SAMPLING METHODS

Learning Objectives

Knowing and practicing basic sampling methods.

Sequence

Basic Terminology

Identification of Correct Population

Random and Fixed Interval Sampling

MUS for Substantive and Compliance Tests

Attribute Sampling

Haphazard Selection

Definition of Sampling

"the application of compliance or substantive procedure to less than 100% of the items within a defined population

to enable the auditor to obtain and evaluate evidence of some characteristic of the population and

to form or assist in forming a conclusion concerning the characteristic"

Sampling Unit

the specific item of which the population is assumed to be composed for sampling purposes.

Example, a population of purchases for the year may compose of:

- Cheques disbursed;
- Supplier invoices within each cheque disbursement;
- Purchases within each supplier invoice; or
- Dollars of value within each purchase.

Sampling Unit

taking individual cash disbursement as the sampling unit makes the sampling process simpler compared with taking individual purchase within a supplier invoice as the sampling unit.

however, all supplier invoices and all purchases within each selected cash disbursement will have to be audited.

Physical Unit

specific document e.g., cash disbursement, individual supplier invoice to which the sampling unit relates.

The physical unit is normally the same as the sampling unit.

The primary exception is MUS where the sampling unit is each individual monetary unit (Dollar).

Population Size

number of sampling units (cash disbursements, supplier invoices, purchases, etc) in the population.

The population size will vary depending on the sampling unit being used. For example, a population size of purchases for the year may be;

- 16,000 cash disbursements,
- 30,000 supplier invoices,
- 70,000 purchases.

Population Size

Except for small population sizes, the size of the population does not influence the size of the sample selected.

Population Size

For other than very small populations, the sample size is dependent on

- the assumed **variability** *(expected error rate)* of the population,
- on the **accuracy** required from the sample *(determined by consideration of materiality)* and
- the **confidence level** *(determined by consideration of risk)*.

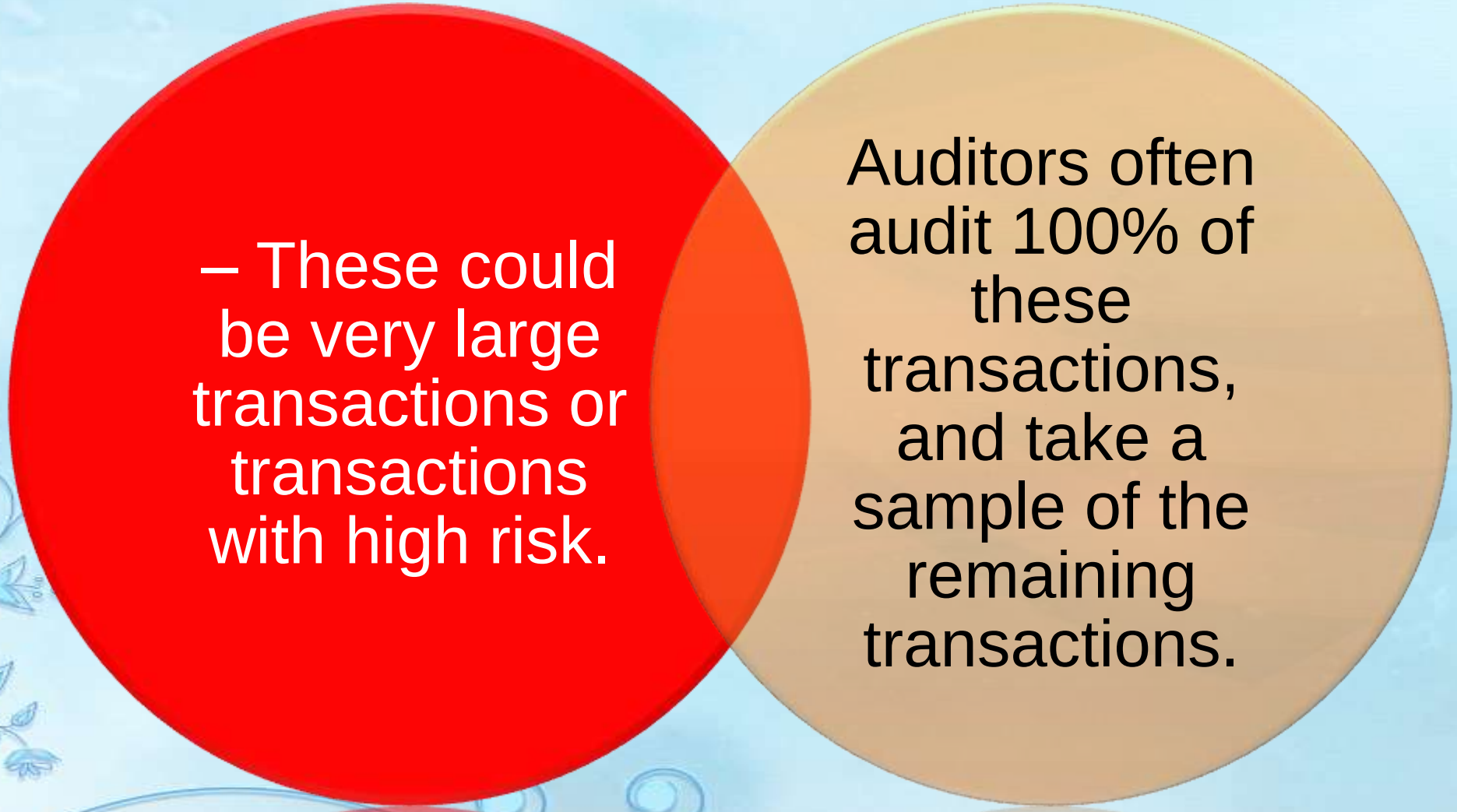
Accordingly, the auditor should not think in terms of selecting a percentage of the population.

