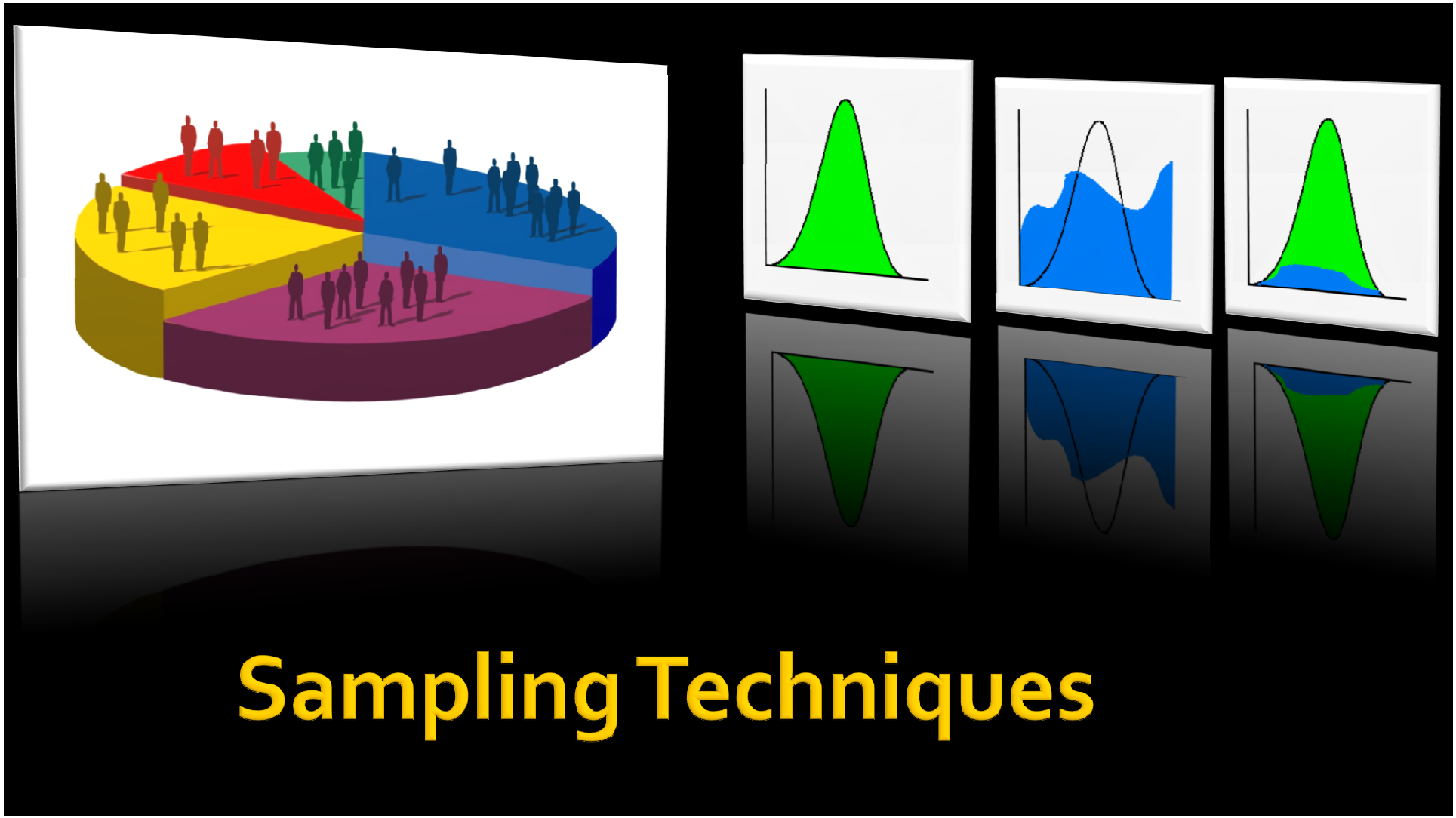
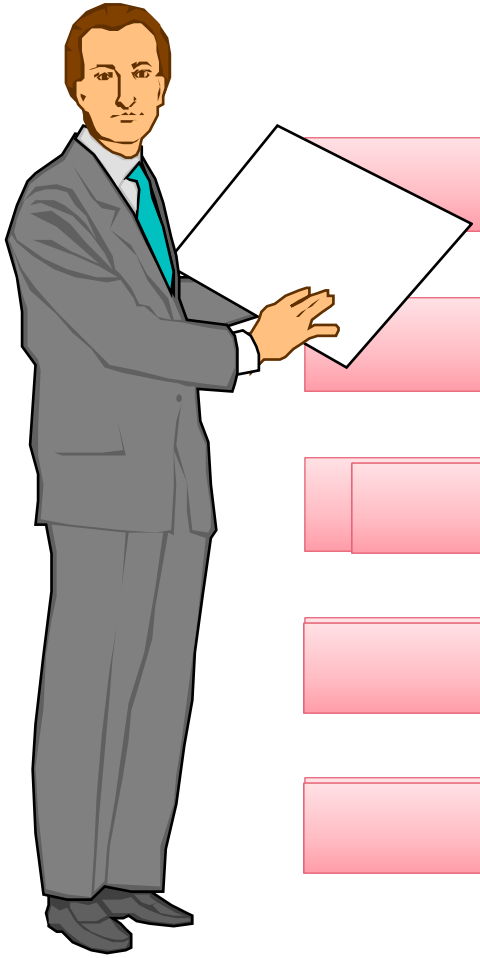


