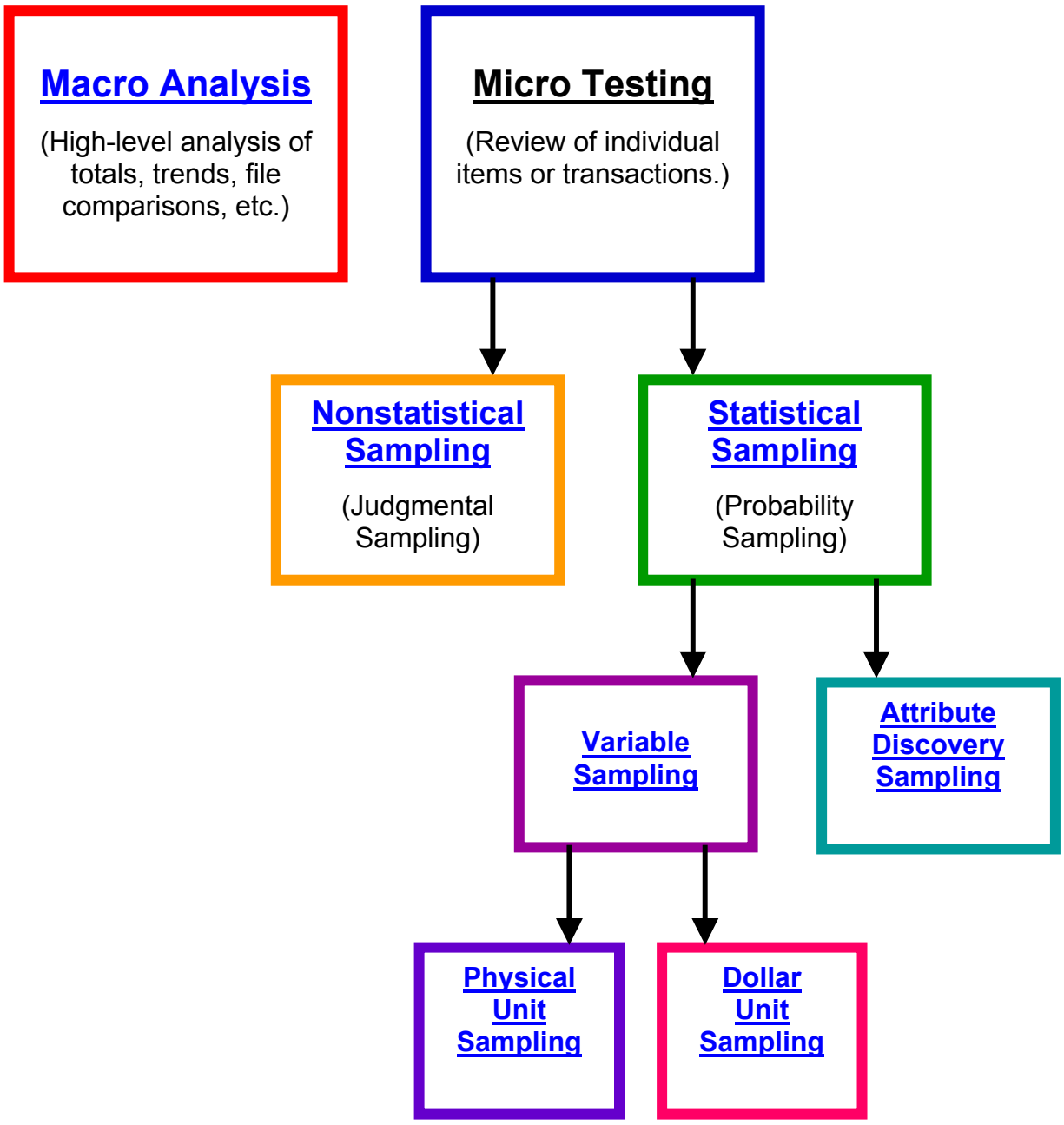