- Taking a fixed percentage will tend to under-sample a small population and over-sample a large population.

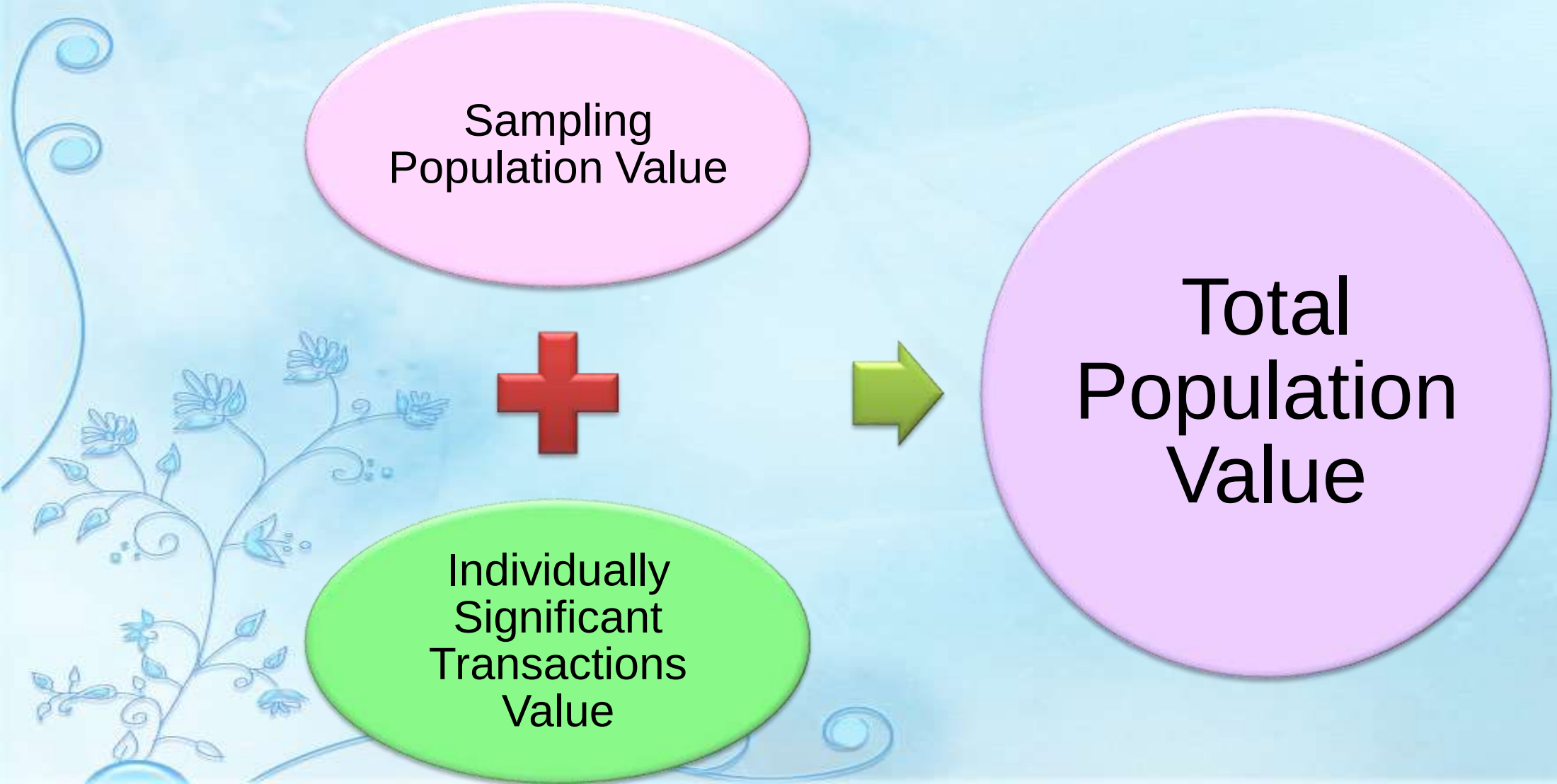
Population Value

monetary amount of the population being sampled, e.g. Rs. 100,000,000.