Sampling Techniques

The Sampling Design Process



Define the Population

↓

Determine the Sampling Frame

↓

Select Sampling Technique(s)

↓

Determine the Sample Size

↓

Execute the Sampling Process

Define the Target Population

The target population is the collection of elements or objects that possess the information and about which inferences are to be made.

The target population should be defined in terms of elements, sampling units, extent, and time.

- An **element** is the object about which or from which the information is desired, e.g., the respondent.
- A **sampling unit** is an element, or a unit containing the element, that is available for selection at some stage of the sampling process.
- **Extent** refers to the geographical boundaries.
- **Time** is the time period under consideration.

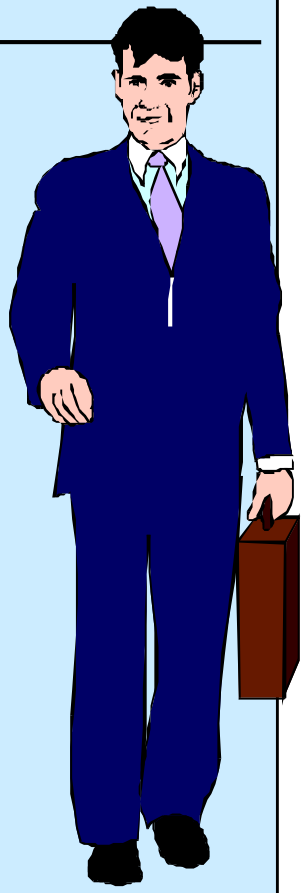
Define the Target Population

Important qualitative factors in determining the sample size

