Food and Agriculture Organization
of the United Nations

Session 5: Overview of ASTI methodology

Definitions and questionnaires

Regional Workshop for Asia and Pacific
Bangkok, Thailand, 15-17 January 2025

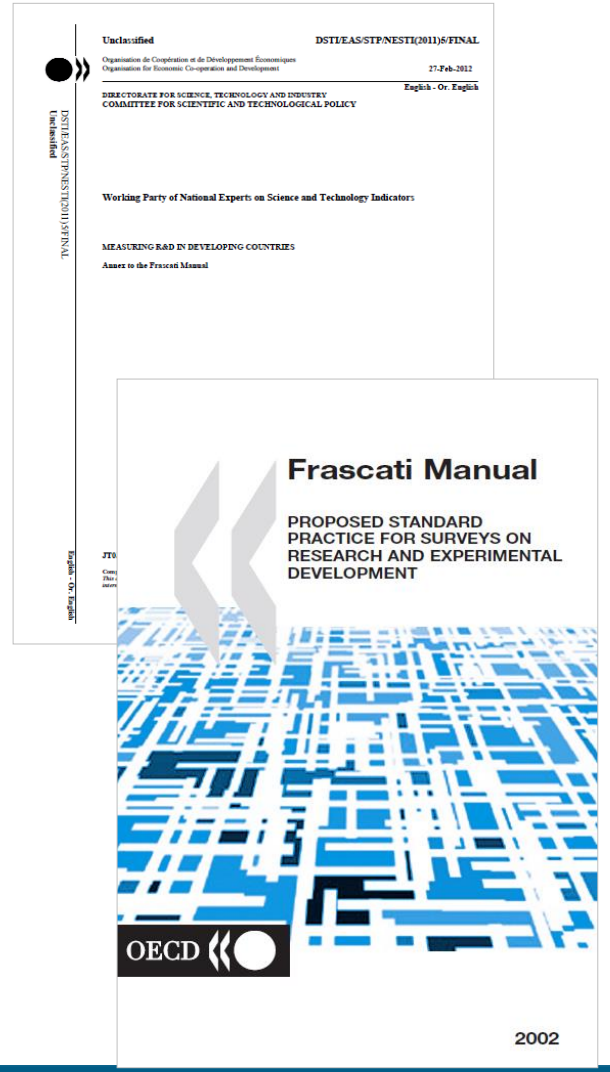
Session 5: Overview of ASTI methodology

1. Introduction to the ASTI survey history and implementation methodology
2. Overview of definitions used to clarify the scope
3. Overview of general indicators and associated data collected
4. Overview of the survey framework
5. Guidelines for survey completion
6. Discussions on the overall methodology

1. Introduction to ASTI survey history and implementation methodology

Historical origins of the ASTI survey

- The ASTI surveys were initiated by IFPRI in response to the gap between research data availability in the Organization for Economic Co-operation and Development (OECD) countries and most of the developing economies in the Global South
- The methodology of the ASTI survey aligns with the Frascati Manual developed by the OECD and its partners, which has remained a reference methodology
- While the methodology is applicable for research indicators in developed countries, ASTI adjusted some criteria to better align with agricultural research indicators in developing countries
- Standardization with the Frascati manual method ensures compatibility of the data over time. The OECD now also consults the ASTI program during its discussions on data format changes.



2. Overview of definitions used to clarify the scope

General definitions used in the Frascati Manual

The scope of ASTI is Agricultural Research and Development (R&D).

ASTI adopts the definition provided in the Frascati manual, which speaks more precisely of "research and experimental development": the "D" in R&D refers to experimental development.

Research and Experimental Development:

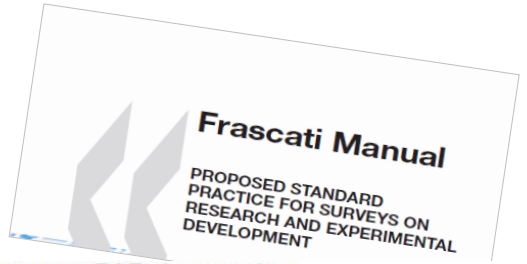
- ***"Creative and systematic work undertaken in order to increase the stock of knowledge [...] and to devise new applications of available knowledge."***
- Three categories: basic research, applied research, and experimental development (ASTI doesn't ask to categorize)
- Excluded: education/training; pure extension; financing (funder); indirect administrative and other support activities.

