

Outline

1. Overview on Statistical Method and Surveys
2. Overview on Survey Methodology
3. Complete surveys and Sample surveys
4. Different perspectives of the Lifecycle of a survey
5. Target Populations, frames and coverage errors
6. Various type of possible errors

1. Overview on Statistical Method and Surveys -1-

- What is a Statistical Survey?



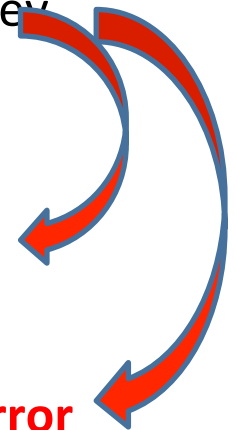
it is a **collection of data** on a Population (of units), implemented and carried out using statistical reasoning and methods

- What is Survey Methodology?



Survey methodology (S.M) seeks to **identify principles** about the **design, collection, processing and analysis** of surveys that are linked to the **cost** and **quality** of survey estimates

- This means that S.M. **focuses** on **improving quality within cost constraints**, or, alternatively, reducing costs for some fixed level of quality
- “**Quality**” is defined within a **framework** labeled “**the total survey error paradigm**”



Statistical Reasoning born with the humanity

STEPS OF GENERAL REASONING

- Problem to be solved
- Information useful
- Collection of information
- Analysis of information
- Decision (choice of the action)

STEPS OF STATISTICAL REASONING

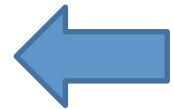
Problem to be solved

Definition of data need

Collection of data (Surveys)

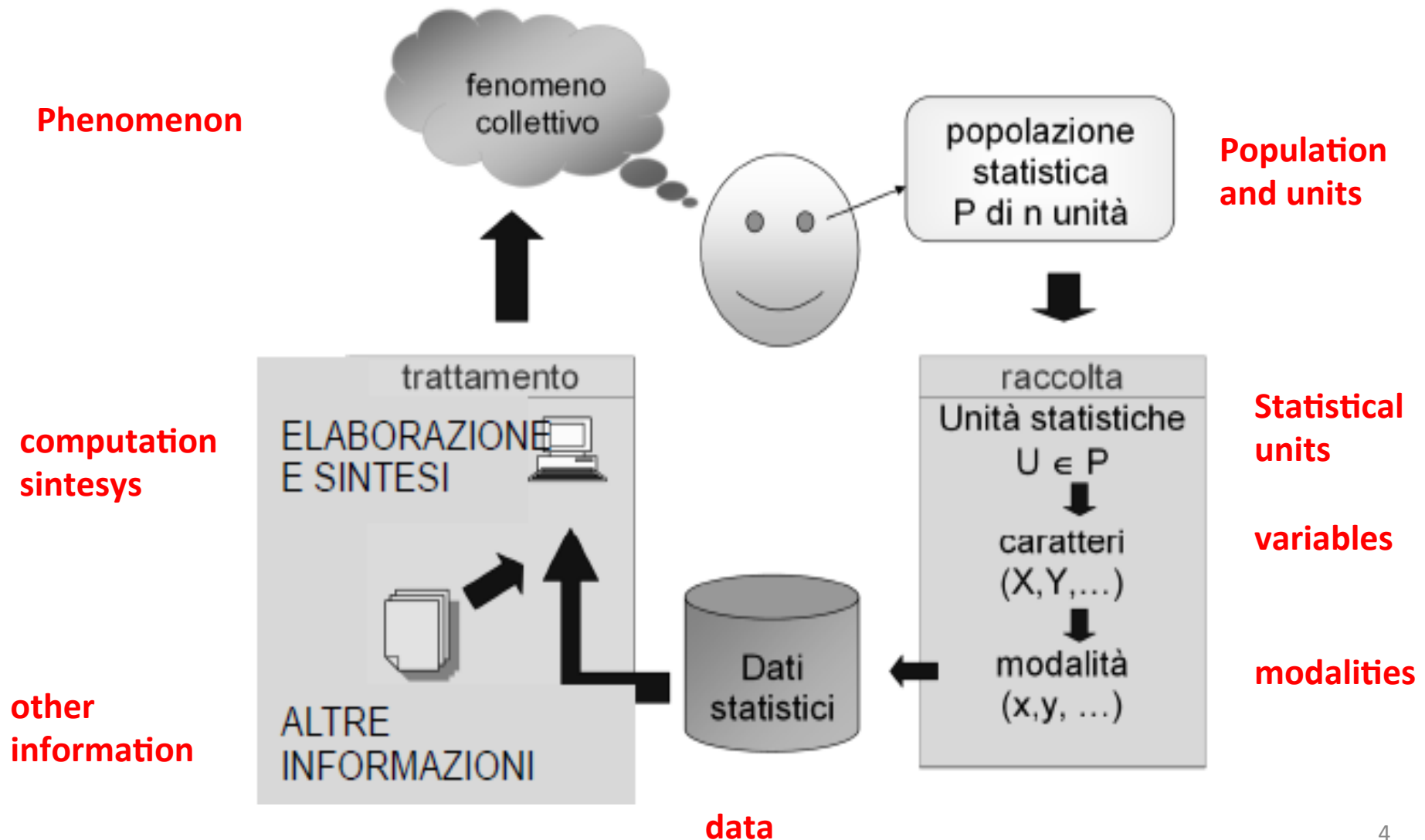
Statistical Methods for Anal.