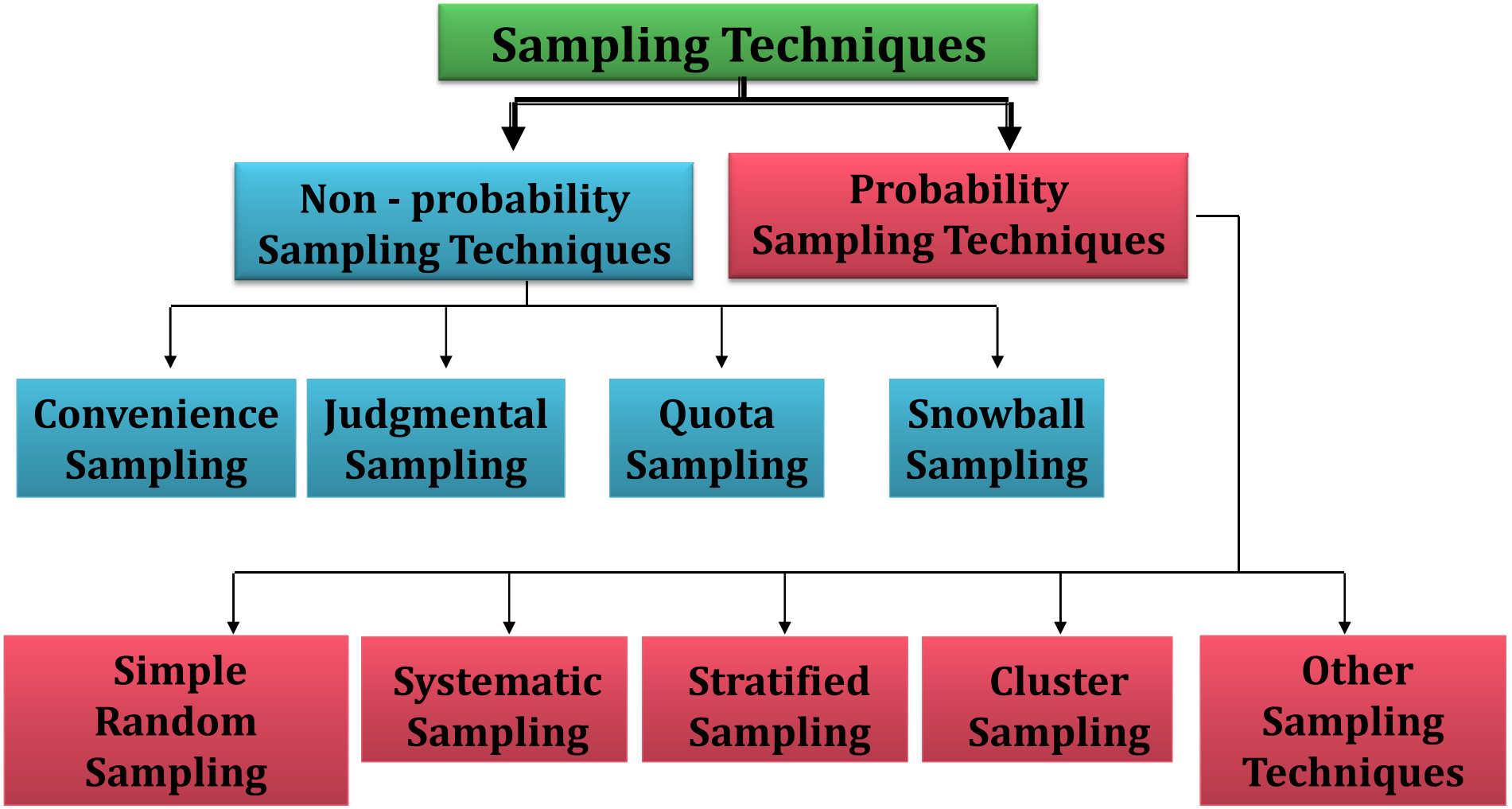
- the importance of the decision
- the nature of the research
- the number of variables
- the nature of the analysis
- sample sizes used in similar studies
- incidence rates
- completion rates
- resource constraints

Sample Sizes Used in Marketing Research Studies

Type of Study	Minimum Size	Typical Range
Problem identification research (e.g. market potential)	500	1,000-2,500
Problem-solving research (e.g. pricing)	200	300-500
Product tests	200	300-500
Test marketing studies	200	300-500
TV, radio, or print advertising (per commercial or ad tested)	150	200-300
Test-market audits	10 stores	10-20 stores
Focus groups	2 groups	4-12 groups



Classification of Sampling Techniques



Convenience Sampling

Convenience sampling attempts to obtain a sample of convenient elements. Often, respondents are selected because they happen to be in the right place at the right time.