"Research" activities:

novel
creative
uncertain
systematic
transferable/reproducible

2. Overview of definitions used to clarify the scope

Some examples of what to include and exclude in R&D



- Routine changes to products or processes are excluded, but new methods developed to perform common tasks are included. (For example, data processing is not an R&D activity unless it is part of a project to develop new methods for data processing.)
- Keeping daily records of temperatures is not R&D, but a standard procedure. The investigation of new methods of measuring temperature is R&D, as is the study and development of new models for weather prediction.
- The concept of experimental development should not be confused with "product development". Experimental development is just one possible stage in the product development process: during the experimental development stage new knowledge is generated, and that stage comes to an end when the R&D criteria (novel, uncertain, creative, systematic, and transferable and/or reproducible) no longer apply.

Boundaries of what activities to include or exclude under R&D are not universally agreed

Table 2.3. **Borderline between R&D, innovation and other business activities**

Item	Treatment	Remarks
Prototypes	Include in R&D	As long as the primary objective is to make further improvements.
Pilot plant	Include in R&D	As long as the primary purpose is R&D.
Industrial design	Split	Include design required during R&D. Exclude design for production process.
Industrial engineering and tooling up	Split	Include "feedback" R&D and tooling up industrial engineering in innovation processes. Exclude for production processes.
Trial production	Split	Include if production implies full-scale testing and subsequent further design and engineering. Exclude all other associated activities.
Pre-production development	Exclude	
After-sales service and trouble-shooting	Exclude	Except "feedback" R&D (to be included).
Patent and licence work	Exclude	All administrative and legal work needed to apply for patents and licences (delivering documentation as an outcome of R&D projects is R&D). However, patent work connected directly with R&D projects is R&D.
Routine tests	Exclude	Even if undertaken by R&D personnel.
Data collection	Exclude	Except when an integral part of R&D.
Routine compliance with public inspection control, enforcement of standards, regulations	Exclude	

2. Overview of definitions used to clarify the scope

General definitions for national agricultural R&D

- **Agricultural R&D (adopted by ASTI):**
  - Crops, livestock, forestry, fisheries, natural resources, and the socioeconomic aspects of **primary** agricultural production.
  - **On-farm** storage and processing of agricultural products.
  - *Excludes: off-farm postharvest and food processing research.*

- ***National* Research:**
  - Domestically targeted research activities funded or executed by (local) research agencies within a particular country.
  - *Research activities of international or bilateral research agencies that are not executed through national institutes are excluded.*

The scope is primary production: everything under the secondary (manufacturing) and tertiary (services) sectors is excluded. *R&D in the agrochemical industry, agricultural machinery, and the food processing industry off farm is not included in the current ASTI data (these belong to the secondary sector and are better reported under those industries).*

Also not included are the more discipline-oriented basic research activities undertaken by departments such as microbiology and zoology, except when this work has a clear focus on agriculture.