Decision (choice of the action)



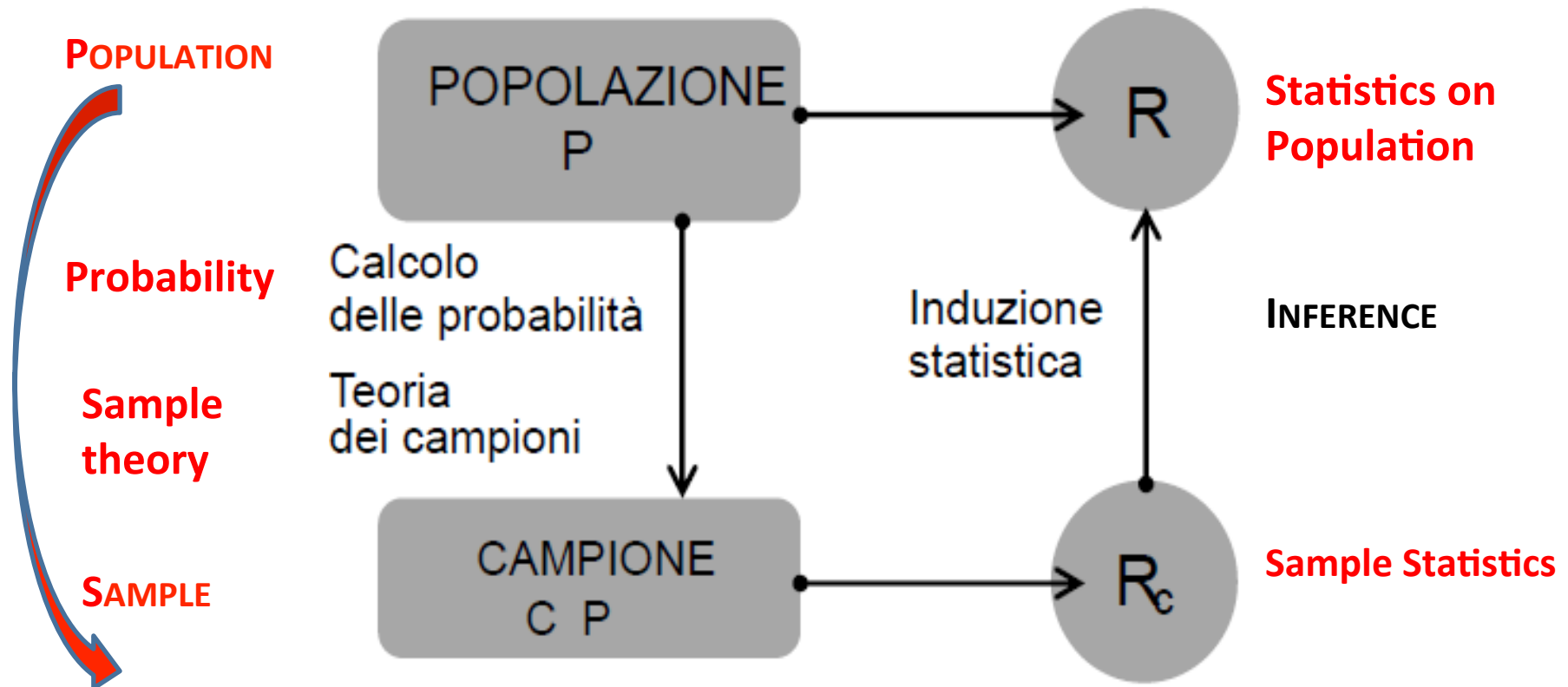
Statistical terms of data collection

Framework of a statistical survey



Use of Sample and Statistical Inference

Statistical Inference Framework



OFTEN YOU CANNOT COLLECT DATA
FOR THE WHOLE POPULATION

2. Overview on Survey Methodology

- **Survey methodology** describes the **different phases** of a survey and why **possible errors** arise, explaining how the details of the surveys affect the quality of their results
- In general term the **different phases** are:
 - ✓ **Survey design**
 - ✓ **Data Collection**
 - ✓ **Data processing**
 - ✓ **Data analysis**
- There are **more than one kind of errors** that affects survey estimates

3. Complete survey and sample survey

➤ **Complete survey
or enumeration
(census)**

When it is possible to collect data for **all the units of the population**

➤ **Sample survey**

Often you **cannot collect data for the whole population**, because it is too big and to do so would be too costly, too time consuming, or impossible.

So it is **necessary to collect data only** for a small group of units or better for a **representative sample** of the population

- ❖ Many possible errors in survey design and data collection **are the same** for censuses and samples, but in the latter case there are **also specific sampling errors**