Individually Significant Transactions



Population Value



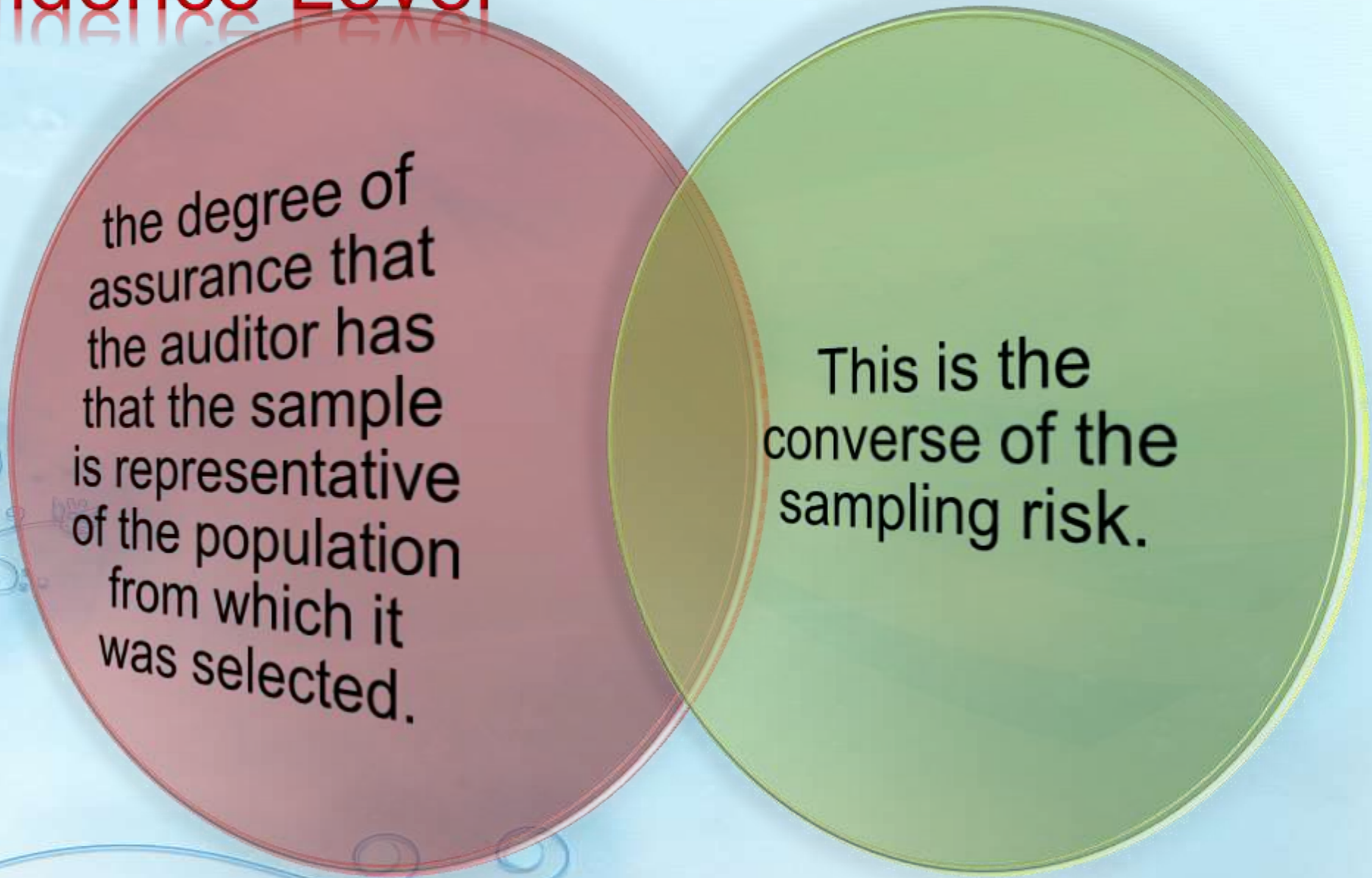
Population Value

Sometimes the auditor does not know the population value when determining the sample size.

- For example, the auditor may wish to select a sample of supplier invoices for the year, and may start auditing the transactions before the end of the year. In this case, the auditor will make an estimate of the population value at the planning stage.

