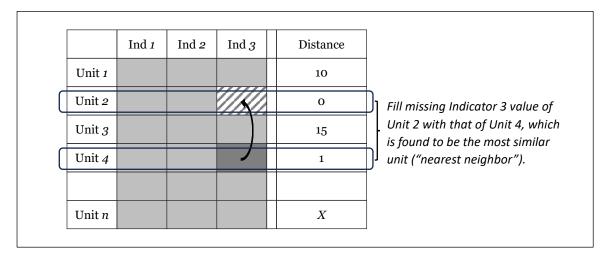
Figure 1 Schematic overview of the hot deck imputation

	Ind *1*	Ind *2*	Ind *3*		Distance
Unit *1*					10
Unit *2*			▨		0
Unit *3*					15
Unit *4*					1
Unit *n*					X

Fill missing Indicator 3 value of Unit 2 with that of Unit 4, which is found to be the most similar unit ("nearest neighbor").

There are different ways to measure distance and identify the nearest neighbor. The method chosen for the two traffic indicators is the geometric average of the absolute distances. This entails the calculation of a matrix of absolute differences considering each indicator between each country and the focal country (and excluding eventual missing indicators); the "nearest neighbor" is then identified by minimizing the geometric average across all indicators, applying the following formula:

$$\sqrt{\sum_{i=1}^{k} (x_i - y_i)^2}$$

The normalized and treated IDI dataset (including estimates) is used for the calculation of the matrix of absolute differences, complemented with an indicator measuring the scale of the economy, measured as GNI per capita expressed in international dollars. The dataset covers all economies, regardless of their inclusion in the IDI.