3. Two types of inference -1-

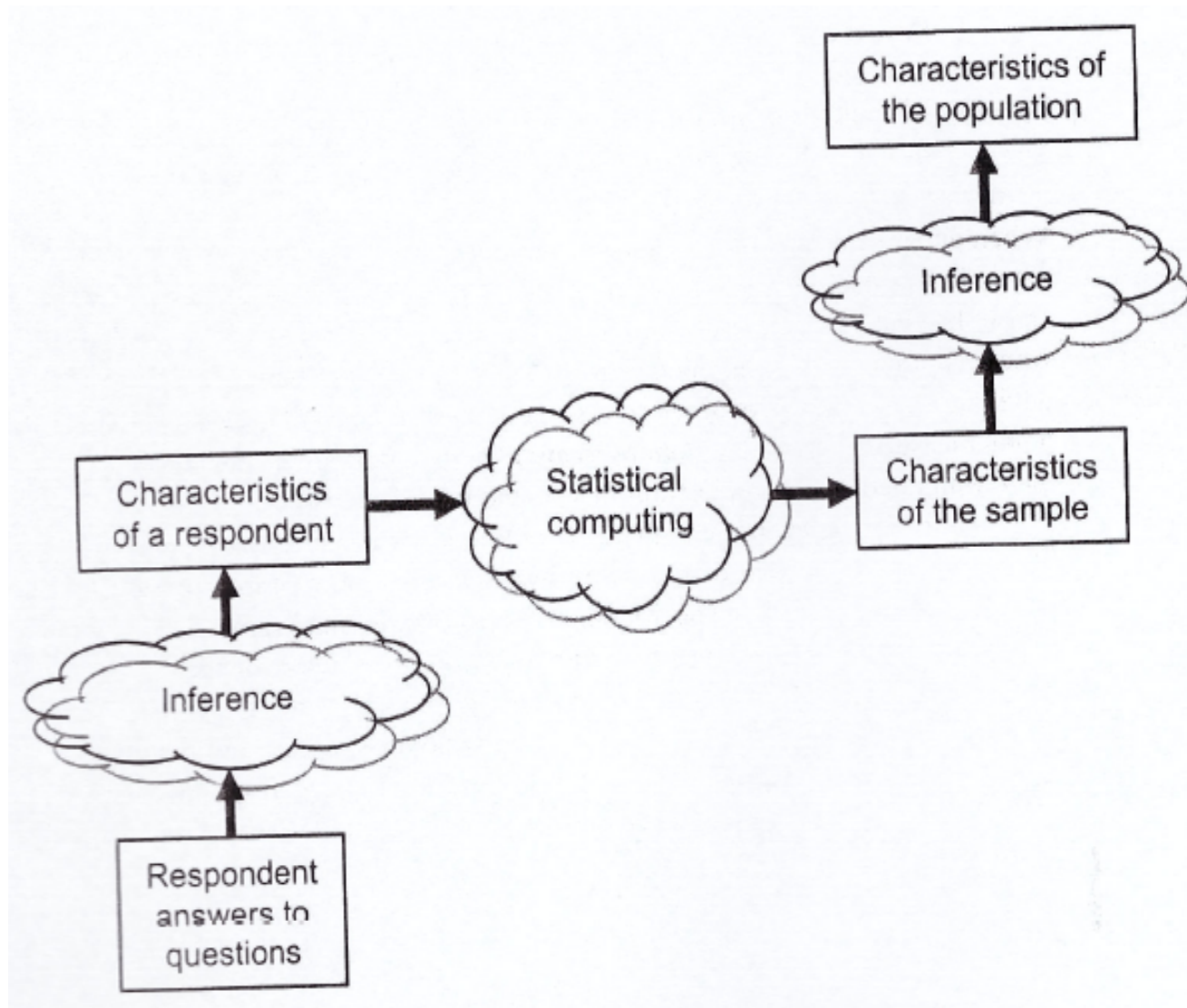
As a starting point, let us think about **how surveys work to produce statistical description of population**

From the following Figure we can see that there are **two types of survey inference** (vertical arrows)

1. From the **individual answer** to draw **inference** about the real characteristic of unit
2. From a **group of units** (sample) **to all units** of the population

Thus, in any case, also without considering the possible errors, the **information obtained imperfectly describe** a more **abstract larger entity**

2. Two types of inference -2-



4. Different perspectives about surveys

Two dominant perspective about surveys

The **DESIGN** PERSPECTIVE

design move from
concrete actions

The **QUALITY** PERSPECTIVE Survey

(major sources of abstract ideas to
errors)

❖ **WITHOUT A GOOD DESIGN, GOOD SURVEY STATISTICS RARELY RESULTS**

➤ There are **two dimensions**

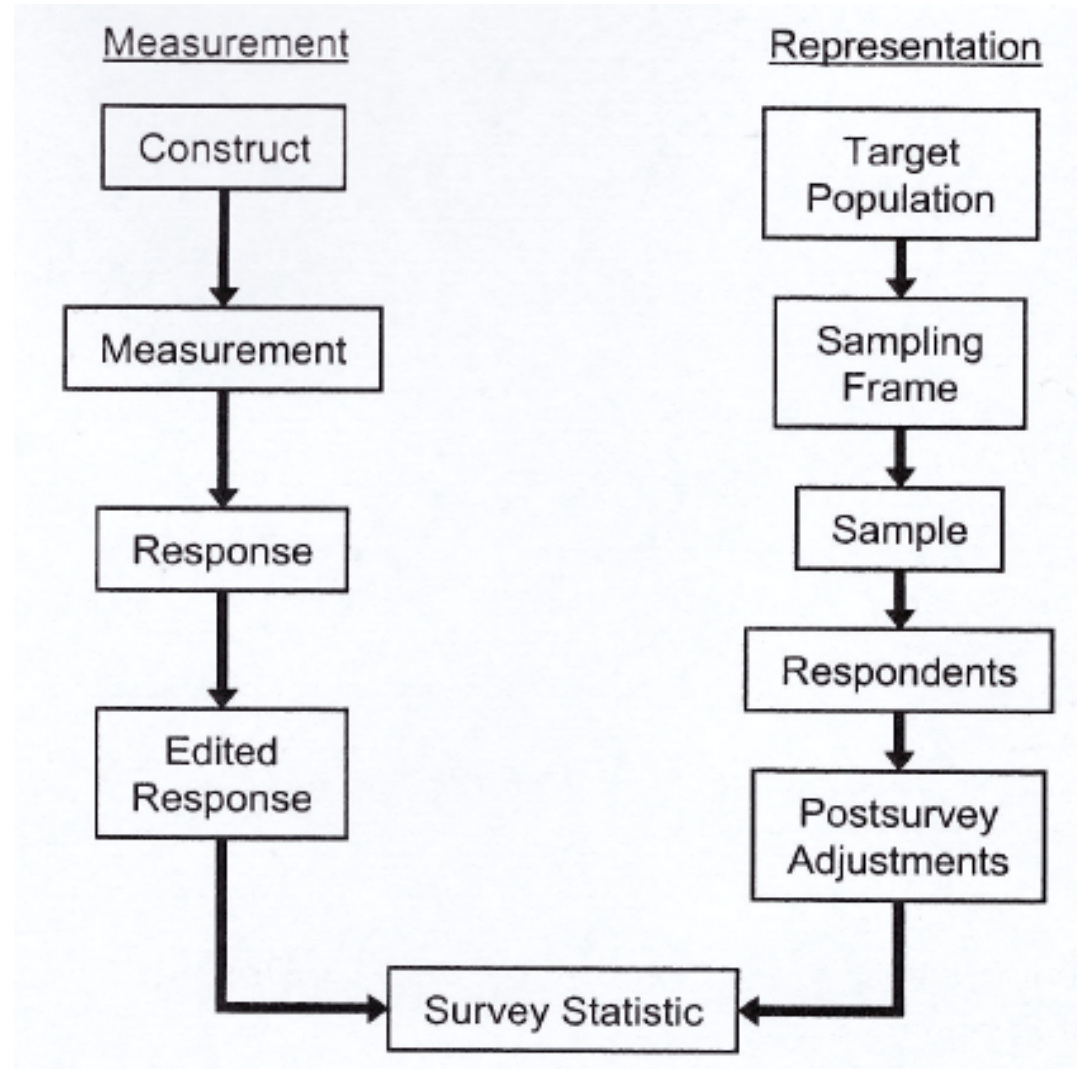
1. **MEASUREMENT** DIMENSION describe what data are to be collected
What is the survey about?