Sampling Risk

Confidence Level



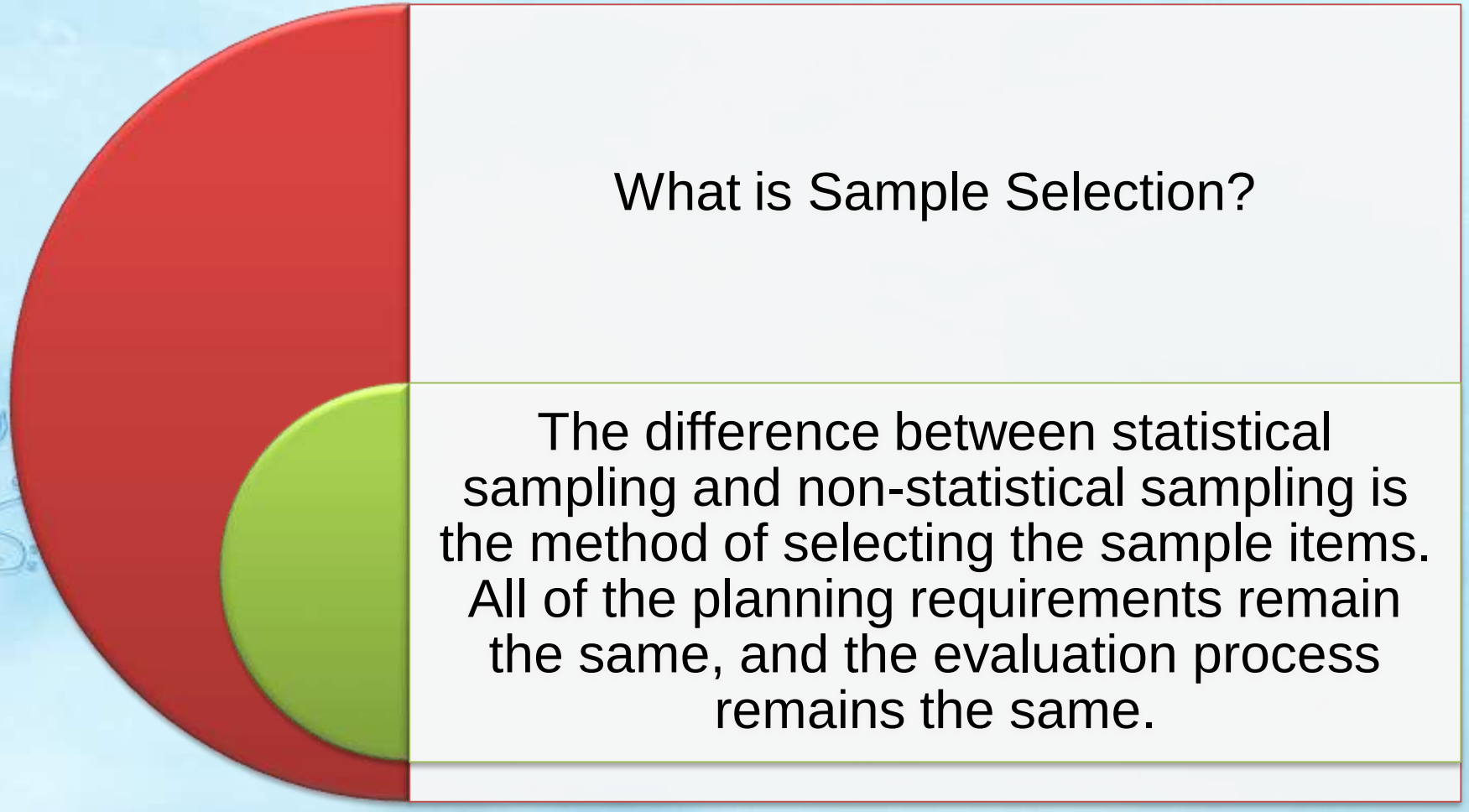
Confidence Level

90% confidence level means

there is a 90% chance that the sample will be representative of the population from which it was selected, and that the audit results will be correct.

Or there is a 10% chance that the sample is not representative of the population, and audit results would be incorrect.

Sample Selection



Sample Selection

There are two basic sample selection rules:

- (1)The sample conclusion only applies to the population from which it is selected; and
- (2)The sample should be representative of the population from which it is selected.

Sample Selection

The rule in (1.) applies equally to statistical and non-statistical sampling.

The auditor has a better chance of achieving (2.) with a statistical sample than with a non-statistical sample.

When using a non-statistical sample, though, the auditor should still strive to ensure the sample is as representative of the population as is possible.

Sampling Prerequisites

For both statistical and non-statistical sampling, there needs to be a

- **complete** listing
- of the valid transactions
- that adds up to the total amount reported on the financial statements.

Sampling Prerequisites

Completeness objective

individual items contained in boxes and filing cabinets are traceable to the listings that make up the total amount reported on the financial statements.

Validity objective

individual items that have been selected from the listing be located physically.

Sampling Prerequisites

In some cases the listings used may be totals of other listings.

In these cases, the auditor will first make a *selection from among* the totals, and will then make *a second selection* of individual transactions from *the listing* supporting each selected total.

Relevant Population

The first basic rule states that the sample conclusion only applies to the population from which it is selected.

Therefore, population should be carefully selected keeping in view the **audit objective(s).**

Relevant Population

If the auditor wants to rely on the internal control structure for the entire year, the best way is to sample from the entire year.

A less effective (but still generally accepted) method is to select a sample of transactions up to some interim date, reach a conclusion on that period, and then conduct inquiries, observations and walk-through procedures to reach a conclusion on the internal control structure for the rest of the year.

As the second approach is not as good as the first, it would normally not be acceptable when a high level of reliance is being placed on the internal control structure.