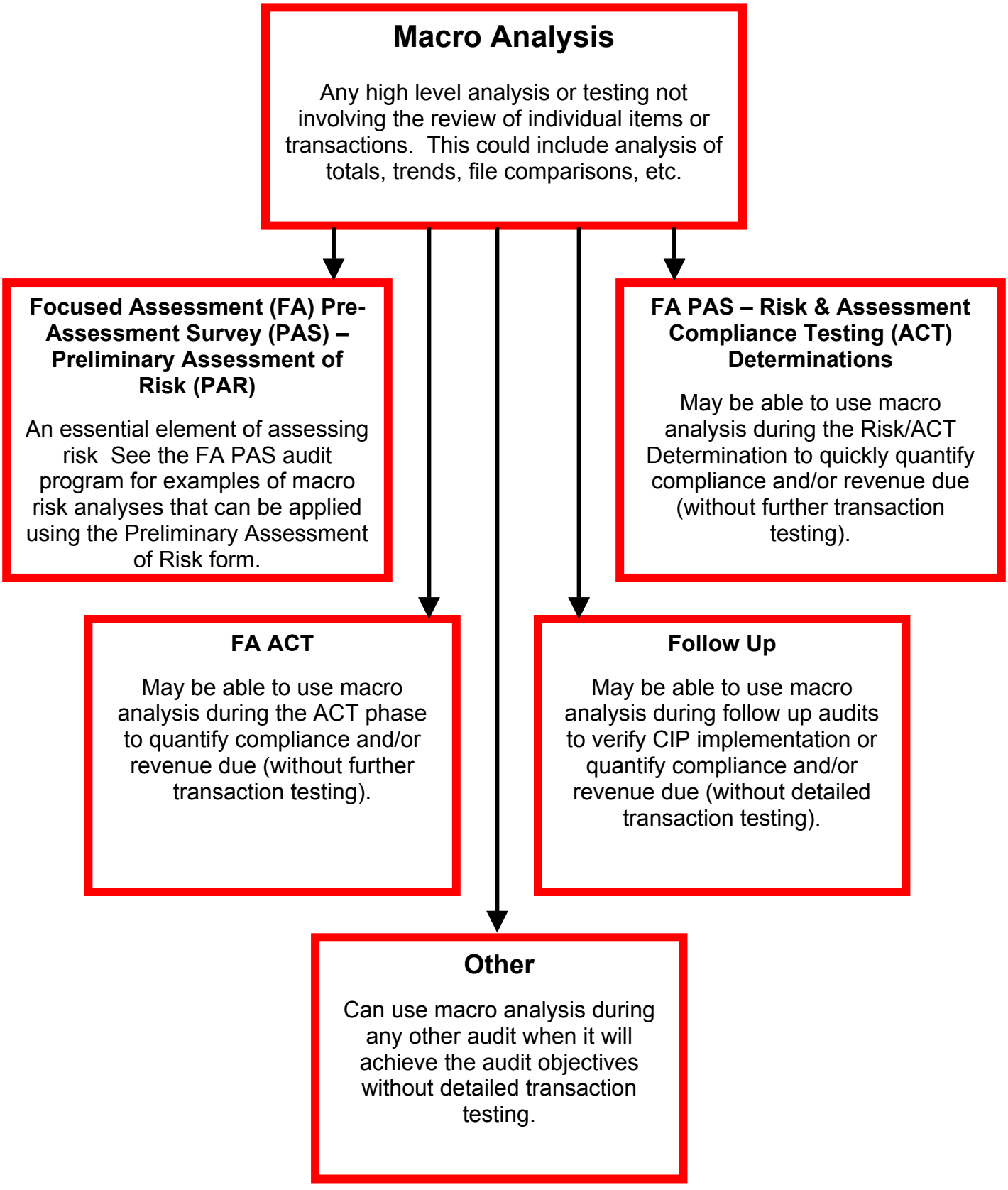
Sampling Methodology Diagrams