2. Overview of definitions to clarify the scope

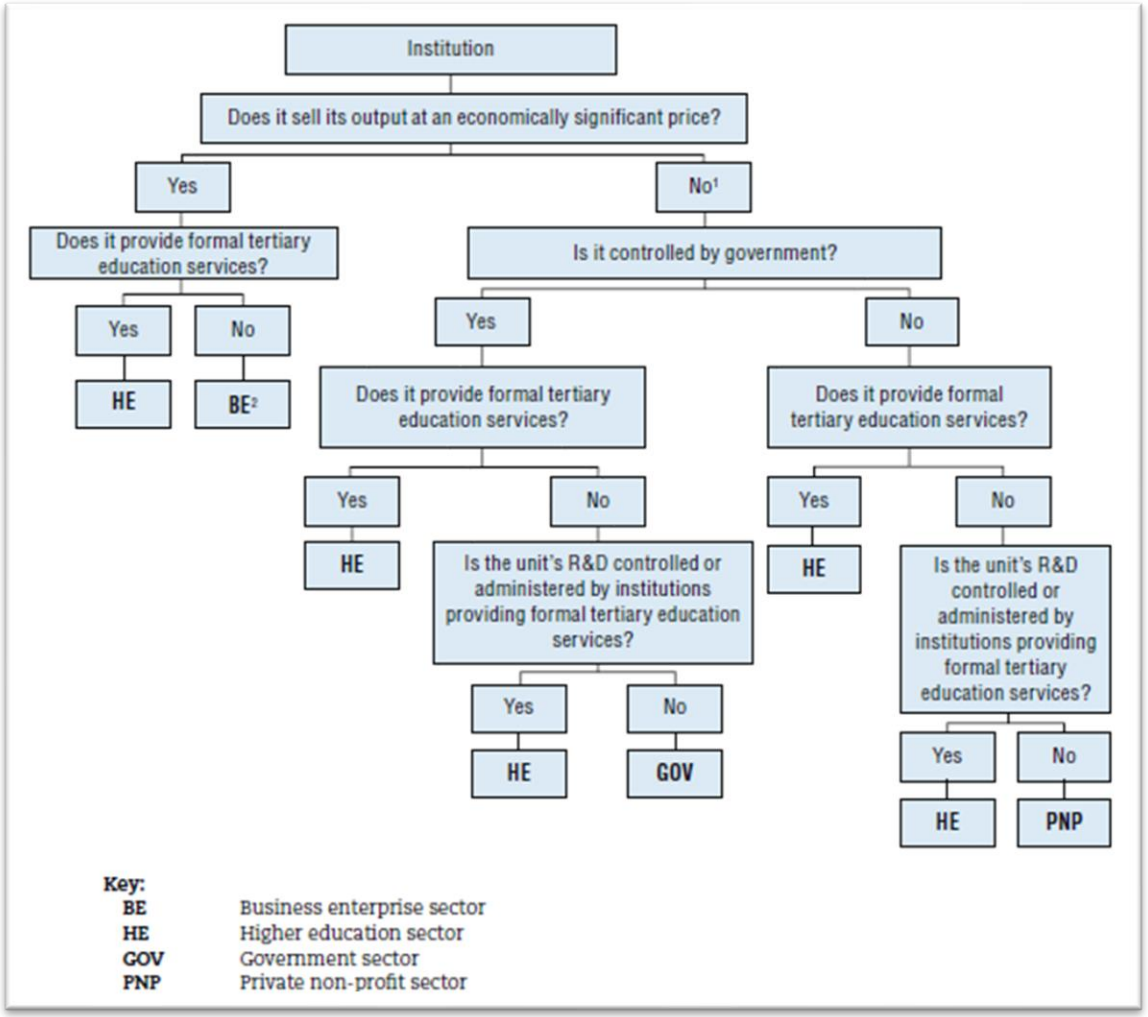
General definitions used in the Frascati Manual

- **Research Performer:**

  The entity that is carrying out the research, not funding the research.

- **Institutional Categories:**
  - Government agencies
  - Higher education agencies
  - Nonprofit agencies
  - Private for-profit agencies