Relevant Population

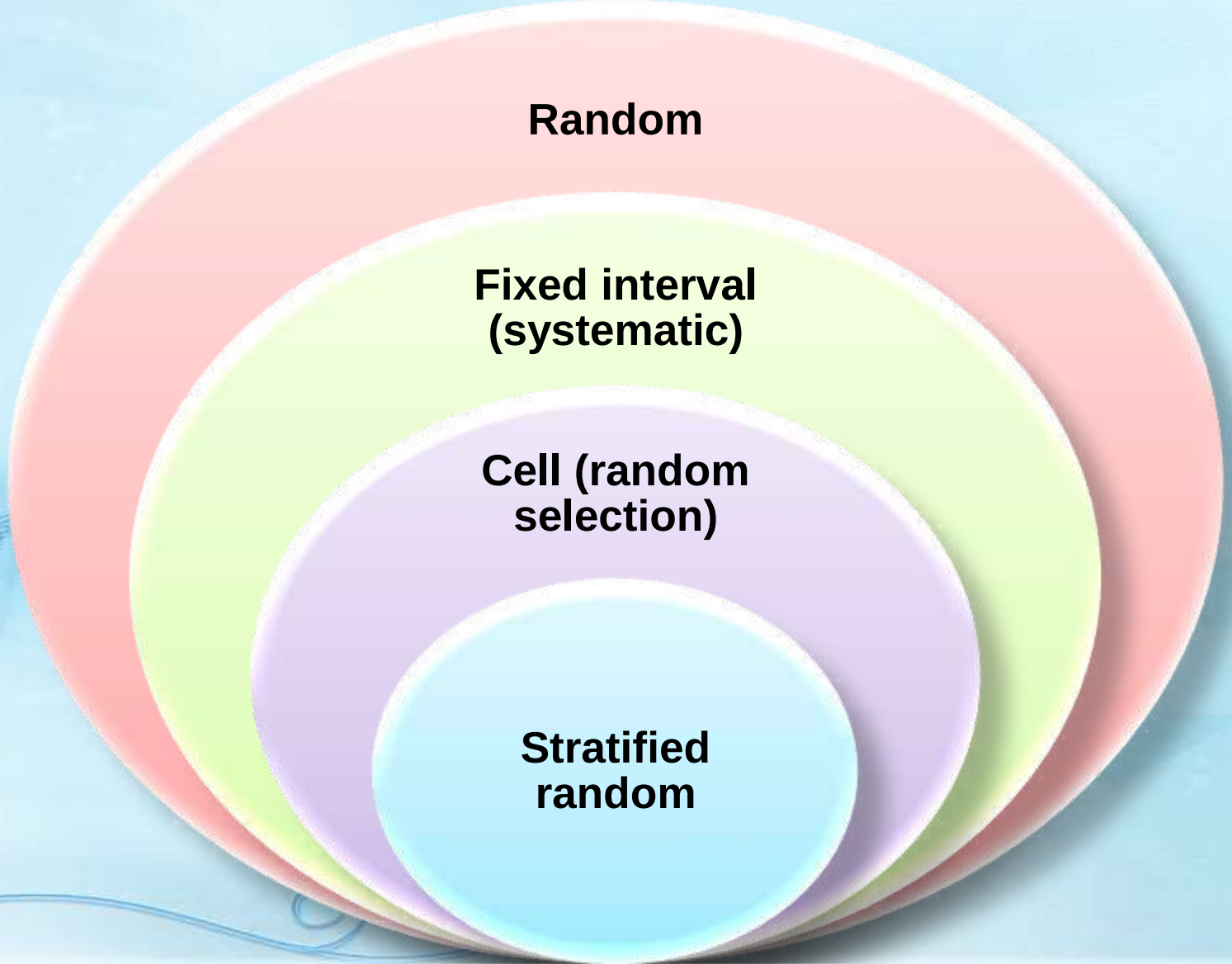
Block or Cluster Sampling:

selecting a sample of transactions from only one month.

the conclusion applies only to that one month – *the auditor really does not have any assurance with respect to the other 11 months*.

In reality, the auditor has not done any sampling at all, and cannot reach a conclusion on the periods of time not covered by the test.

Sample Selection Methods



Random Selection

the method in which each and every item has an equal chance of selection.

Random Selection

involves numbering all of the items in the population and then using a random number table or software program to select (say) 200 random numbers.

The auditor then identifies the sampling unit that corresponds to each number.

This method is difficult to use unless the sampling units are already pre-numbered (pre-numbered sales invoices, for example) or can easily be numbered (30 supplier invoices per page and the pages are numbered, for example).

Fixed Interval (Systematic)

This method involves selecting a random start and then every *n*th item.

In our example, the auditor could select every 150th supplier invoice – 30,000 divided by 200.

The random start would be a number between 1 and 150.

If, say, the auditor picked a random start of 50, he/she would select the 50th item, the 200th item, the 350th item, etc.

Cell (Random Interval) Selection

This method essentially combines the previous two methods.

The auditor divides the population into cells and then picks a random item from within each cell.

In our example, the first cell would contain the first 150 items, the second cell items 151 to 300, the third cell items 301 to 450, etc.

Stratified Random Selection

The population is first stratified based on monetary ranges, type of expenditure, etc., and then a random sample is drawn from each range.

This could be used,

- to weight an attribute sample to the larger dollar items or
- specific expenditure types, or
- to ensure that at least one sample item is drawn from each expenditure type. etc

Fixed Interval Sampling

MUS

Sampling unit is individual monetary unit, as opposed to physical transaction vouchers like individual supplier invoices, cash disbursements, etc.

an individual Dollar from the population is used as a hook to catch the voucher in which it occurs

Example: population of 30,000 supplier invoices that had a population value of Rs. 100,000,000. When using MUS, the auditor would consider the population to be composed of 100 million individual Dollars, as opposed to 30,000 invoices.

MUS

all sampling units (individual Dollars) will have the same chance of being selected. This means that, the larger the supplier invoice, the greater the chance of it being selected.

This is why MUS is sometimes referred to as *sampling proportionate to size*.

Example: the sampling interval is $ 1,000,000, then:

- A $ 100,000 invoice would have a 10% chance of selection;
- A $ 500,000 invoice would have a 50% chance of selection;
- A $ 1,000,000 invoice (or larger) would have a 100% chance of selection.