Audit Testing Methods



Macro Analysis
Appropriate Uses



Nonstatistical Sampling
Appropriate Uses

Nonstatistical Sampling
(Judgmental Sampling)

Judgmental sampling is appropriate when statistical results are not needed and/or there is a high degree of certainty that a conclusion can be reached without further sampling, AND WHEN:

Survey

The purpose is to survey the area in order to determine the necessity for and extent of substantive testing (further transaction testing).

- **FA PAS**
- **Follow up**
- **Any other audit where a survey is appropriate to achieve the audit objectives.**

Known Problem Area

There is a desire to concentrate audit effort in a specific limited problem area revealed by a previous sample or other source of information.

- **FA ACT**
- **Follow up**
- **Any other audit where there is a specific limited problem area.**

Very Small Universe

The universe is very small and it would be quicker and easier to review all or most of the items in the universe.

- **FA ACT**
- **Follow up**
- **Any other audit where the universe is very small.**

Very Sensitive Area

The area is very sensitive and there is no room for error or exact results are needed so all of the items in the universe must be reviewed.

- **Fraud**
- **Any other very sensitive audit where there is no room for error or where exact results are needed.**

Nonstatistical Sampling
Sample Sizes

Nonstatistical Sampling
(Judgmental Sampling)

Nonstatistical sample sizes are generally small and will vary depending on the application and area being reviewed.

FA PAS

Sample sizes will be 1 to 20, depending on the results of the initial risk exposure and internal control assessment.

Low risk exposure and strong internal controls = low end of 1 to 10 range.

Low risk exposure and adequate internal controls = middle of 1 to 10 range.

Low risk exposure and weak internal controls = high end of 1 to 10 range.

Moderate risk exposure and strong internal controls = low end of 5 to 15 range.

Moderate risk exposure and adequate internal controls = middle of 5 to 15 range.

Moderate risk exposure and weak internal controls = high end of 5 to 15 range.

High risk exposure and strong internal controls = low end of 10 to 20 range.

High risk exposure and adequate internal controls = middle of 10 to 20 range.

High risk exposure and weak internal controls = high end of 10 to 20 range.

All Other Audits

Sample sizes will generally be 100% of the review area.

Judgmental sample sizes generally should not significantly exceed a normal statistical sample of 60 to 100.
If the area is much larger than that, then statistical sampling should be considered instead.

Nonstatistical Sampling
Common Selection Methods

Nonstatistical Sampling
(Judgmental Sampling)

Judgmental sampling is a process in which sample items are selected subjectively rather than statistically (i.e. randomly). It relies solely on auditor judgment to appropriately select sample items to accomplish the particular audit and sample objectives.

Cross Section Test

Items from all parts of an area are selected (e.g., 5% sampled by selecting every 10th item or by haphazardly selecting items). This is a good method when there is no knowledge of the area or when it is desirable to get broad representation.

Block Test

A specific section or "block" of items is selected for review (e.g., one month of transactions). This method has limited applicability and may not give a clear picture of the entire area. The results may not be applicable to untested blocks.

Purposive Test

Known or suspected problem items are selected (e.g., all items in the tooling account). This method efficiently focuses resources. Caution must be exercised to avoid overstating the problem when attempting to apply the results to untested areas.

Convenience Test

The easiest or most readily available items are selected (e.g., the items in the office file drawer). This method rarely reflects good audit judgment, can be manipulated by the auditee, and is not recommended.

Large Dollar Test

The largest dollar items are selected (e.g., all items over $100,000). Caution must be exercised when attempting to apply conclusions to untested smaller items. Breakdowns in internal controls are often more pronounced in the smaller dollar area.

Nonstatistical Sampling Evaluation Methods

Nonstatistical Sampling
(Judgmental Sampling)

Judgmental sampling, by definition, relies solely on auditor judgment to evaluate sample results. That is, statistical analysis is not used to evaluate judgmental sample results.

100% Reviews

When the judgmental sample represents 100% of the review area, then the sample results represent actual results for the review area.

If the review area represents only part of the entire area being evaluated/reported on, then the review area results must be analyzed within the context of the entire area under evaluation.

< 100% Reviews

When the judgmental sample does not represent 100% of the review area, then the sample results must be evaluated by the auditor to determine if the audit and sample objectives have been achieved and if an opinion on the review area can be expressed.

It is generally not appropriate to compute compliance rates or project dollar impacts (revenue or value) based on the results of small nonstatistical samples.

Statistical Sampling
Basic Categories

Statistical Sampling
(Probability Sampling)

Statistical sampling is an objective process for testing a limited number of transactions in order to draw a conclusion about a larger universe. It uses a sampling plan in such a way that the laws of probability can be used to make statements or generalizations about the universe.

Statistical sampling is appropriate when the universe is too large to review 100% and statistical results are needed (i.e. to statistically project the sample results to the universe).