2. **REPRESENTATIONAL** DIMENSION concerns what populations are
described

Who is the survey about?

The Life Cycle of a Survey -1-

THE LIFE CYCLE OF A SURVEY FROM A DESIGN PERSPECTIVE



Constructs and Measurement

- **What do you want to know?**
- **Construct are the elements of information that are sought by the researcher**
- **Some constructs more easily lend themselves to measurements than others**
- **Some constructs are more abstract than others**

Clarifying the Purpose

- **Why conduct a survey?**
- **Who are the stakeholders?**
- **Who is the population of interest?**
- **What issues need to be explored?**

5. Target Population and Study Population

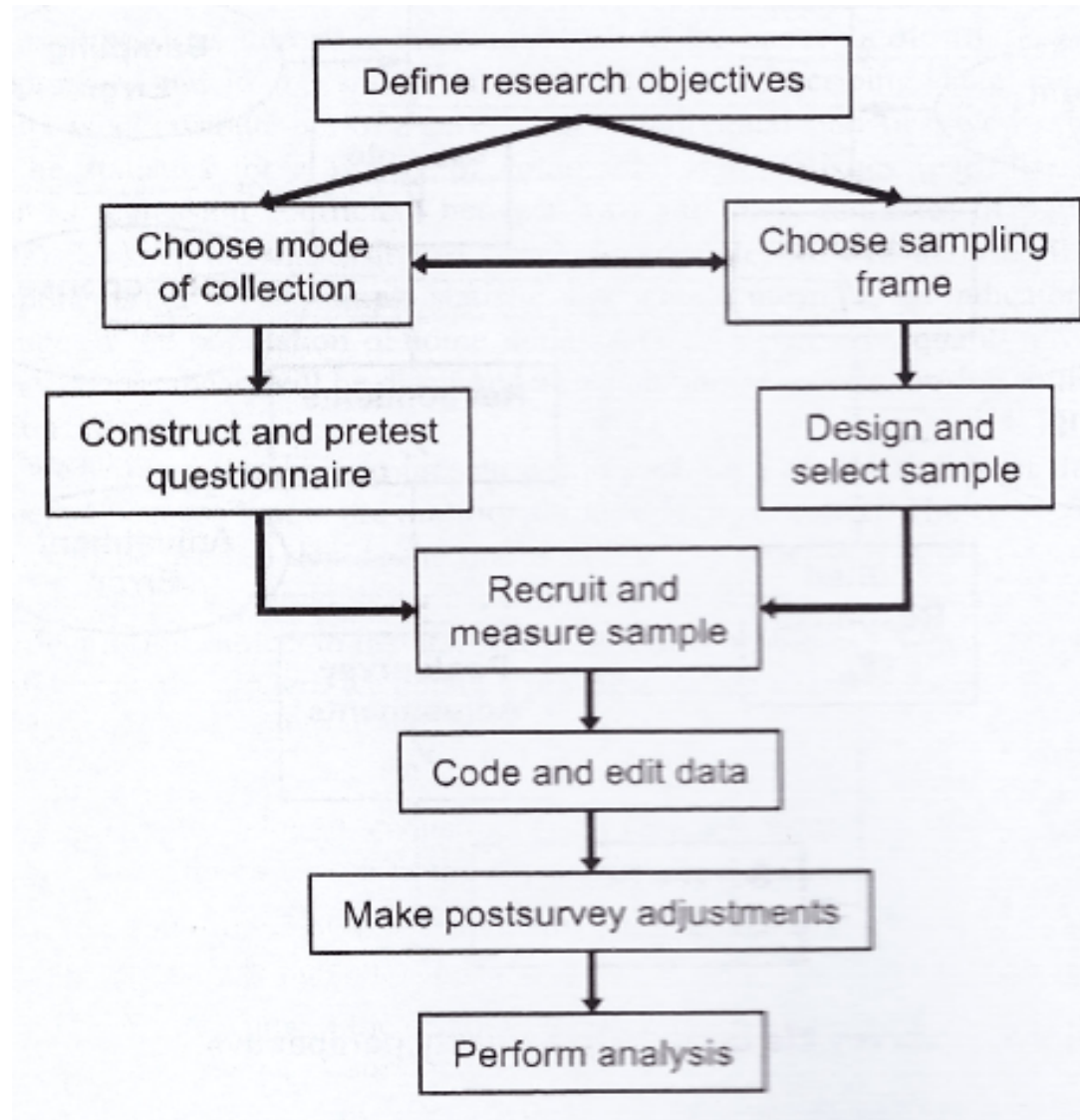
- **Population** – all the theoretically-relevant cases (e.g. 'Fiorentina-football supporters'). This is also often referred to as the **Target Population**.
- This may differ from the **Study Population**, which is all of the theoretically-relevant cases which are actually available to be studied (e.g. 'all Fiorentina club members')