- use of students, and members of social organizations
- "people on the street" interviews

Judgmental Sampling

Judgmental sampling is a form of convenience sampling in which the population elements are selected based on the judgment of the researcher.

- test markets
- purchase engineers selected in industrial marketing research
- expert witnesses used in court

Quota Sampling

Quota sampling may be viewed as two-stage restricted judgmental sampling.

- The first stage consists of developing control categories, or quotas, of population elements.
- In the second stage, sample elements are selected based on convenience or judgment.

	Population composition	Sample composition	
Control Characteristic	Percentage	Percentage	Number
Sex			
Male	48	48	480
Female	52	52	520
	100	100	1000

Snowball Sampling

In **snowball sampling**, an initial group of respondents is selected, usually at random.

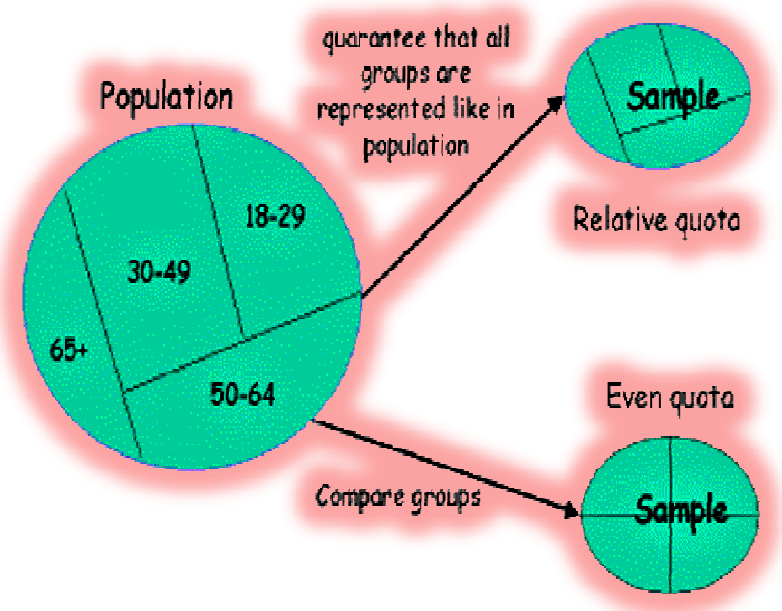
- After being interviewed, these respondents are asked to identify others who belong to the target population of interest.
- Subsequent respondents are selected based on the referrals.

Simple Random Sampling

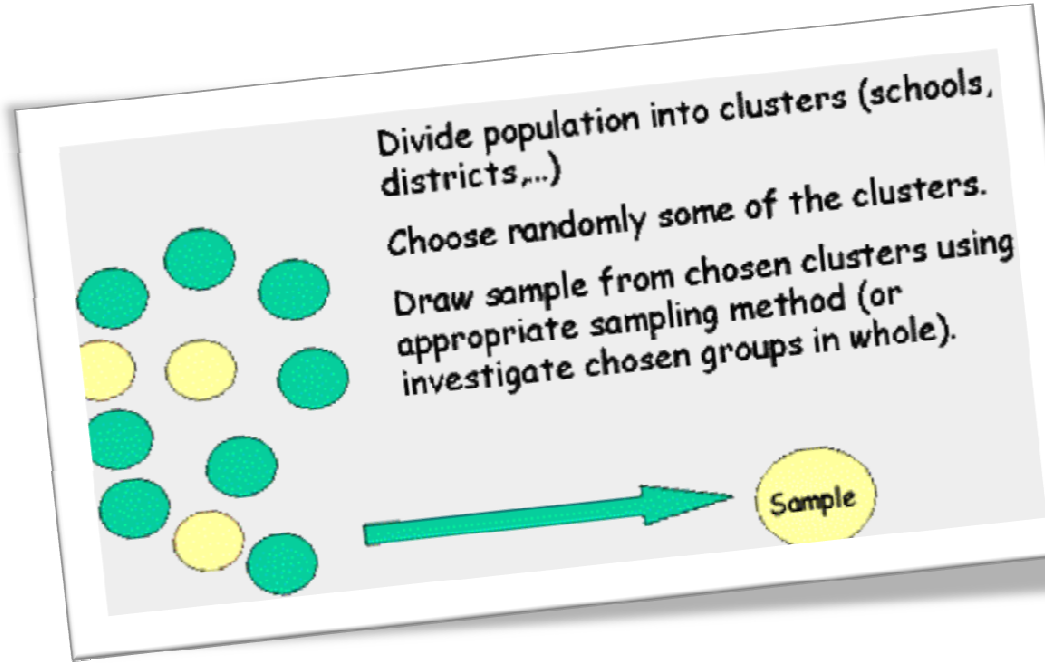
- Each element in the population has a known and equal probability of selection.
- Each possible sample of a given size (n) has a known and equal probability of being the sample actually selected.
- This implies that every element is selected independently of every other element.