Variable Sampling

Variable sampling is a form of substantive testing of dollars that is quantitative in nature and results in better estimates of amounts. Sample items are evaluated for error amounts or variables. Variable sampling answers the question “how much?”

Attribute Sampling

Attribute sampling is a form of compliance testing that is qualitative in nature, can be used to determine the rate of occurrence, and may result in system changes. Sample items are evaluated for compliance or attributes. Attribute sampling answers the question “how many?”

Variable Sampling Types

Variable Sampling

Variable sampling is a form of substantive testing that is quantitative in nature, can be used to determine the amount of variance, and may result in dollar impacts.

There are 2 basic types of variable sampling based on the sampling unit selected.

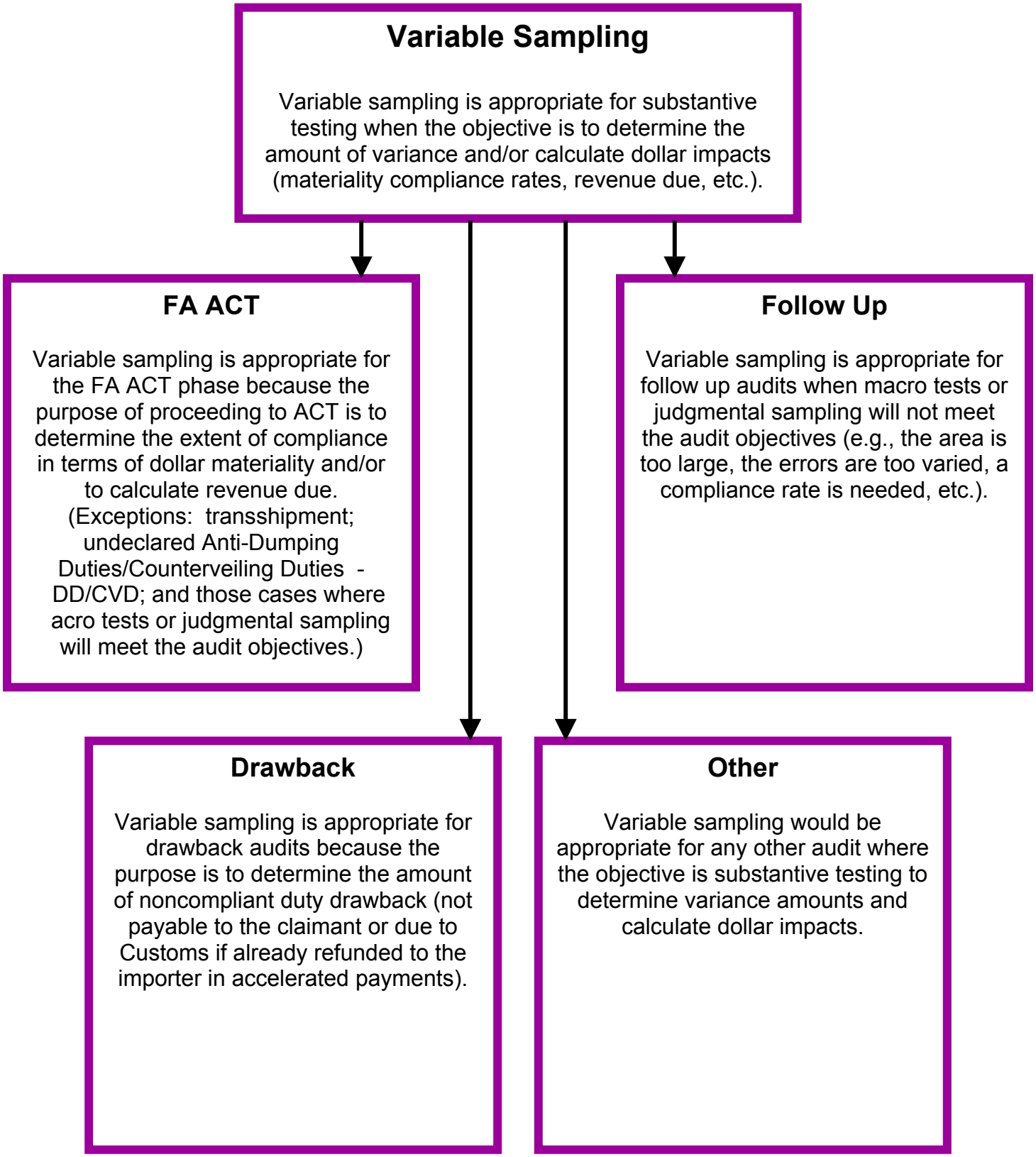
Physical Unit

Physical unit sampling is a type of variable sampling in which the sampling unit is defined as a physical item or transaction, with each physical item or transaction having an equal chance of selection (or determinable non-zero chance of selection in the case of stratification). Physical unit sampling directly selects physical units (items, transactions, etc.) for examination.

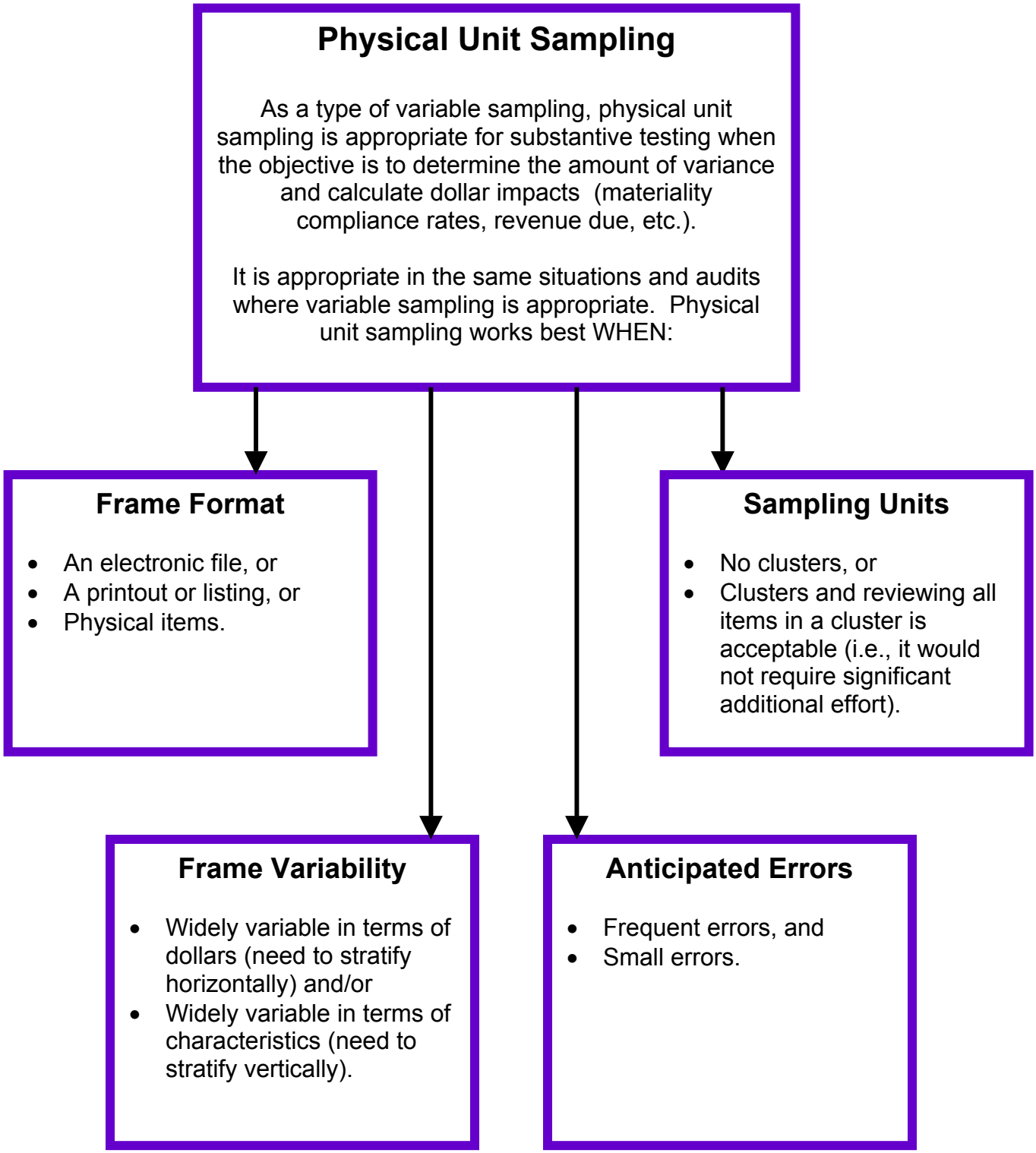
Dollar Unit

Dollar unit sampling is a type of variable sampling in which the sampling unit is defined as an individual dollar, with each dollar having an equal chance of selection. Dollar unit sampling selects individual dollars, which are then tied to physical units (items, transactions, etc.) that are examined.