Unit of Survey Analysis and research instrument

- Typically, individuals are the 'units of analysis'. (This is not always the case though: for example in a survey of schools)
- Individuals, referred to as respondents, provide data by responding to questions.
- The 'research instrument' used to gather data is often referred to as a questionnaire.
- Questionnaires/'Interview schedules':
 - collect standardised information.
 - are used to elicit information to be used in analyses.

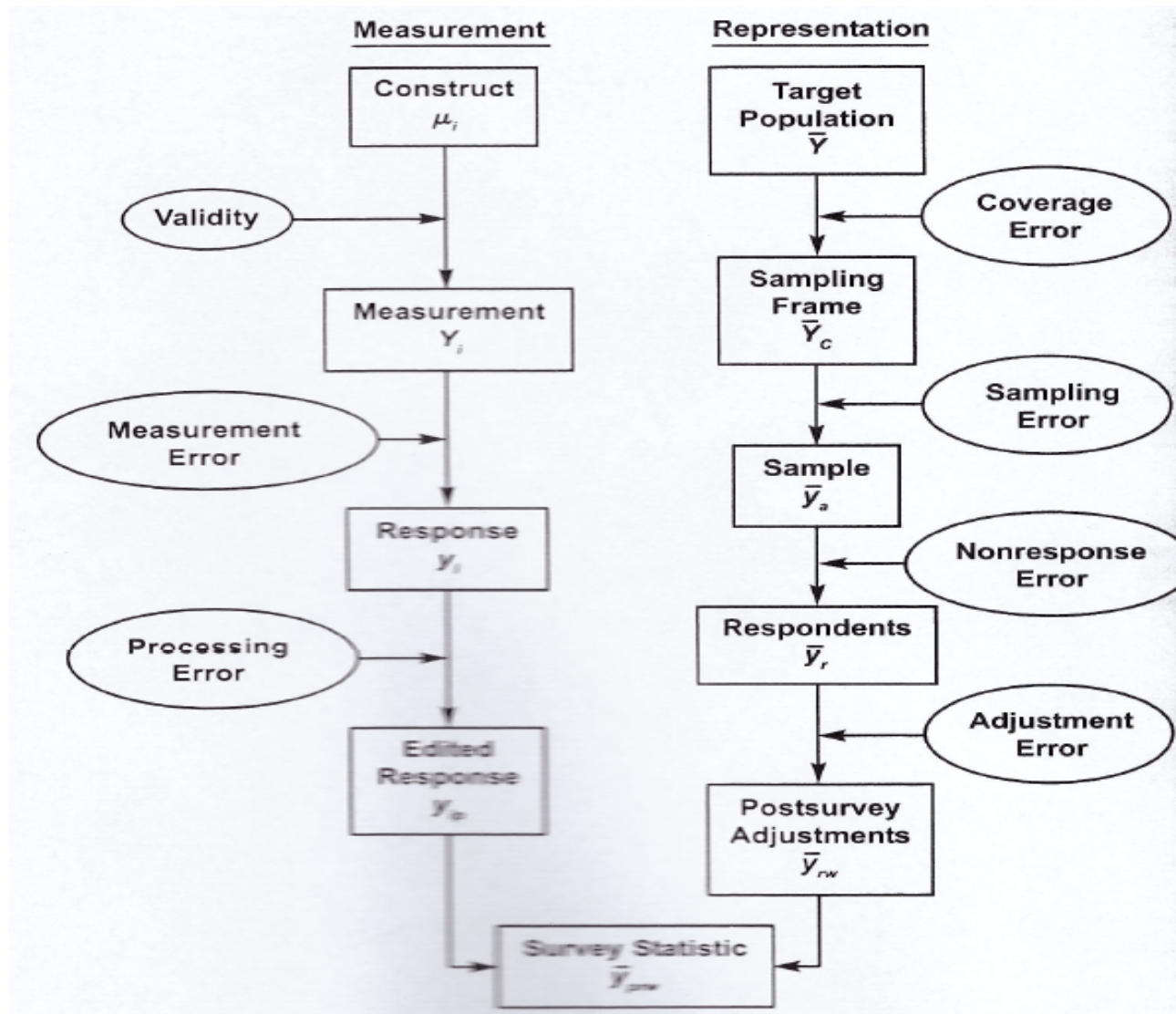
How Design becomes Process

A SURVEY FROM A PROCESS PERSPECTIVE



The Life Cycle of a Survey -2-

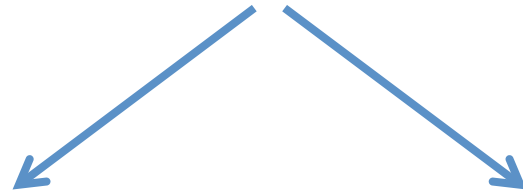
THE LIFE CYCLE OF A SURVEY FROM A QUALITY PERSPECTIVE



6. Types of errors

The **use of the term «error»** does not imply mistake in the colloquial sense

Instead, it **refers to deviation** of what is desired in the survey process from is **attained**