Stratified Sampling

- A two-step process in which the population is partitioned into subpopulations, or strata.
- The strata should be mutually exclusive and collectively exhaustive in that every population element should be assigned to one and only one stratum and no population elements should be omitted.
- A major objective of stratified sampling is to increase precision without increasing cost.



Stratified Sampling



Cluster Sampling

Cluster Sampling

- The target population is first divided into mutually exclusive and collectively exhaustive subpopulations, or clusters.
- Then a random sample of clusters is selected, based on a probability sampling technique such as SRS.
- Elements within a cluster should be as heterogeneous as possible. Ideally, each cluster should be a small-scale representation of the population.

Types of Cluster Sampling

- Cluster Sampling
  - One-Stage Sampling
  - Two-Stage Sampling
    - Simple Cluster Sampling
    - Probability Proportionate to Size Sampling
  - Multistage Sampling

Sample size for estimating a Population Mean

- How close to the true mean
- Confidence around the sample mean
- Type I error.

- $N = (Z_{\alpha/2})^2 \sigma^2 / d^2$

  σ: standard deviation

  d: the accuracy of estimate (how close to the true mean).

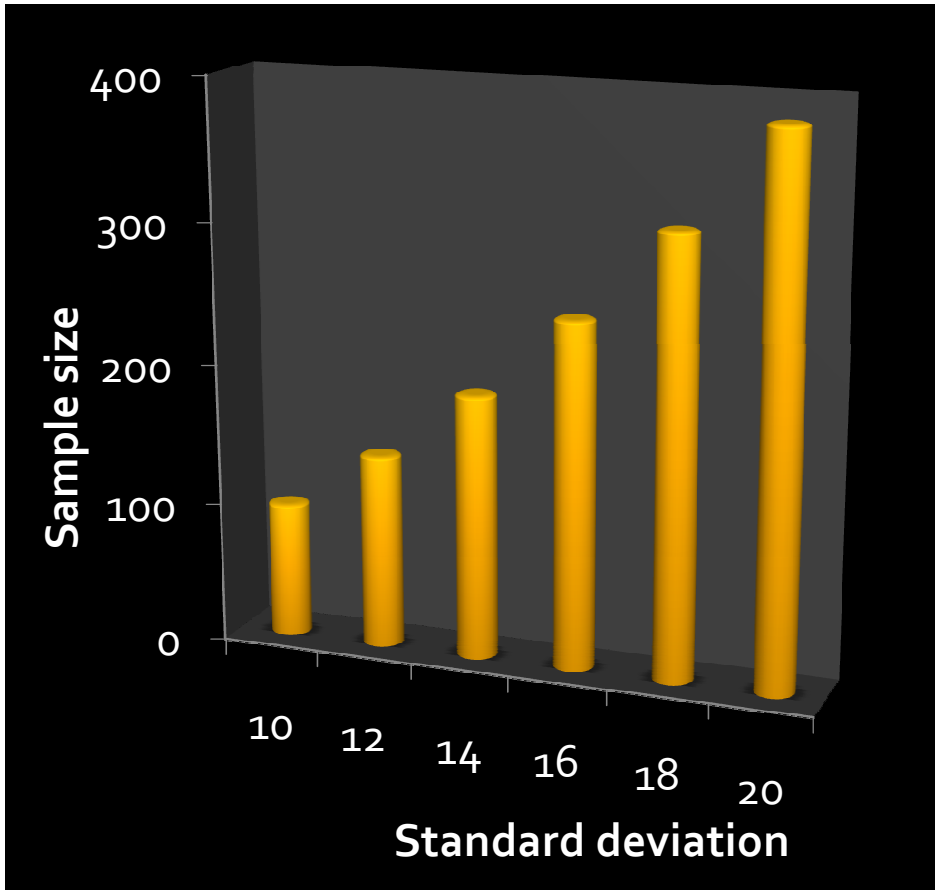
  $Z_{\alpha/2}$: A Normal deviate reflects the type I error.