Determining the Sample Size

Determining the Sample Size

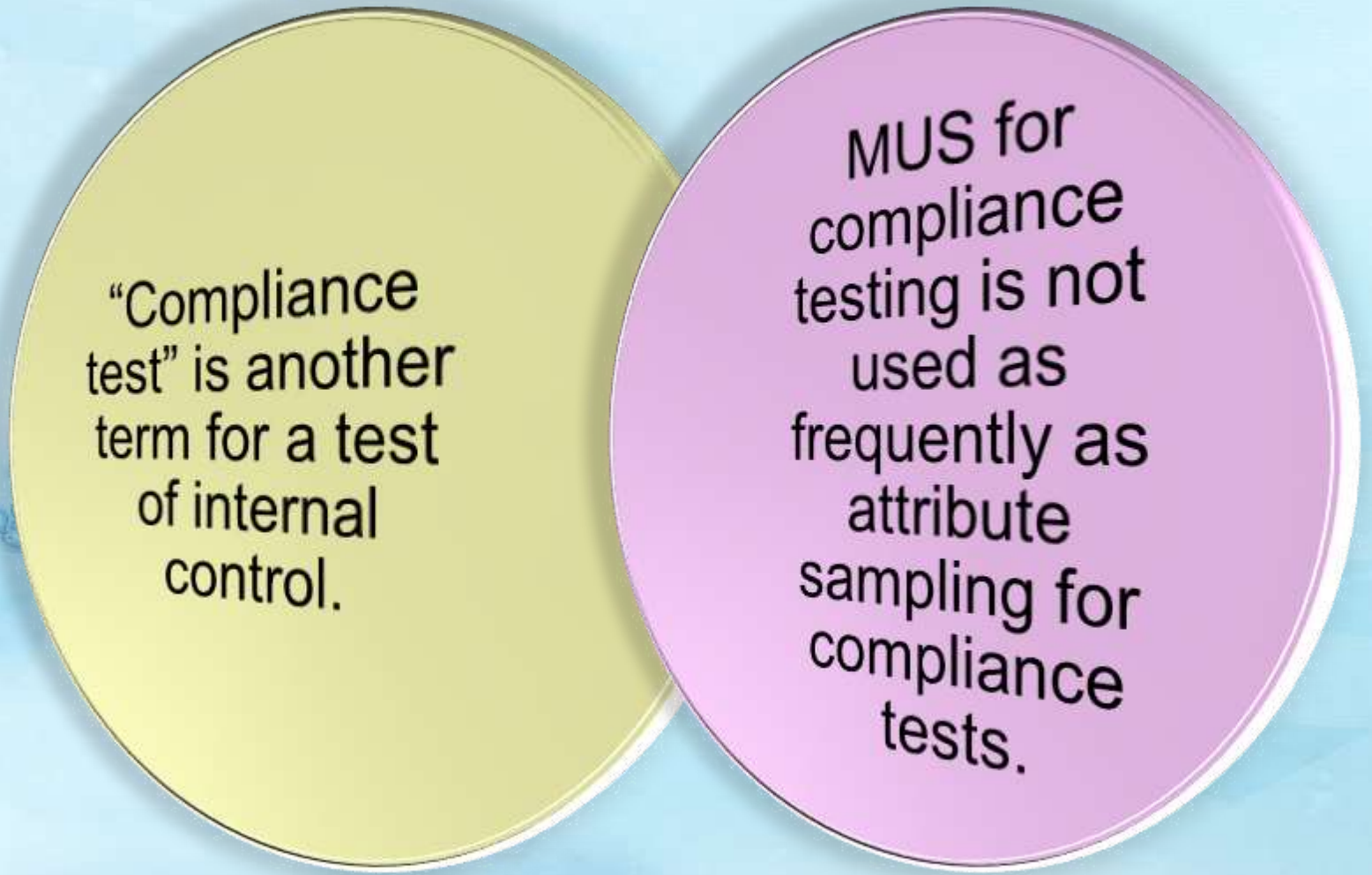
Materiality and the expected aggregate error are for the financial statements as a whole – therefore determined at the start of the planning process.

- Example: use a Rs. 3,000,000 materiality amount and a Rs. 816,500 expected aggregate error.

Confidence level is assurance to be derived from the substantive test of details.

- Example: if STDR is 15%, required confidence level is 85%

MUS for Compliance Tests



MUS for Compliance Tests

MUS is used to give more weightage to larger transactions.

Auditor takes the position that internal control deviations in large monetary items are more significant than in small monetary items.

Terminology

MUS for Substantive Test of Details	MUS for Compliance Test
Population value	Population value
Materiality	Materiality
Expected aggregate error	Tolerable Deviation Rate
Confidence level	Confidence level
- N/A-	Multiplier