Variable Sampling
Appropriate Uses



Physical Unit Sampling
Appropriate Uses



Physical Unit Sampling
Minimum Sample Sizes

Physical Unit Sampling

Physical unit sample sizes depend on the variability of the sampling frame. The more variability in the sampling frame, the larger the sample size required to achieve acceptable sample results.

Minimum sample size guidelines (based on statistical principles) have been established to assist the auditors.

Homogenous Frame

A homogenous sampling frame (similar dollars and characteristics) with a coefficient of variation < 50% (standard deviation of frame / frame mean * 100) requires as a minimum:

1 sample with 1 random stratum of 60 items.

Nonhomogenous Frame

A nonhomogenous sampling frame (dissimilar dollars and/or characteristics) with a coefficient of variation ≥ 50% (standard deviation of frame / frame mean * 100) requires as a minimum:

1 sample with 3 random strata plus a 100% (e.g., high dollar) stratum.

The total sample size should be at least 100 items. Each random stratum should be at least 30 items except when 30 items would be more than 5% of the items in the entire stratum. In that case, the stratum size can be 5% or 15 items, whichever is greater.

Physical Unit Sampling Selection Methods

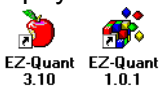
Physical Unit Sampling

Valid statistical methods require that each physical sampling unit (item or transaction) has an equal or determinable nonzero chance of selection and that each sampling unit is randomly selected.

EZ-Quant RANUM

(Random Numbers Generator)

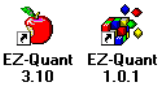
A computer procedure that generates random numbers which can then be used to select sample items. It works with an electronic frame, a numbered printout or listing frame, or a numbered physical frame.



EZ-Quant RASEQ

(Random Number Sets Generator)

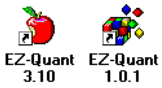
A computer procedure that generates sets of random numbers which can then be used to select sample items. It works with an unnumbered printout or listing, or an unnumbered physical frame.



EZ-Quant STRAT

(Physical Unit Sample Selection Procedure)

A computer procedure that automatically stratifies a universe into equal dollar strata and randomly selects sampling units in each stratum. It requires an electronic frame or small printout/listing that can be typed into the program.



Manual Systematic Interval

A manual selection method that selects every nth item by means of a fixed interval with a random start. It should only be used with an unnumbered physical frame when it would produce a better cross-section or would be quicker and easier than using RASEQ.

Other Computer Programs

Other programs, such as Microsoft Access or SAS, may be used if the electronic frame is too large to fit into Microsoft Excel (for analysis, manual stratification, or application of EZ-Quant RANUM) or too large to fit into EZ-Quant STRAT (for stratification and/or sample selection).

Physical Unit Sampling Evaluation Methods

Physical Unit Sampling

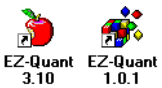
An essential phase of statistical sampling, including physical unit sampling, is the statistical evaluation of the sample results.

EZ-Quant SAMPL
(Physical Unit Sample Evaluation Procedure)

A computer procedure that projects the physical unit sample results to the universe and provides reliability measures for evaluating that projection.

The procedure provides two point estimates (one for the ratio method and one for the difference method) along with associated precision dollars and confidence intervals based on the confidence level specified. The point estimate with the lowest precision percentage (precision dollars / point estimate) should be selected and its precision percentage compared to the desired precision percentage from the sampling plan when determining the acceptability of the point estimate.

Sampling parameters should be 95% confidence level and < 100% precision percentage.



Other Computer Programs

Other computer programs, such as Microsoft Access or SAS, may be necessary to statistically project and evaluate the sample results if the electronic file is too large for EZ-Quant SAMPL.