Measurement errors
or errors of observation

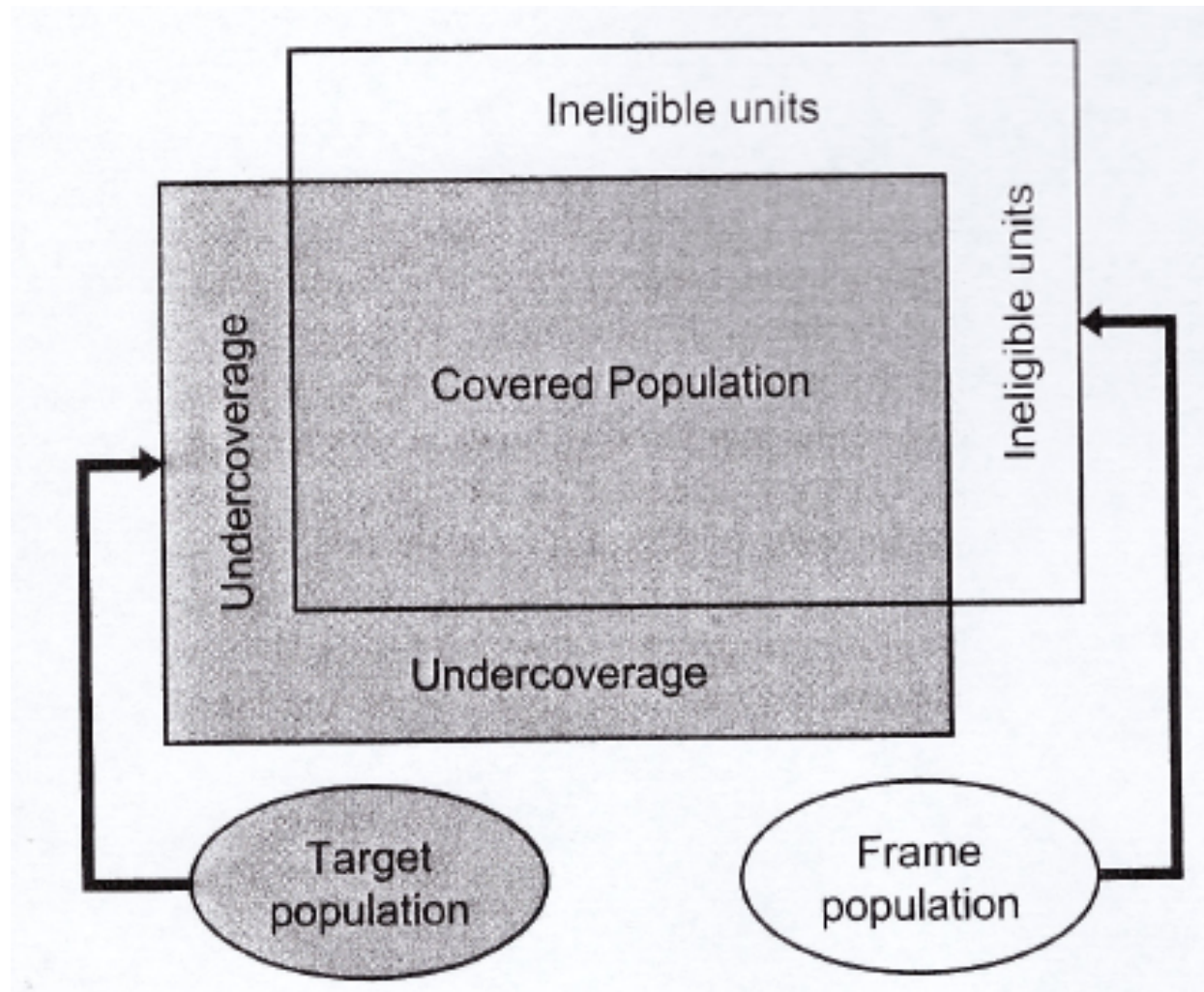
Errors of non- observation

Some types of errors

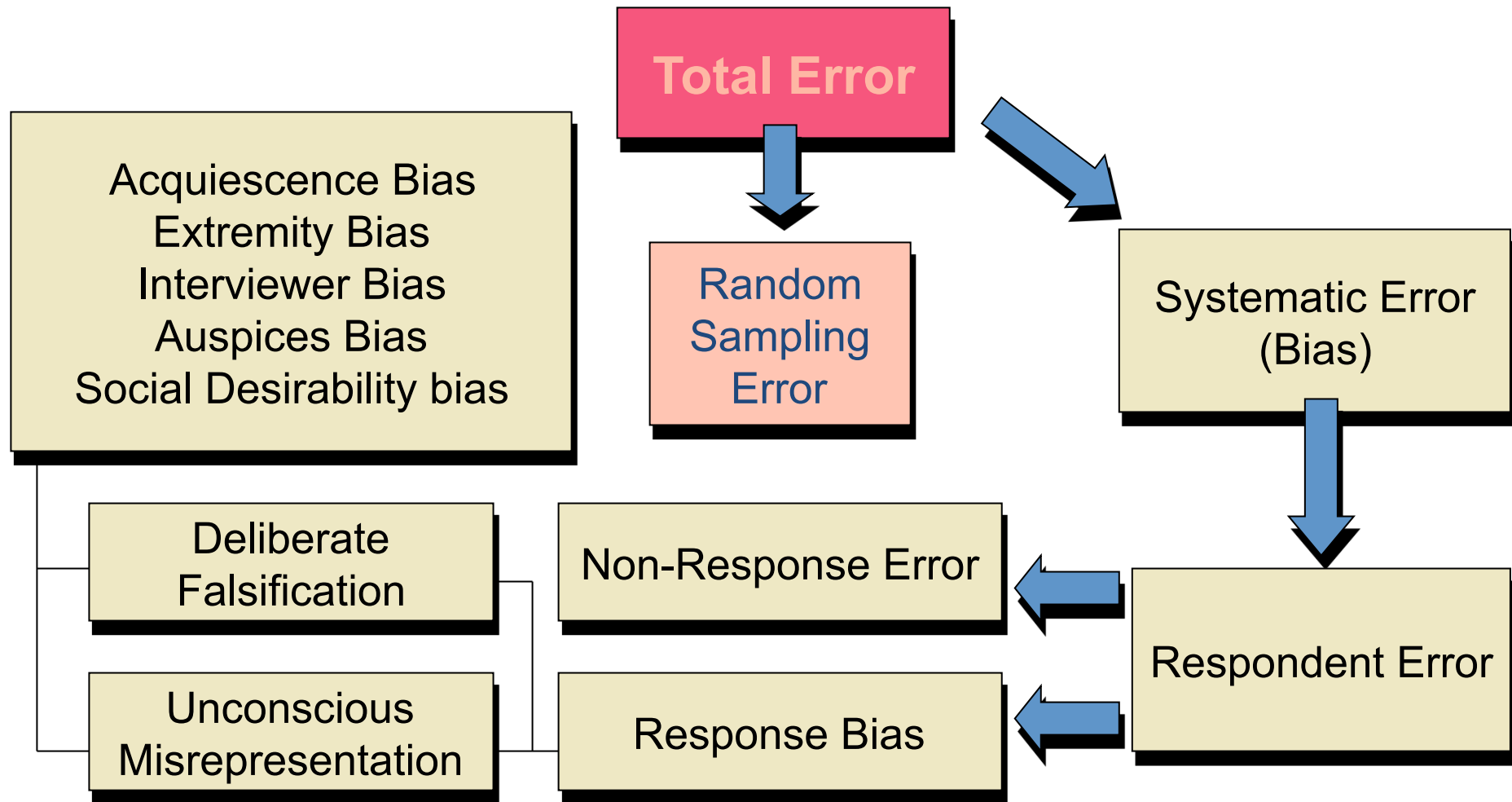
- **Sampling Error – Who are you sampling?**
- **Coverage Error – Does your list include everyone?**
- **Measurement Error – Does everyone answer a question the same way?**
- **Non-response Error – Why did respondent not answer:**
 - ✓ **Instrument (whole questionnaire not returned)**
 - ✓ **Item (question not answered)**

Coverage Error

NON OBSERVATIONAL GAP BETWEEN THE TARGET POPULATION
AND THE FRAME POPULATION



Potential Errors in Undertaking Surveys



Random Sampling Error and Systematic Error

- **Random sampling errors** arise when the group selected out of a population for the purpose of undertaking a survey is not totally representative of the population, i.e. a variation exists. Technically, a random sampling error is the difference between the results of a sample and the result of a census conducted using identical procedures. As the sample size is increased, the variation will decrease
- **Systematic error** results from some imperfect aspect of the research design which causes response error, or from a mistake in the execution of the research

Respondent Error

- Surveys depend on individuals responding to the questions asked of them in written or verbal form. Respondents must thereby fulfill two preconditions:
 - Be cooperative
 - Be truthful
- If these two preconditions are not fulfilled, the survey is unlikely to achieve its goal. Two major problems resulting from the non-fulfillment of these two preconditions by respondents are:
 - Non-response Error
 - Response Bias

Non-Response Error and Causes of Non-Responding

- **Non-Response error** is defined as the statistical difference between the results of a survey that includes those individuals who responded, and a perfect survey in which all individuals would have responded
- A consequent problem stemming from non-response error is that the survey-based research **results may be unutilizable** for decision-makers if those individuals who did respond to the survey are not representative of those who did not respond