Frascati Manual 2015, page 91



2. Overview of definitions to clarify the scope

Q&A – 10 min

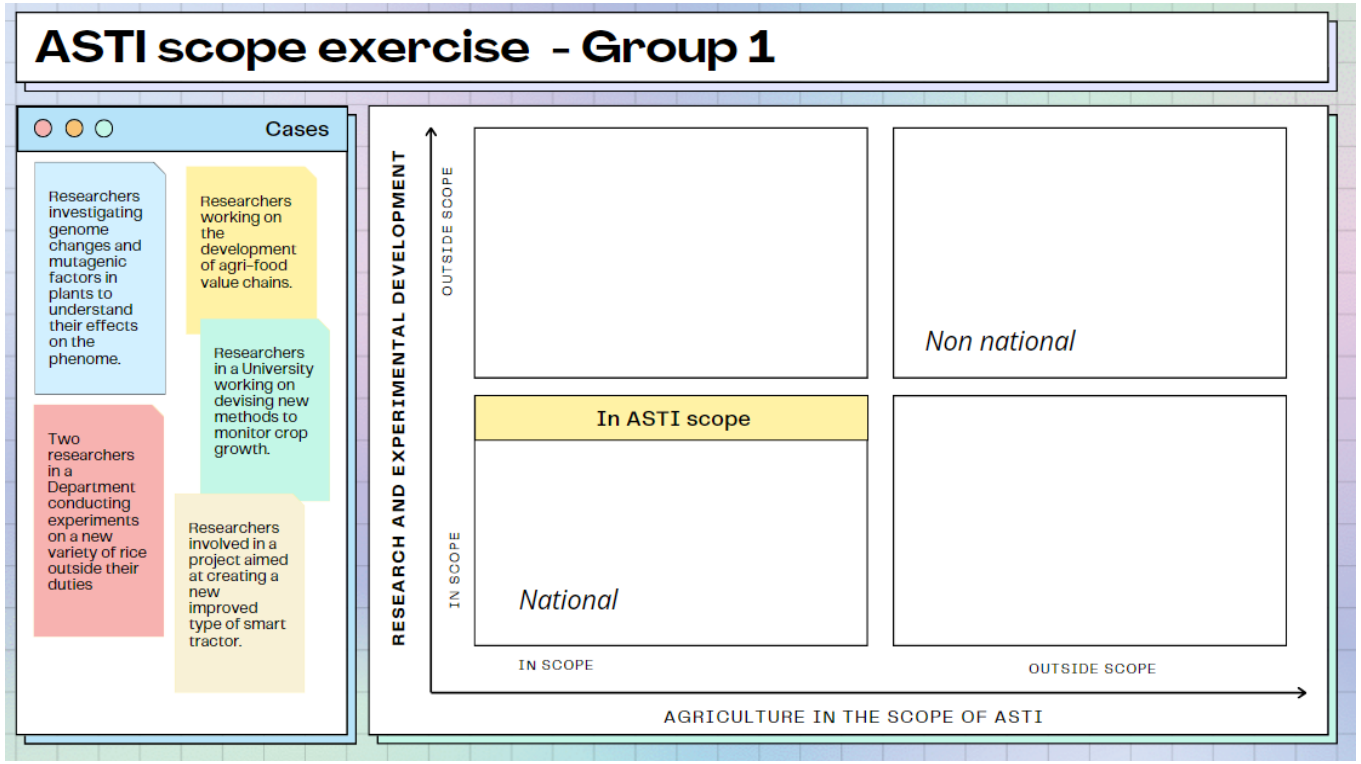
Activity 1 – 20 min

Blurred boundaries / borderline cases

3 or 4 groups

Stickers with sample cases: group has to agree on where the stickers go on the board.

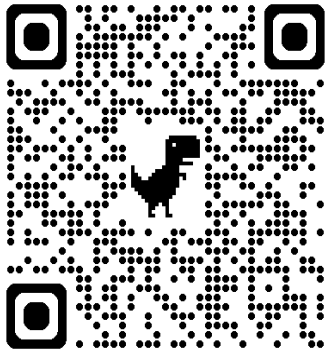
Interesting cases / disagreements to be discussed all together.



Link access to the group exercises

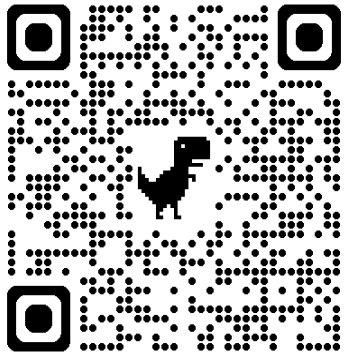
GROUP A
Malaysia
Thailand
Iran
Fiji

Click to access



GROUP B
Lao PDR
PNG
Nepal
Bhutan

Click to access



GROUP C
Vietnam
Bangladesh
Cambodia
Sri Lanka
Philippines

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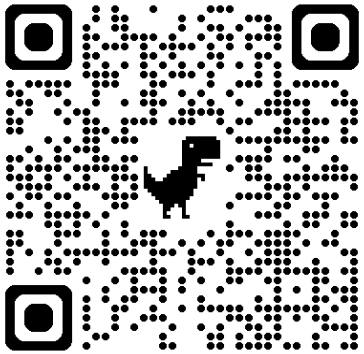

3. Overview of indicators and associated data collected

Types of data collected are based on the indicators being measured

- **ASTI has a set of indicators:**
  - Institutional details (foundational data)
  - Human resources(by gender and degree),
  - Financial data (Spending and funding resources)
  - Research focus by comodity and thematic areas.
  - Research outputs *(not collected through the agency surveys anymore)*

  ……
- **ASTI also collects Qualitative Information** through interviews
  - Qualitative data gathered on broad issues
  - To complement the core data during analysis

3. Overview of indicators and associated data collected

ASTI data indicators by category

1. Human Resources

- Researchers' time spent on research
- Researchers by degree, gender, and age bracket
- Researchers by commodity focus
- Researchers by thematic focus & addressing crucial cross-cutting themes
- Support staff (technicians, admin, other)