Sampling parameters should be 95% confidence level and < 100% precision percentage.

Dollar Unit Sampling
Appropriate Uses

Dollar Unit Sampling

As a type of variable sampling, dollar unit sampling is appropriate for substantive testing when the objective is to determine the amount of variance and calculate dollar impacts (materiality compliance rates, revenue due, etc.).

It is appropriate in the same situations and audits where variable sampling is appropriate. Dollar unit sampling works best WHEN:

Frame Format

- An electronic file, or
- A small printout or listing that can be typed into EZ-Quant.

Sampling Units

- Clusters and reviewing all items in a cluster is not acceptable (i.e., it would require significant additional effort).

Frame Variability

- Not widely variable, or
- Widely variable in terms of dollars but not in terms of characteristics (especially if left skewed with many high dollar items and few low dollar items).

Anticipated Errors

- Infrequent errors, and
- Large errors.

Dollar Unit Sampling
Minimum Sample Sizes

Dollar Unit Sampling

Dollar unit sample sizes depend on the variability of the sampling frame. The more variability in the sampling frame, the larger the sample size or the more samples required to achieve acceptable sample results.

Minimum sample size guidelines (based on statistical principles) have been established to assist the auditors.

Homogenous Frame

A homogenous sampling frame (similar dollars and characteristics) with a coefficient of variation < 50% (standard deviation of frame / frame mean * 100) requires as a minimum:

1 sample of 60 items.

Nonhomogenous Frame
(High Dollar Variability)

A nonhomogenous sampling frame (dissimilar dollars) with a coefficient of variation ≥ 50% (standard deviation of frame / frame mean * 100) requires as a minimum:

1 sample of 100 items.

Nonhomogenous Frame
(High Characteristic Variability)

A nonhomogenous sampling frame (dissimilar characteristics) with a coefficient of variation >= 50% (standard deviation of frame / frame mean * 100) requires as a minimum:

Multiple samples of 60 items each (one sample for each characteristic group).

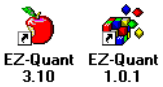
Dollar Unit Sampling Selection Methods

Dollar Unit Sampling

Valid statistical methods require that each sampling unit (i.e. dollar) has an equal chance of selection and that each sampling unit is randomly selected.

EZ-Quant DUSSEL
(Dollar Unit Sample Selection Procedure)

A computer procedure that automatically selects dollar units using a systematic interval method. It requires an electronic frame or small printout/listing that can be typed into the program.



Manual Systematic Interval

A manual selection method that selects every nth dollar by means of a fixed interval with a random start. While possible to use with a printout/listing frame, it is generally not recommended due to the amount of effort required to manually select the dollar hits.

Other Computer Programs

Other programs, such as Microsoft Access or SAS, may be used if the electronic frame too large to fit into Microsoft Excel (for analysis) or too large to fit into EZ-Quant DUSSEL (for sample selection).

Dollar Unit Sampling Evaluation Methods

Dollar Unit Sampling

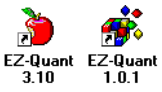
An essential phase of statistical sampling, including dollar unit sampling, is the statistical evaluation of the sample results.

EZ-Quant DUSAM
(Dollar Unit Sample Evaluation Procedure)

A computer procedure that projects the dollar unit sample results to the universe and provides reliability measures for evaluating that projection.

The procedure provides a point estimate along with associated precision dollars and confidence intervals based on the confidence level specified. The achieved precision percentage (precision dollars / point estimate) should be compared to the desired precision percentage from the sampling plan when determining the acceptability of the point estimate.

Sampling parameters should be 95% confidence level and < 100% precision percentage.



Other Computer Programs

Other computer programs, such as Microsoft Access or SAS, may be necessary to statistically project and evaluate the sample results if the electronic file is too large for EZ-Quant DUSAM.

Sampling parameters should be 95% confidence level and < 100% precision percentage.

Attribute Discovery Sampling
Appropriate Uses

Attribute Discovery Sampling

Attribute discovery sampling is a special kind of attribute acceptance sampling where the occurrence of even a single error constitutes a failure of the universe.