- There are **many reasons for not responding to surveys**, for example, lack of time and preoccupation with routine work, absence from home, lack of interest in the survey, cultural factors (e.g. Middle East)

Response Bias

- A **response bias** occurs when survey respondents tend to answer the questions posed to them in a certain direction, thereby consciously or unconsciously, or intentionally and inadvertently, misrepresenting the truth
- Response bias has been found to depend on factors such as the income or social class of respondents and their ethnic background.

Example: Mayoral and gubernatorial elections in the USA
(white respondents and their supposed choice of candidates)

Deliberate Falsification by Survey Respondents

- **Deliberate falsification** occurs when survey respondents deliberately give false answers. There are many reasons for this, for example, when respondents want to appear more intelligent, to avoid embarrassment, and to conceal personal information

Examples: Survey about shopping habits (respondent has forgotten expenses paid and does not want to admit this; employees are asked to give their opinion about their employers and give false answers because they fear adverse consequences; respondents want to please the interviewer and give answers they think will bring this about; survey respondents want to appear 'average' so that they don't stand out too much)

Unconscious misrepresentation by Survey Respondents

- **Unconscious misrepresentation** occurs because of the specific situation or stimulus a survey respondent finds himself or herself in, or because of the nature of the questions asked, even though the respondent is trying to be truthful and cooperative
- **Examples:** Respondent has forgotten dates and details and gives a “best guess” estimate, which may not be accurate; respondent doesn’t have enough time to think about the answer to a question; feelings often cannot be expressed accurately in words)
- International surveys are particularly susceptible to unconscious misrepresentation by survey respondents due to cultural and communicational differences