The Multiplier

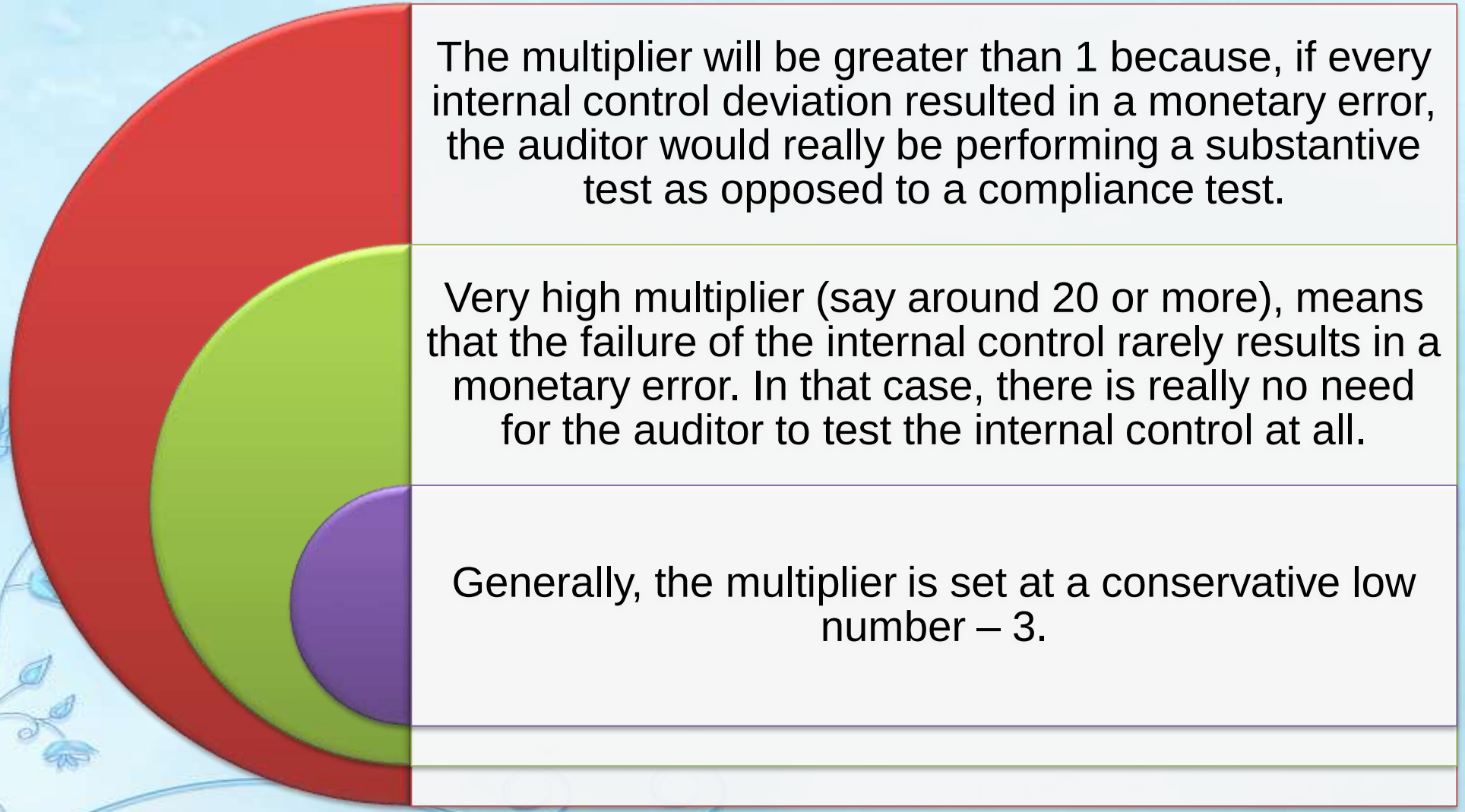
It reflects the fact that all internal control deviations do not result in a monetary error.

- E.g., just because a supplier invoice is not properly approved does not mean that it is incorrect.

The higher the number of internal control deviations that can occur before a monetary error occurs, the higher the number of internal control deviations that the auditor can tolerate.

The reason why the multiplier is not applicable for substantive testing is because every substantive error is a monetary error, so the multiplier would always be 1.0.

The Multiplier - Estimation



The multiplier will be greater than 1 because, if every internal control deviation resulted in a monetary error, the auditor would really be performing a substantive test as opposed to a compliance test.

Very high multiplier (say around 20 or more), means that the failure of the internal control rarely results in a monetary error. In that case, there is really no need for the auditor to test the internal control at all.

Generally, the multiplier is set at a conservative low number – 3.

The Multiplier - Estimation

For example with materiality as 3 million and multiplier as 3,

- if $ 9,000,000 worth of supplier invoices are not properly approved,
- the internal control will have failed often enough to permit errors aggregating to more than $ 3,000,000 to occur in the recorded amount.

Tolerable Deviation Rate

A low number (1 or 2) is often used because;

- there is no point testing an internal control that is known to be not working well simply to prove that it cannot be relied upon.
- Auditors therefore normally only test internal controls that are expected to be working well, and these are the controls that have a low internal control deviation rate.

Auditors rarely use “zero” as the tolerable number of internal control deviations.

- Why?

Confidence Level

For compliance testing, the confidence level is *not* the converse of control risk in the audit risk model. This is because:

- usually several key internal controls need to work together to prevent or detect material error; and
- The auditor is also usually performing non-sampling procedures as well, such as inquiries, observations and walk-through procedures.

Confidence Level Guideline

Level of Reliance	Possible Confidence Level
High level of reliance on the specific internal control (control risk set at low – 20%)	95%
Moderate level of reliance on the specific internal control (control risk set at moderate – 50%)	90%
Low level of reliance on the specific internal control (control risk set at high – 80%)	80%

Record Sampling for Compliance Tests

Attribute sampling involves the selection of a sample of physical units (supplier invoices, for example), as opposed to individual monetary units (Rupees/TKR/etc).

Record Sampling

Because the auditor is selecting individual supplier invoices as opposed to individual $, all physical units, regardless of their size, will have an equal chance of selection.

The auditor is taking the position that internal control deviations in small monetary items are just as significant as in large monetary items.

- Do you Agree?

Determining the Sample Size

MUS for Compliance Testing	Attribute Sampling for Compliance Testing
Population value	Population size
Materiality	Tolerable deviation rate
Tolerable number of internal control deviations	Expected deviation rate
Confidence level	Confidence level
Multiplier	- N/A -

Population Size

Complete no. of Physical Units.

Population Size

It is not required for the purposes of determining the **sample size**, because the population size only affects the sample size when the population size is less than 10,000 units.

It is required to ***select*** **the sample** using either fixed interval selection or cell selection to estimate average sampling interval

Tolerable Deviation Rate

Represents the maximum percentage of internal control deviations that can be tolerated in population.

This represents that deviations has resulted in material error.

- Example: 9% TDR, represents more than 2,700 (9% of the 30,000) unapproved supplier invoices – the internal control will have failed often enough to permit errors aggregating to more than Rs. 3,000,000.

