

Learning Objectives

- Understand the concepts of data integrity auditing
- Understand how to conduct an Attribute Agreement Analysis
- Recognize when to consider conducting a data integrity audit

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Data Collection Review

Important questions for data collection:

- What type of data do I have? (Continuous vs. Discrete)
- What do you want to know?
- From who do you want to know it?
- What will you do with the data?

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Continuous and Discrete Data

Continuous Data/Measuring Examples:

- Weighing something
- Measuring the length of something
- Measuring how long something takes

Discrete Data/Evaluating Examples:

- Evaluating if something is pass or fail
- Evaluating type of support (category)
- Evaluating what code group for a purchase

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Key Factors of Data Collection

- Length of time: per hour, day, shift, batch, etc.
- Type: cost, errors, ratings, etc.
- Source: reports, observations, surveys, etc.
- Cost: internally and externally
- Collector: team member, associate, expert, etc.

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Measurement System Analysis

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Measurement Systems Analysis: Three Types

Data Integrity Audits

- ✘ Used to assure that captured data is handled and reported without error or distortion

Attribute Agreement Analysis

- ✘ Used when making assessments or judgments involving discrete (nominal and ordinal) data

Gage R&R

- ✘ Used when making assessments or judgments involving continuous (interval and ratio) data

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Goal of MSA - Assure Reliable Data

- Determine the magnitude (impact) of the measurement error
- Determine if the measuring system is “capable” for this study
- Determine sources of measurement error
- Determine if measuring system stable over time

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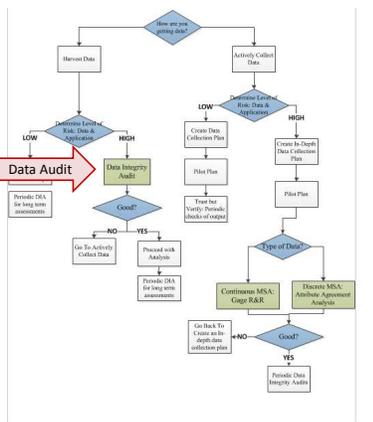


Data Integrity Audit

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Data Collection: Road Map



Audit Exercise

- You are an inspector at the Department of Prevention and your job is to find defects in a form you have been given
- **Defect Definition:** The Letter F/f
- **Task:** Count the defects without altering the product in 60 seconds

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Audit Exercise

The Necessity of Training Farm Hands for First Class Farms in the Fatherly Handling of Farm Live Stock is Foremost in the Eyes of Farm Owners. Since the Forefathers of the Farm Owners Trained the Farm Hands for First Class Farms in the Fatherly Handling of Farm Live Stock, the Farm Owners Feel they should carry on with the Family Tradition of Training Farm Hands of First Class Farmers in the Fatherly Handling of Farm Live Stock Because they Believe it is the Basis of Good Fundamental Farm Management.

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Data Integrity Audits

Data comes to us from various places:

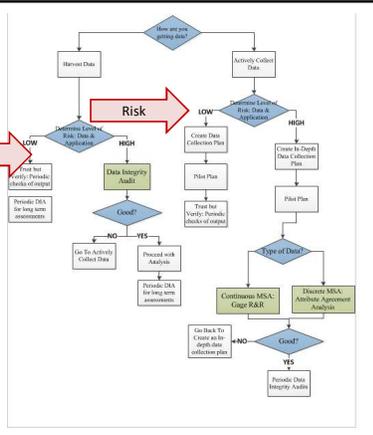
- Databases
- Customers
- Co-workers
- OAKS

How can we be sure this data is good?

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Data Collection: Road Map



Data Analysis: Evaluating Risk

- Is there a data entry process? Is the process being followed?
- How many points of entry are there for the data entry process?
- Where are you getting the data?
- Is the data system historically reliable?
- What is the experience level of data collector?
- Is there a secondary source to check the data?
- Is the process politically sensitive?

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Data Spreadsheets: Common Issues

- Formulas are incorrect
- Spreadsheet is not protected or locked
- Lose data through errors or computer issues
- Omitted information
- Added information
- Data collectors can make mistakes

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Requesting Data

When you are requesting information:

- Be clear
- Be concise
- Time bound
- Realistic timeframes
- If possible ask for all information once

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Time Component

- The data you collect may be a snapshot of the current state
- Use your time as productively as possible
- Be realistic when collecting and analyzing data
- Collect data in a time frame that is specific and relevant to your project or process

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When Is Enough Actually Enough?