2. Financial Resources

Spending by cost category

- Salaries
- Operating and programs costs
- Capital investments

Funding sources

- Government funding (core and other)
- Donor contributions
- Development bank loans
- Commodity levies
- Sales of goods and services
- Other

3. Research outputs (not in the survey)

- Peer-reviewed publications
  - Journal articles (international, regional, national)
  - Books
  - Book chapters
- New registrations of crop varieties and non-crop technologies

3. Data collection and data series frequency

- Some data needs to be collected and published every year,.
- Some data needs to be available for every year, but can be collected on benchmark years retroactively.
- Other data can be updated at larger intervals only for benchmark years.
- Under the new approach, each indicator built from this dataset has been assigned to a tier:
  - **Tier 1**: indicators collected annually
  - **Tier 2**:
    - A. indicators that need to be available in yearly data series but can be published at larger intervals;
    - B. indicators that can be collected for and published in benchmark years

3. Frequency and channels

Tier 1: basic aggregates

Indicators on human resourcse and spending will be updated through a FAO questionnaire administered annually (to start with, total spending, total researchers by degree and gender)

This data will be disseminated on FAOSTAT

Tier 2: detailed and granular data

Full questionnaire every 3-5 years for more granular and in-depth data administered by the ASTI focal point (e.g. research funding sources, partnerships)

This data will be disseminated by counrties and **on the FAO STI portal**

4. Guidelines for survey completion

Tier 1 data

Direct indicators on human resources: headcount data

RES.HC	Researchers	headcounts
RES.FEMALE.TOT.HC	Researchers, total, female	headcounts
RES.MALE.TOT.HC	Researchers, total, male	headcounts
RES.BSC.HC	Researchers, BSc	headcounts
RES.MSC.HC	Researchers, MSc	Headcounts
RES.PHD.HC	Researchers, PhD	Headcounts

Absolute headcount numbers taken from the survey responses

B2. Researchers (including research managers) by highest education level and by gender, 2023			
	Number (headcount)		
	Female	***Male***	***SUM***
PhD			**0**
MSc			**0**
BSc			**0**
TOTAL	**0**	**0**	**0**

4. Guidelines for survey completion

Data on HUMAN RESOURCES

Tier 1 data

Key concept: Proportion of time spent on agricultural R&D

Question 1 in the “Human resources” section.
The key question that asks for the overall percentage of researchers' time devoted to agricultural research.
It is used to calculate the Full Time Equivalent in combination with the researchers' headcount question.

B1. Overall proportion (%) of research staff time dedicated to ag research vs. non-research, 2023	
	Proportion (%)
	2023
Agricultural research	85%

4. Guidelines for survey completion

Key concept related to HUMAN RESOURCES data

- **Calculation of 'Full-Time Equivalents' (FTEs) for Human Resource data**
  - ASTI collects human resource data in headcounts, and time-use/focus data in percentages.
    However, the final data are presented in Full-time Equivalents (FTEs), which take into account the proportion of actual time spent on agricultural research activities.

FTEs

The ratio of working hours actually spent on R&D during a specific reference period (usually a calendar year) divided by the total number of hours conventionally worked in the same period by an individual or by a group.

  - *For example, university staff spend a considerable proportion of their time on non-research activities, such as teaching, administration, or student guidance.*
  - *Thus, four faculty members estimated to spend 25 percent of their time on research would individually represent 0.25 FTE and collectively be counted as 1.0 FTE.*

RES.FTE	Researchers	FTEs
RES.PHD.FEMALE.FTE	Researchers, female, PhD	FTEs

- **Calculation of 'Full-Time Equivalents' (FTEs) for Human Resource data**

GLOBAL.RES.PERCENT	Percentage of staff time devoted to ag R&D	share out of total staff time

Key reference value for calculating FTEs from key question B1

Calculation

RES.FEMALE.PHD.HC	Researchers, female, PhD	headcounts	ASTI	IMPORT('RES.FEMALE.PHD.HC')
RES.PHD.FEMALE.FTE	Researchers, female, PhD	FTEs	CALCULATED	AY('RES.FEMALE.PHD.HC') * AY('GLOBAL.RES.PERCENT')
RES.FEMALE.PHD.SHRE	Researchers, female, PhD	share of PhD, headcounts, %	CALCULATED	(ACY('RES.FEMALE.PHD.HC') / ACY('RES.FEMALE.PHD.HC','RES.MALE.PHD.HC')) * 100