Attribute discovery sampling is appropriate when the risk of erroneous rejection of a universe is immaterial, AND:

Any Systemic Error = Noncompliance

The area is sensitive and any systemic error would constitute noncompliance and/or potential fraud.

- **FA ACT Unacceptable Risk Areas of Transshipment and Undeclared ADD/CVD.**
- **Follow Up of Transshipment and Undeclared ADD/CVD.**

No Anticipated Errors and/or Errors Result in Penalties Rather then Revenue Due

No error is expected in the universe (a low risk universe).

- **Broker.**
- **Bonded Warehouse.**

Attribute Discovery Sampling
Sample Sizes

Attribute Discovery Sampling

Attribute discovery sample sizes will vary depending on the universe size and sampling parameters.

The larger the universe and the tighter the sampling parameters (the higher the confidence level, the lower the critical error rate, and the lower the government risk), the larger the required sample size.

EZ-Quant ATTDISC
(Attribute Sample Size Determination Procedure)

A computer procedure that calculates the sample size required to achieve the attribute sample objective based on the universe size and specified sampling parameters.

Sample sizes computed will generally be in the range of 59 to 90.

Sampling parameters when any systemic error results in noncompliance are 5% critical error rate and 1% government risk.

Sampling parameters when no errors are anticipated or errors result in penalties rather than revenue due e 5% critical error rate and 5% government risk

Attribute Discovery Sampling Selection Methods

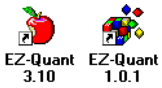
Attribute Discovery Sampling

Valid statistical methods require that each sampling unit has an equal or determinable nonzero chance of selection and each sampling unit is randomly selected.

EZ-Quant RANUM

(Random Numbers Generator)

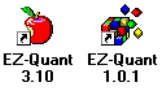
A computer procedure that generates random numbers which can then be used select sample items. It works with an electronic frame, a numbered printout or listing frame, or a numbered physical frame.



EZ-Quant RASEQ

(Random Number Sets Generator)

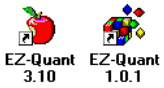
A computer procedure that generates sets of random numbers which can then be used to select sample items. It works with an unnumbered printout or listing, or an unnumbered physical frame.



EZ-Quant STRAT

(Physical Unit Sample Selection Procedure)

A physical unit sample selection computer procedure that may be used for attribute discovery sample selection by specifying 1 stratum and no high dollar stratum items. It requires an electronic frame or small printout/listing that can be typed into the program.



Manual Systematic Interval

A manual selection method that selects every nth item by means of a fixed interval with a random start. It should only be used with an unnumbered physical frame when it would produce a better cross-section or would be quicker and easier than using EZ-Quant RASEQ.

Other Computer Programs

Other programs, such as Microsoft Access or SAS, may be used if the electronic frame is too large to fit into Microsoft Excel (for application of EZ-Quant RANUM) or too large to fit into EZ-Quant STRAT (for sample selection).

Attribute Discovery Sampling Evaluation Methods

Attribute Discovery Sampling

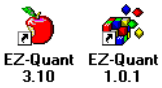
The purpose of attribute discovery sampling is to determine if any error (usually systemic) exists in the universe. Any such sample error would result in a failed universe or determination of noncompliance.

EZ-Quant SAMPL

(Physical Unit Sample Evaluation Procedure)

Since attribute discovery samples are s lected using physical unit procedures, the EZ-Quant SAMPL Physical Unit Sample Evaluation Procedure may be used to project dollar impacts (e.g., value or revenue) when applicable.

Sampling parameters should be 95% confidence level and < 100% precision percentage.



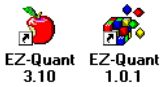
EZ-Quant ATTEVAL1

(Attribute Discovery Acceptance Sample Evaluation Procedure)

If it is necessary to estimate the total error rate in the universe, the EZ-Quant ATTEVAL1 attribute discovery acceptance sample evaluation procedure may be used for this purpose.

The confidence level when any systemic error results in noncompliance is 99%.

The confidence level when no errors are anticipated or errors result in penalties rather than revenue due is 95%.



Other Computer Programs

Other computer programs, such as Microsoft Access or SAS, may be necessary to statistically project and evaluate the sample results if the electronic file is too large for EZ-Quant SAMPL.

Sampling parameters should be 95% confidence level and < 100% precision percentage.