- You may have to rely on your gut reaction with your data...
- Determine what your level of acceptable risk is and do your best to work with what data is available
- BUT note any issues or concerns as disclaimers with your project stakeholders and in your project charter

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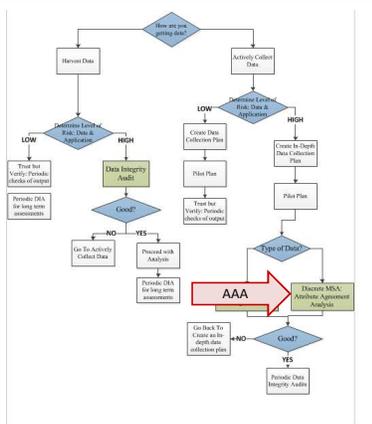


Attribute Agreement Analysis

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Data Collection: Road Map



How do you make sure the data is valid?

Taking steps to ensure accuracy and consistency of measurements through analysis and review is necessary to obtain process control

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MSA Definition

Measurements System Analysis (MSA) refers to the analysis of precision and accuracy of measurement methods. Three characteristics contribute to the effectiveness of a measurement method:

- Repeatability
- Reproducibility
- Accuracy

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Repeatability

A measurement method must be **repeatable**. A user of the method should be able to repeat the same results given multiple opportunities with the same conditions

Repeatability describes the minimum variability in results and implies that the variability of the measuring instrument itself is consistent

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Reproducibility

The method must then be **reproducible**. Several different users must be able to achieve the same results

Reproducibility describes the variability in results and implies that variability across operators is consistent

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Repeatability and Reproducibility

Repeatability and **reproducibility** often come under the heading of **precision**

Precision requires that the same measurement results are achieved for the condition of interest with the selected measurement method

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Accuracy vs. Precision

Accuracy describes Centering



How close to target?

Precision describes Spread



How close together?

Causes of Measurement Error

- Process variation
- Operator variation
- Operator-to-operator variation
- Equipment variation

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Attribute Agreement Analysis

- Used with Discrete Data (human judgement required)
- When categorizing items (good/bad; type of call; reason for leaving) you need a high degree of agreement on which way an item should be categorized
- Disagreements should be used to clarify operational definitions for the categories

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Attribute Agreement Analysis Purpose

- Determines whether everyone involved in the process is using the same process/criteria

Discover areas where:

- Additional training is needed
- Procedures are weak or non-existent
- Standards are not defined

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Setting Up an Attribute Agreement Analysis

- Select a set of samples in your process
- Identify the appraisers
- Have each appraiser, independently and in random order, assess the sample and determine whether or not the selected samples are pass or fail
- Enter the data into Minitab to report the effectiveness of the attribute measurement system (or eyeball it)
- Implement solutions to remedy defects
- Complete another Attribute Agreement Analysis after control measures are in place to assess improvements

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Attribute Agreement Analysis Example

Attribute Gage R & R Effectiveness

SCORING REPORT

Attribute Legend: *based on comparison*

1 pass

2 fail

DATE: 8/10/2006

NAME: Joe Smith

PRODUCT: My Gadget

BUSINESS: Unit 1

Sample #	Known Population Attribute	Operator #1		Operator #2		Operator #3	
		Try #1	Try #2	Try #1	Try #2	Try #1	Try #2
1	pass	pass	pass	pass	pass	fail	fail
2	pass	pass	pass	pass	pass	fail	fail
3	fail	fail	fail	fail	pass	fail	fail
4	fail	fail	fail	fail	fail	fail	fail
5	fail	fail	fail	pass	fail	fail	fail
6	pass	pass	pass	pass	pass	pass	pass
7	pass	fail	fail	fail	fail	fail	fail
8	pass	pass	pass	pass	pass	pass	pass
9	fail	pass	pass	pass	pass	pass	pass
10	fail	pass	pass	fail	fail	fail	fail
11	pass	pass	pass	pass	pass	pass	pass
12	pass	pass	pass	pass	pass	pass	pass

Gage R&R

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Attribute Agreement Exercise

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Attribute Agreement Exercise

Groups of Four: Pair up to group of two.

- Your company needs to deliver 'high quality' product. You want to know if your inspection process is capable.
- Each team of two will be given ten samples. The experts inspect each sample (M&M or Skittles) and decide by consensus if it passes or fails. This is done away from the inspectors.

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Attribute Agreement Exercise

- Each team of two will write operational definitions of what is a "pass" or "fail."
- Each team will define the Truth (pass or fail) for each sample based on their operational definitions
- The teams should vary the samples (clear passes, clear fails and some in the middle)
- Remember: you are trying to test your operational definitions
- Each inspector then inspects each M&M or Starburst for pass or fail. They inspect the samples at least twice (separate inspections.)
- The order of the samples should be changed between inspection runs to minimize the chance that an inspector will remember their previous sequence of pass/fail (this is rarely an issue).

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Questions?

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