It's imported directly from the surveys – NO calculation

Multiplies the above HC by the reference GLOBAL.RES.PERCENT

Calculates disaggregation (female) % out of total (PhDs)

4. Guidelines for survey completion

Tier 2 data

Data on HUMAN RESOURCES: definition of categories

- **Professional Research Staff:**
  - Those holding a research position, at least a BSc degree
  - Include long-terms consultants and long-term contractual staff
  - Include management positions such as (deputy) director and heads of research programs
  - Only staff on post (exclude staff on long-term unpaid leave and positions approved but not filled)
  - *Expats paid by their mother institutes are not on the payroll of national agricultural research institutes*

- **Research Support Staff**
  - Technical support staff: those who directly support the design and conduct of agricultural research activities but who do not hold a formal researcher position
  - Administrative support staff: those providing administrative support
  - Other support staff: All remaining staff not classified in the above categories

The data collected for human resources numbers, disaggregated by gender, age group, education level, position and category, is in **headcounts**.

4. Guidelines for survey completion

Data on HUMAN RESOURCES: research focus

Tier 2 data

- **Percentage of researchers' time to represent Research Focus**

The “Research focus” section collects data on the focus of the research conducted. It does so through three questions on **percentages of researchers’ time** spent respectively on:

- specific commodities,
- specific thematic areas,
- cross-cutting themes including equality, climate change, environmental sustainability).

An "other" category is always listed, so that the total of the focus percentages has to be 100%, and the 100% is relative to the overall proportion of time dedicated to agricultural research, as reported in question B1

4. Guidelines for survey completion

Data on HUMAN RESOURCES: research focus

Tier 2 data

- **Percentage of researchers' time to represent Research Focus by commodity:**

D1. Commodity focus in percentages, 2023					
1. Cereals	***0%***	***5. Horticulture***	***0%***	***8. Animals***	***0%***
Wheat		Vegetables		Cattle	
Rice		Bananas and plantains		Goats	
Barley		Flowers and ornamentals		Sheep	
Maize		Grapes		Camelids	
Sorghum		Citrus Fruits		Buffaloes	
Millet		Apple		Swine	
Quinoa		Olive		Equines	
Other cereals		Pineapples		Poultry	
2. Roots and Tubers	***0%***	Tomatoes		Seri- and apiculture	
Potatoes		Mangoes		Dairy	
Sweet potatoes		Lettuce		Other animals	
Cassava		Carrots		***9. Pastures and forages***	***0%***
Garlic		Chillies and Peppers		Pastures and forages	
Yams		Avocados		***10. Forestry***	***0%***
Taro (old cocoyam)		Melons		Forestry	
Onions		Other fruits		***11. Fisheries***	***0%***
Yautia (new cocoyam)		***6. Nuts***	***0%***	Marine	
Other roots and tubers		Pistachio		Inland (including aquaculture)	
3. Pulses	***0%***	Almond		***13. Non-commodity categories***	***0%***
Beans		Other nuts		Other categories	
Chick-peas		***7. Other crops***	***0%***		
Lentils		Sugar			
Cowpeas		Coffee			
Other pulses		Cocoa			
4. Oil-bearing crops	***0%***	Tea			
Soybeans		Tobacco			
Oil palm		Rubber			
Sesame		Spices			
Groundnuts		Cotton			
Coconut palm		Medicinal Plants			
Other oil-bearing crops		Jute			
		Other crops		***TOTAL***	***0%***

4. Guidelines for survey completion

FINANCIAL DATA: Spending and funding sources

FUND. CURNTLCU.HC	Funding, total	million current local currency
FUND.GOVCORE.CURNTLCU.HC	Funding, government, core	million current local currency
EXP. CURNTLCU.HC	Spending, total	million current local currency
EXP.SALARIES.CURNTLCU.HC	Spending, salaries	million current local currency

Absolute amounts in local currency taken from the survey responses, before FTE adjustment.