- **Example**: we want to estimate the average weight in a population, and we want the error of estimation to be less than 2 kg of the true mean, with a probability of 95% (e.g., error rate of 5%).

- $N = (1.96)^2 \sigma^2 / 2^2$

Effect of Standard Deviation

Std Dev (σ)	Sample size
10	96
12	138
14	188
16	246
18	311
20	384



Sample size for estimating a population proportion

- How close to the true proportion
- Confidence around the sample proportion.
- Type I error.

- $N = (Z_{\alpha/2})^2\, p(1\text{-}p) \,/\, d^2$

  p: proportion to be estimated.

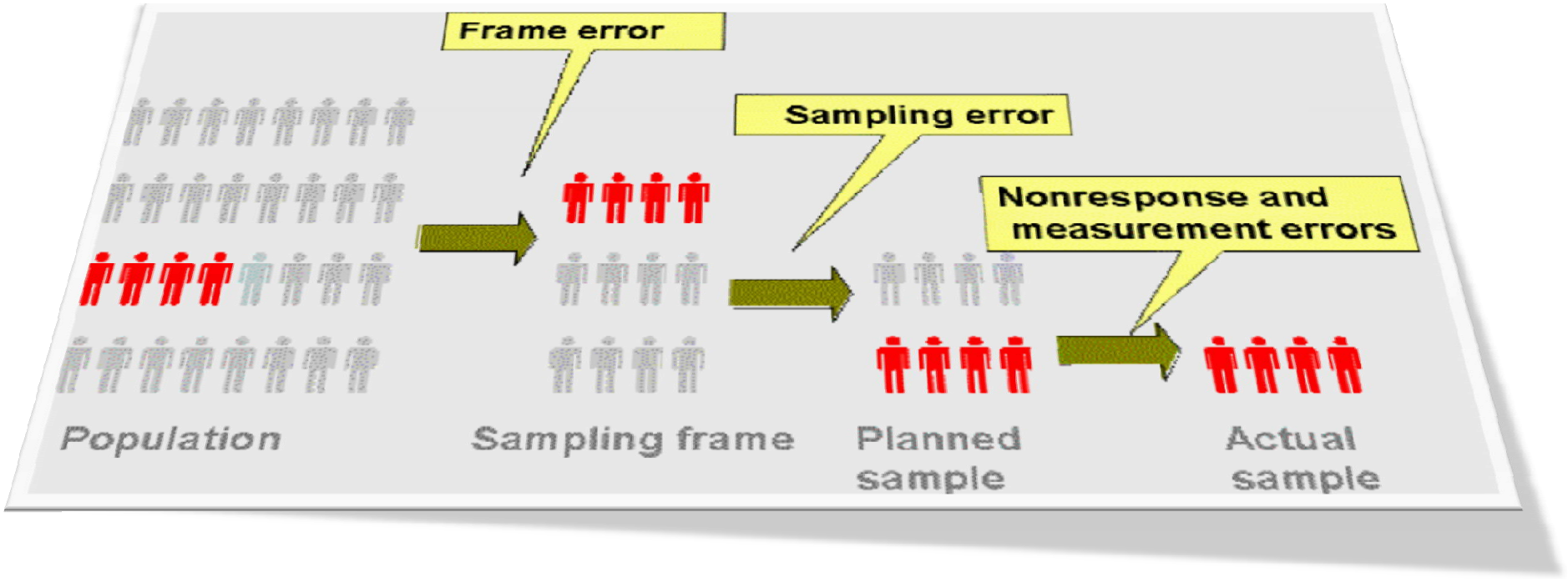
  d: the accuracy of estimate (how close to the true proportion).