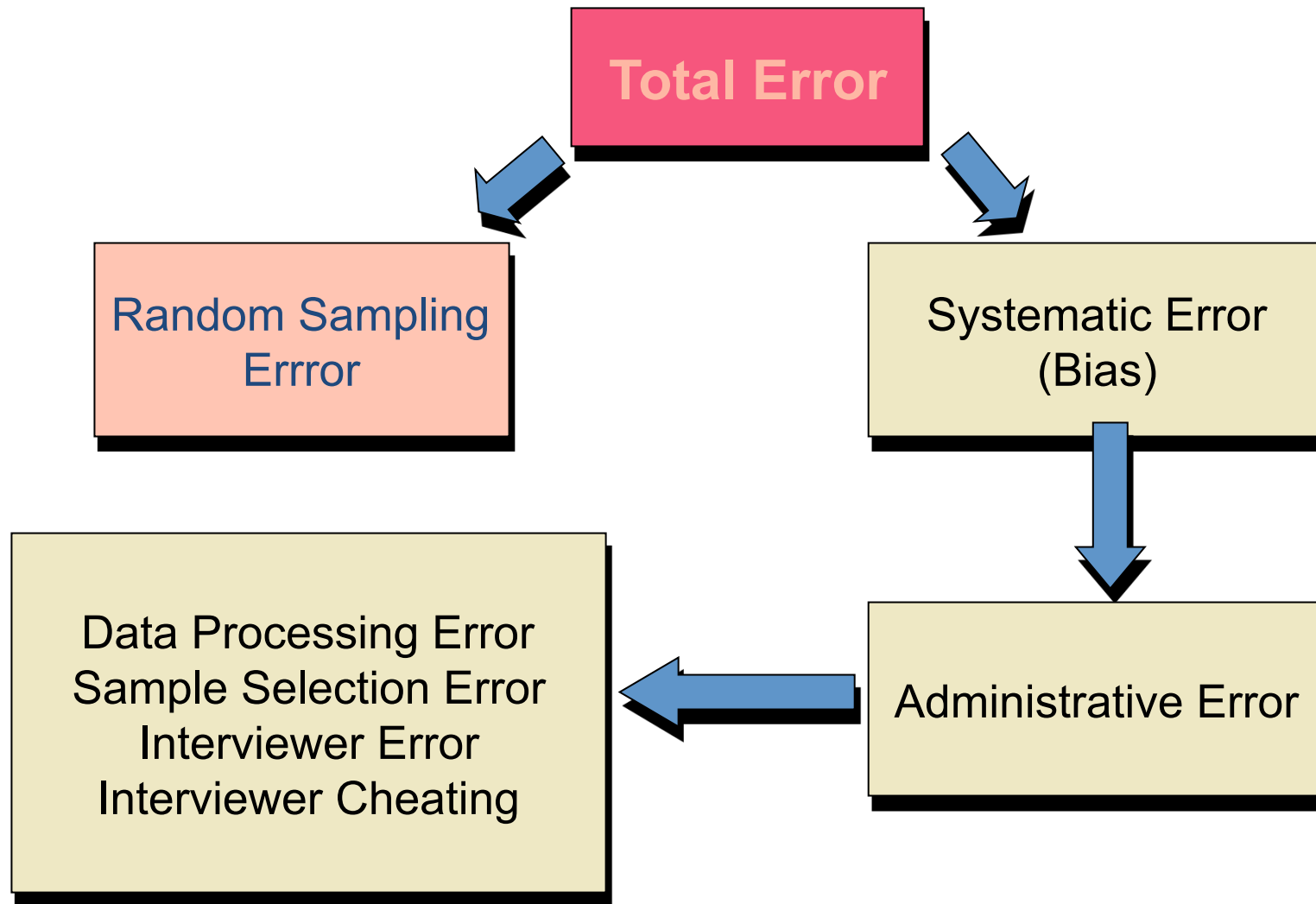
Types of Response Bias (1)

- ❑ **Acquiescence Bias** –Tendency of survey respondents to agree with the questions asked of them, especially in regard to surveys relating to new or unfamiliar programs, products or ideas. Acquiescence bias can, on the other extreme, result in a respondent disagreeing with all questions asked of them
- ❑ **Extremity Bias** – Tendency of survey respondents to use extremes when responding to questions, unlike other respondents who may adopt a neutral stance
- ❑ **Interviewer Bias** – Tendency of survey respondents to give untrue answers because of the presence or influence of interviewers on them and their interest in appearing intelligent, more affluent or just willing to please

Types of Response Bias (2)

- ❑ **Auspices Bias** – Tendency of survey respondents to give answers to questions based on their perception of the organization which is undertaking the survey. For example, employees of CIIT may give quite different responses to an in-house CIIT survey than they would, were they asked by a neutral or unrelated organization
- ❑ **Social Desirability Bias** – Tendency of survey respondents to give answers that put them in a favourable light with the interviewer. For example, people may claim to be more socially active than they really are because being socially active is considered a positive activity, or inflate their education and income levels to save face and gain prestige

Potential Errors in Undertaking Surveys



Survey design and Survey process

- **Having presented the first part of the Survey Design, we have to discuss now the eventual design of the Sample and the other phases of a Survey (data collection and so on)**
- **It is important to remember that when the decision on those designs are applied then will be very difficult to come back**
- **If something increase the possible errors, the results which is possible to obtain will be non adequate**