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UIS Indicator Development in the Field of Education

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Abbreviations

AOS	Analysis and Outreach Section
API	Application Program Interface
DHS	Demographic and Health Survey
EFA	Education for All
ESM	Education Standards and Methodology Section
ESS	Education Surveys Section
GAML	Global Alliance to Monitor Learning
GEMR	Global Education Monitoring Report
GPE	Global Partnership for Education
IAEG-SDGs	Inter-Agency Expert Group on SDG Indicators
ISCED	International Standard Classification of Education
ITS	I.T. Services Section
MDG	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey
NEA	National Education Account
OECD	Organisation for Economic Co-operation and Development
OOSCI	Out-of-School Children Initiative
SCC	Science, Culture and Communications Section
SDG	Sustainable Development Goals
TCG	Technical Cooperation Group
UIS	UNESCO Institute for Statistics
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund

1. Introduction

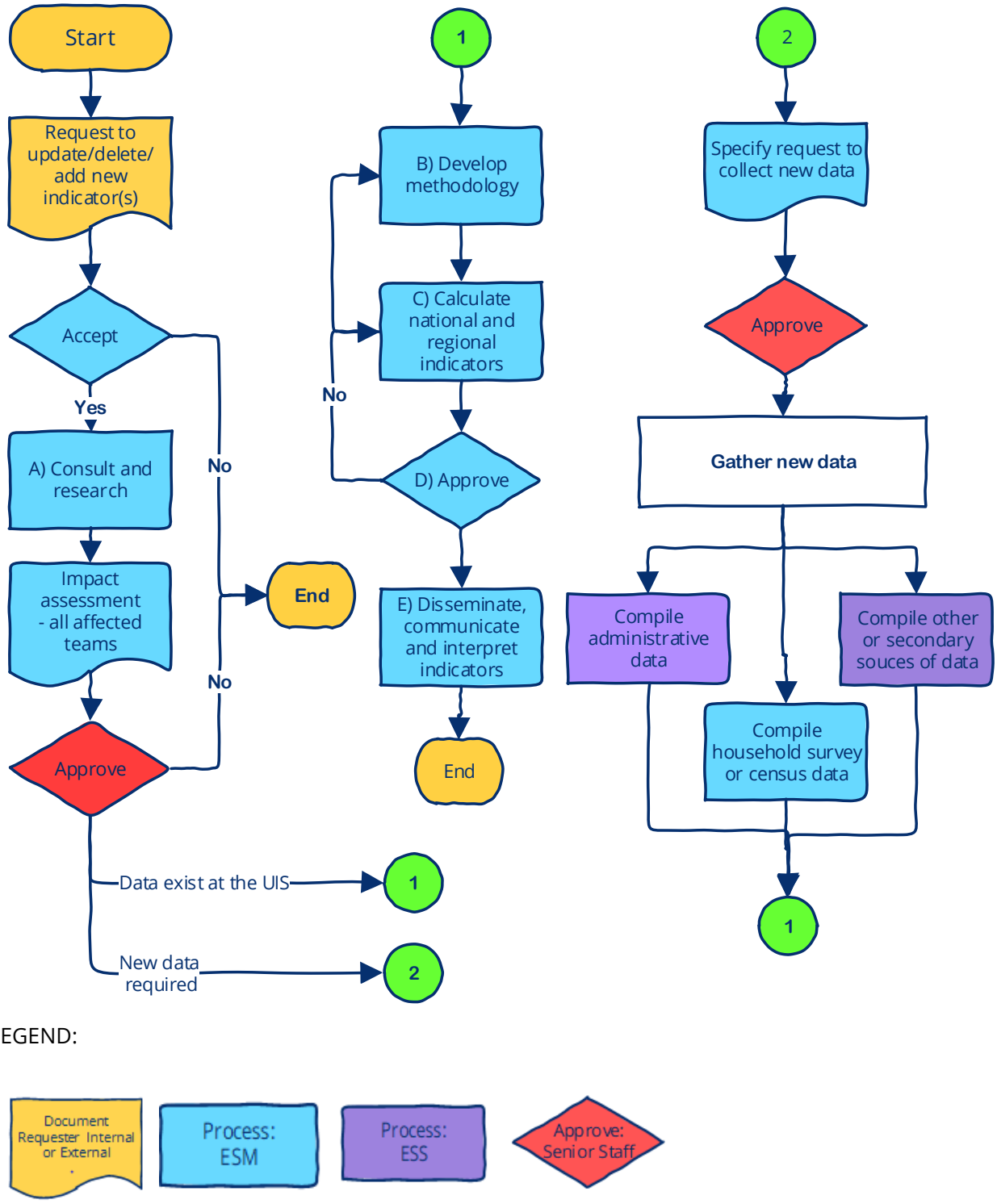
This paper describes current procedures undertaken by the UNESCO Institute for Statistics (UIS) to develop education indicators from administrative and survey data.