  $Z_{\alpha/2}$: A Normal deviate reflects the type I error.

- **Example**: The proportion of preference for product A is around 80%. We want to estimate the preference p in a community within 5% with 95% confidence interval.

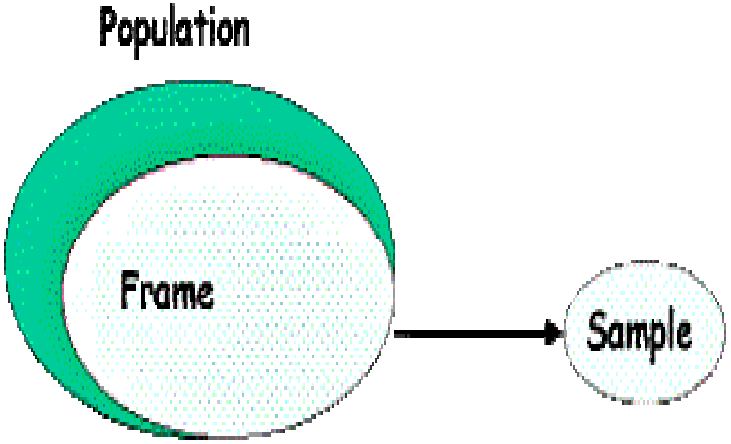
- $N = (1.96)^2\,(0.8)(0.2) \,/\, 0.05^2 = 246$ consumers.

Error sources



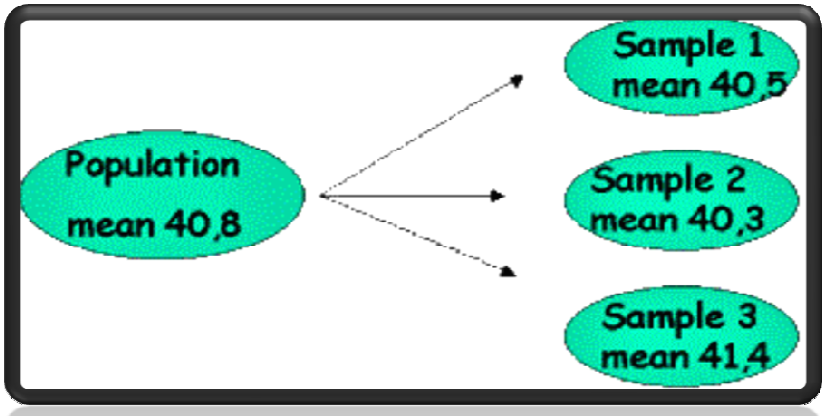
Sampling is the error caused by observing a sample instead of the whole population .

Frame error



- In practice the whole population may not be available when you select a sample (frame # population).
- Ex: You may draw a sample of Australian companies from the register (frame).
- Due to the frame error, conclusions about the whole population may be biased. Bias may be crucial if those, missing from the frame, are somehow different from those belonging to the frame.