Tolerable Deviation Rate

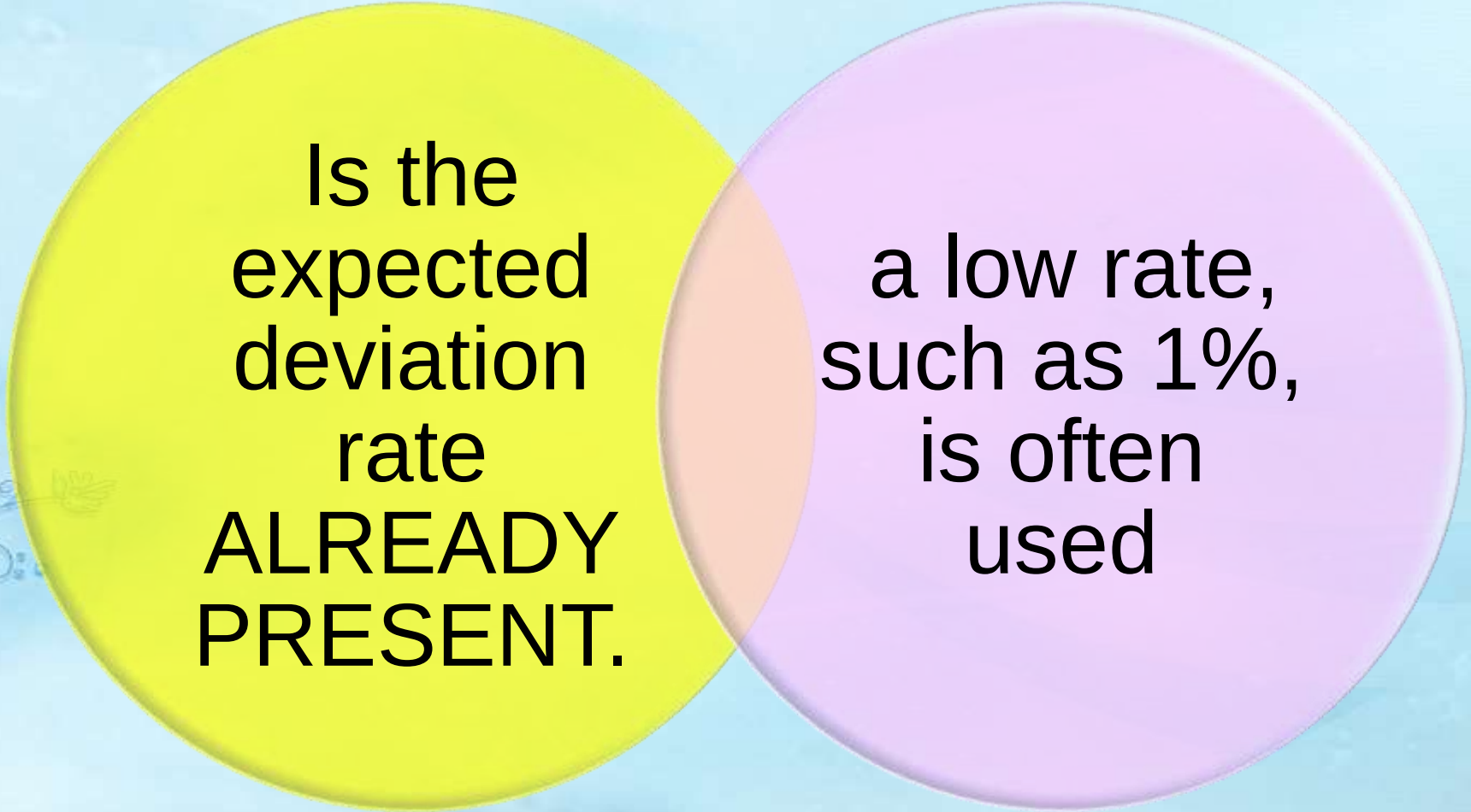
The tolerable deviation rate has a relationship to the population value, the materiality amount, and the multiplier.

Tolerable Deviation Rate

=

(Materiality x Multiplier)/Population Value

Expected Deviation Rate



Haphazard Selection

This the non-statistical approximation of a random sample .

- The ways in which the auditor could approximate a statistical sample
- The auditor increases his/her statistical sample size from 20 to 50 to compensate for not taking a statistical sample. *(Why is this needed?)*

Haphazard Selection

- Periodic Selection
- Page selection
- Box/cabinet selection

Periodic Selection

There are 52 weeks in a year.

divide the sample size by 52 to determine how many sample items should be selected from each week of the year,

Select the appropriate number of items from the transactions processed in each of those weeks.

If there are fewer than 52 sample items, the auditor could use half-months or months.

For a sample size of 60, the auditor could select 1 sample item from most weeks, and 2 sample items from the other weeks.

Page Selection

The auditor could divide the number of pages on which the transactions are listed by the sample size, and then select the appropriate number of items from each group of pages.

For example, if there are 300 pages of transactions and the auditor wishes to select a sample of 60 transactions, the auditor could select one sample item from each fifth page, or from each group of five pages.

Selecting from Boxes, Filing Cabinets

Divide the sample size by the number of boxes or filing cabinets of transactions in which the documents are stored,

Select the appropriate number of items from each of the boxes or filing cabinets.

If sample size is less than boxes or filing cabinets, boxes or filing cabinets are grouped and sample selected from each group.

ACL Demonstration

Manual/Excel Form for MUS


THANK YOU