The need to create new indicators can arise for various reasons and through several channels. Indicators are generally developed or improved in response to:

- Methodological innovation by the UIS (e.g. adjusted gender parity index);
- The need to monitor country progress towards international goals and targets (e.g. Sustainable Development Goals (SDGs), Millennium Development Goals (MDGs), Education for All (EFA));
- Regional data needs from organizations such as the OECD or from groups or alliances of countries in Africa, Asia and Latin America, and regional commissions of the United Nations (UN);
- Demands by other international organizations and UIS clients (e.g. indicator on mean years of schooling was produced for use by the UNDP to calculate the Human Development Index; other new indicators have been requested by the World Bank, Global Partnership for Education (GPE), UNESCO, UNICEF, the Global Education Monitoring Report (GEMR), etc.); and
- Projects and initiatives (e.g. the rate of out-of-school children of pre-primary age was developed as part of the Out-of-School Children Initiative (OOSCI) and new finance indicators were developed for a project on National Education Accounts).

Every attempt is made to use existing data sources rather than conduct new data collections in order to manage respondent burden and ensure efficiency of the UIS statistical system. Indicator development is at the heart of UIS' work and is one of the main drivers for introducing new data collections or changing existing ones. Once the need for an indicator is identified and its further development agreed, the next steps are to develop the methodology to calculate the indicator, identify the data sources, administer a survey to Member States or identify alternate sources of data, and finally analyse the indicators. All of this is closely aligned with the UIS Medium-Term Strategy 2014-2021.

Figure 1. High-level process diagram of education indicator development[1]



[1] The letters A, B, C, D and E refer to sub-processes which are described in this document.

2. Process for updating or developing new indicators

A. Consult and research

For the majority of indicators, the requesting section, unit or organization submits the proposal for a particular indicator to the Education Standards and Methodology Section (ESM) for further development. This process includes the development of new indicators, calculation of new regional averages and the disaggregation of existing indicators by additional dimensions. ESM reviews the feasibility, and discussions are undertaken with the requester to ensure that the specifications are well understood and clear.

The process is more complex for indicators specifically developed for monitoring international goals, such as the SDGs, MDGs or EFA, as well as for specific regional needs. In such cases, the request is often more general: for the UIS to propose indicators to measure new concepts, targets or goals, rather than to produce a particular indicator. To address these types of requests, the UIS launches a consultation process with relevant international, regional and national partners to identify the best set of indicators and the underlying data needed. The process may involve sending a questionnaire to Member States, regional and international organizations and key stakeholders, or the establishment of a technical expert panel, such as the Technical Cooperation Group (TCG) or the Global Alliance to Monitor Learning (GAML).

Data availability and the feasibility of implementation, as well as an impact assessment on systems and cost, are addressed at this stage. After approval by the head of ESM, ESM staff do a preliminary calculation using available data and review the results. If no data are available, ESM staff consider what is required to obtain the necessary data and make a recommendation on whether to proceed.

The UIS relies on four main sources of data for indicator calculation: administrative records; household surveys and population censuses; learning assessments; and data from third parties, such as population estimates by the UN Population Division or financial data from the World Bank or the International Monetary Fund (IMF).

Approval to proceed to the next stage is given by the Head of ESM, in consultation with I.T. Services (ITS), the Analysis and Outreach Section (AOS) and the Education Surveys Section (ESS). Where further development is expected to involve substantial human or financial resources, the final approval to proceed is given by the Director of the UIS. Once approved, senior staff adjust budgets and work plans.

If data are already available, the UIS proceeds to develop the methodology for producing the indicator (step B, described below). If data are not available at the UIS, a placeholder may be proposed until data are available or a new process to gather the necessary data is established (see process 2 in Figure 1). The decision to gather new data[2] or to abandon the indicator development process is taken by the UIS Senior Team or, where minor adjustments to existing surveys are required, by the Head of ESM in consultation with the initial requester and, if appropriate, the Head of ESS. The decision is based on an assessment of the relevance of the indicator and the approximate cost in human and financial resources of developing a mechanism to collect, process and disseminate the data, and of the viability and feasibility of being able to produce a reliable indicator or set of indicators at the end.

[2] This paper does not describe the data compilation processes, which include updating the survey plan, designing the data collection system and infrastructure, and collecting the data.

B. Develop methodology and calculate the indicator

The next stage is to further develop the methodology and calculate the indicator. Calculation methods are defined and documented. The UIS also ensures the indicator is internationally comparable, measurable and relevant. If requested in the initial specification and data coverage is sufficient, regional averages are also calculated.

This work is typically undertaken by the ESM section with inputs from the ESS section and the initial requester. Every effort is made to use existing standards (e.g. the International Standard Classification of Education (ISCED)) and methodologies, including capping and filtering. If the data sources already exist (for example information on free and compulsory education for SDG Indicators 4.1.7 and 4.2.5), the work proceeds to test, finalise and document the methodology (step C).