Sampling error



- Different samples (although sample size is constant) give different results. This is due to sampling error.
- We can estimate the amount of the sampling error by using probability calculations.
- Actually, the sampling error is the only source of error that can be calculated.
- Statistical inference (drawing conclusions about population) is based on knowing the sampling error.

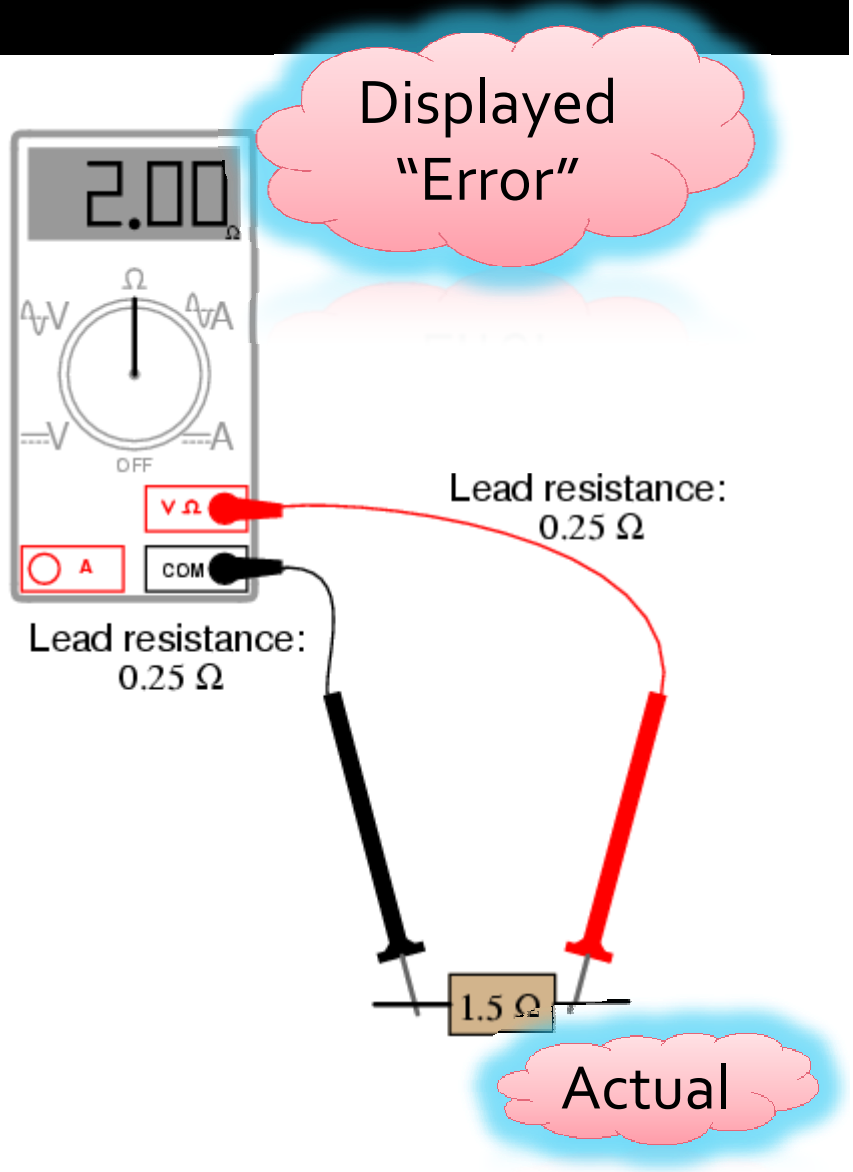
Non response error

- Some units selected to a sample may be impossible to reach or may refuse to answer. Due to non response error our conclusions about population may be biased.

- It is usually difficult to estimate, how crucial the non response error is.

Measurement error

- Measurement errors are related to questions, measurement devices, behavior of interviewers and respondents.
- A researcher or analyst must do his best to avoid measurement error.




Thank You.