C1. Total expenditures by cost category, 2023 (in thousands of current, local currency units)	
	2023
Salaries and benefits for all personnel*	
Operating and research program costs**	
Capital investments***	
TOTAL	0

C2a. Total funding by source, 2023 (in thousands of current, local currency units)	
	2023
Government (core funding)	
Government (other)	
Loans from development banks	
Bilateral and multilateral donors	
Commodity levies/Producer organization	
Sale of goods and services	
Other	
TOTAL	0

4. Guidelines for survey completion

Tier 1 data

FINANCIAL DATA: Spending

Research expenditures categories:

- ***Salaries:*** Include also staff remuneration packages of permanent staff as well as temporary staff salaries
- ***Operating and program expenditures:*** Include items as electricity, gasoline, agricultural inputs, staff training, travel, maintenance, etc.
- ***Capital expenditures:*** Include all expenditures related to the purchase or rental of items that last longer than a year (e.g., land, building, lab equipment, computers, furniture, vehicles)

Only actual expenditures to be used, not those budgeted/projected

Should include expenditures under all funding sources

Known challenges:

- *Often difficult for universities to separate research costs from other costs*
- *Salaries of temporary/contract staff are often reported under operating costs*

4. Guidelines for survey completion

Tier 2 data

FINANCIAL Data: Funding sources

Funds actually received, not budgeted/projected

Types of funding sources:

- **Government core** allocations: include direct institutional funding from central budget
- **Other government**: Include government funding that complements annual appropriations from national budgets
- **Loans** from multilateral donors
- **Grants** from multilateral and bilateral donors: include grants from CGIAR centers, Donors, RO/SRO, private foundations
- **Commodity levies / producer organizations**: Include funding through commodity taxes levied on agricultural production or exports
- **Sale** of goods and services, including contract-based research for public/private enterprises
- Other sources

Known challenges:

- *Financial reporting systems of agencies do not always reflect the same classifications used by ASTI*
- *Financial years do not necessarily match calendar years*. (If the financial year differs from the calendar year, spending is reported in the calendar year that covers the majority of the financial year in question. For example, if the 2017/18 financial year begins April 1, 2017, all costs for that year are reported as 2017; if the financial year begins July 1, 2017, all costs for that year are reported as 2018.)

4. Definitions and guidelines for survey completion

Key concept related to FINANCIAL Data

- **Local currencies and comparability**
  - ASTI collects financial data in local currencies. Then it harmonizes this data for comparison purposes.
  - ASTI uses a procedure that first deflates research expenditures in current local currency units and then converts to a common currency unit using **Purchasing Power Parity (PPP) Dollars** [2011] .
  - PPPs measure the relative purchasing power of currencies across countries.
  - The ASTI website provides spending data both in PPP dollars and local currency units.
- **FTE Adjustment**
  - All financial data will be FTE adjusted in order to represent agricultural research spending more precisely.

ESP.PPP.FTE	Total spending (PPP)	FTEs
ESP. Salaries.PPP.FTE	Spending on Salaries (PPP)	FTEs

5. Discussions on the questionnaire structure and survey approach

Final discussion / reflection – 15-20 min

Q&A, reflection

Is this set of indicators relevant? Would it help YOUR institution and YOUR country to have this data?

Is the methodology and framework (tiers, recipient groups, sections) adequate and practical?

Output of the session

- *Feedback collected on the clarity / understanding of the scope of ASTI*
  - *Improvement of scope description and examples*
- *Feedback collected on the methodology and indicators*
- *Identified specific challenges*

Thank you!

4. Guidelines for survey completion

Tier 2 data

Data on HUMAN RESOURCES: research focus

- **Percentage of researchers' time to represent Research Focus by thematic area:**

D2. Thematic areas focus in percentages, 2023	
Research area	*% of researchers' time*
Plant breeding (including trees, excluding biotechnology)	
Agronomy (crop production and management, fertilizer research)	
Crop pest and disease control (including plant pathology and entomology)	
Plant biotechnology	
Other plant-related areas	
Animal breeding (including fisheries, excluding biotechnology)	
Animal husbandry and management	
Pastures / animal nutrition	
Animal pest and disease control (including veterinary science)	
Livestock biotechnology	
Other livestock-related areas	
Forestry and agroforestry	
Fisheries and aquatic resources	
Soil	
Water	
Other natural resources areas	
Agricultural engineering (including mechanization)	
Digital agriculture (remote sensing, drones, precision agriculture...)	
Frontier technologies	
Food safety (excluding off-farm)	
On-farm storage and processing	
Integrated farming systems	
Biodiversity conservation / agroecology	
Socio-economic and policy aspects of primary agricultural production	
Farm management / agribusiness development	
Total should be 100%	0%