C. Calculate national and regional indicators

If data are already available from existing survey instruments, such as UIS questionnaires, or have been obtained from other sources, such as DHS, MICS and other household surveys, then the next stage is to calculate and test the indicator and methodology for the set of available countries and years. Existing standards – such as for missing codes, imputation, capping and filtering – are applied and tested. The indicator is calculated and the results are carefully reviewed and compared to related indicators.

For key indicators and data, in particular those needed for the monitoring of international goals, the UIS also calculates regional and global values when relevant and possible.[3] To ensure these values are representative for the respective regions, imputations are made for countries with missing national data during the calculation. The UIS uses a variety of methods to impute missing data:

- nearest-year imputation (using data from the same country from a different year);
- unweighted group mean imputation (using the unweighted regional average for countries with missing data); or
- sequential imputation (using imputed values for other indicators in the imputation of the target indicator).

In some cases, mainly with sequential imputation, auxiliary information is used to impute a national value. For example, missing enrolment figures can be imputed by multiplying the previous year's gross enrolment ratio by the school-age population for the reference year for which enrolment is missing. Most imputations are only used to calculate regional totals or averages and are therefore not intended for publication. However, UIS staff may estimate missing data using similar methods to complete a dataset; these values are always flagged as UIS estimates and the estimation method is documented in the internal UIS database.

The simplest regional aggregates are sums of national values, for example total enrolment in primary education. Other aggregates are weighted averages of national indicators calculated as ratios. For the weight, the denominator of the underlying indicator is typically used. As an example, the national population of primary school age is used as the weight to calculate the regional primary net enrolment rate.

[3] Regional values are not calculated for all indicators because of the complexity of the imputation process.

Regional and global aggregates are only published by the UIS if the imputation time gap (the weighted average distance between the nearest year with publishable data and the reference year) is less than or equal to four years and if countries with publishable data represent at least 33% of the regional reference population. In those cases, the following quality standards are applied:

- If regional averages are based on publishable national data representing at least 60% of the regional reference population, for example the population of primary school age, they are published without qualifier.
- If regional averages are based on publishable national data for at least 33% but less than 60% of the regional reference population, they are published as "UIS estimates".

Once the calculation methodology has been finalised, documentation – such as the definition, glossary items, CalcIndic manuals and the indicator programming code – is updated. Documentation is provided in indicator-specific documents, e.g. for mean years of schooling, or more commonly as part of the code used to program indicators. The Heads of the Indicators Methodology Unit (MET) or the Household Survey and Equity Unit (HHS), responsible for testing and finalising the indicator methodology, approve the completion of this sub-process.

The UIS glossary (http://uis.unesco.org/en/glossary) is the main methodological reference for external data users. It contains definitions of indicators, describes calculation methods and data requirements, and offers information on interpretation and limitations of the indicators. Additional information is available in a regularly updated UIS document with Frequently Asked Questions About Education Statistics (http://uis.unesco.org/en/methodology).

Most data and indicators are disseminated with appropriate metadata, such as the data source used, data characteristics, concepts, classifications and interpretation of the indicators. All data and indicators in the UIS database are flagged to indicate whether they are based on observed data, estimated, missing, included in another category or not applicable.

D. Approve/endorse methodology

The final indicator methodology is approved by the Head of ESM. For indicators in the SDG 4 thematic framework, there are additional stages for approval, first by the TCG for all indicators (global and thematic) and then by the Inter-Agency Expert Group on SDG Indicators (IAEG-SDGs) for global indicators. This step can include feedback to improve the methodology. The Education 2030 Steering Committee is invited to endorse the indicators approved by the TCG but is not expected to reopen the technical discussions on the development of the indicators.

E. Disseminate, communicate and interpret indicators

The final phase in indicator production is to disseminate the indicator and for high-impact indicators to develop analytical tools, such as reports, fact sheets and eAtlases, to promote their use. The head of the relevant area of statistics or theme is responsible for updating the content of these products.

ESM staff update the theme trees and hierarchy of education indicators for UIS.Stat and the API, as well as the associated web tools and other products. Survey staff in ESS and ESM are responsible for updating and disseminating any metadata, such as the data sources, data characteristics, concepts and classifications, and

interpretation of the indicators. Metadata attached to individual indicators in the UIS database (http://data.uis.unesco.org) also contain information from the UIS Glossary, mentioned in Section C.

The UIS calculates regional averages once during a calendar year. This date is normally related to the main release of the survey and is aligned to critical dissemination products and events, such as the launch of the GEMR report or International Literacy Day. Even if new national data are released in a subsequent release, the regional averages remain unchanged. However, the UIS does calculate regional averages using the data from the main release for new or updated regional groupings based on client demands in a subsequent data release.

This work is undertaken as part of the regular dissemination process and new indicators are only released at the next planned data release. Changes are implemented and releases launched by I.T. Services based on the agreed dissemination timetable established annually by the Head of I.T. Services in agreement with the Heads of ESS, ESM and SCC. The dissemination timetable is reviewed and revised periodically during the year.

Changes to web tools and other products are approved by the Head of the Analysis and Outreach Section (AOS) and implemented by AOS in collaboration with I.T. Services.