

Understanding Data:

How to make better decisions



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Introduction

- Firmly believe that All Work is a process
- All processes vary (some vary more than others)
- The key to process improvement is being able to distinguish the signals from the noise in the variation.
- This starts with Understanding Data and more importantly the Data Collection process. Specifically;

Measures → Data (+ math) → Statistics → Information → Decisions

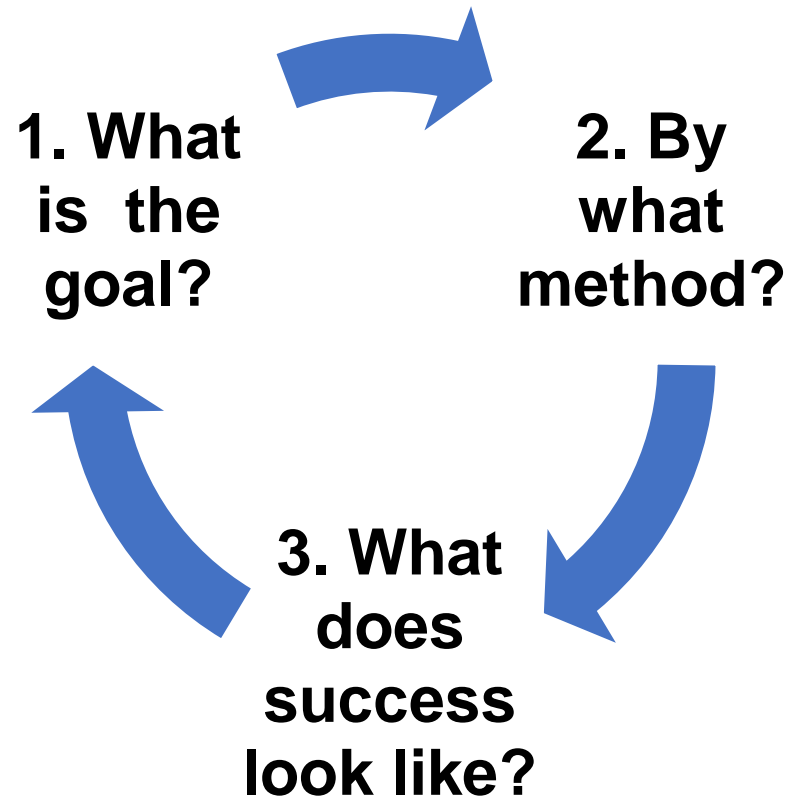
Understanding Data – How to make better decisions

Key Points/Take Away

- If the values in the data set are not all collected under the same conditions and in a consistent manner, the values are not comparable.
- Collecting good and consistent data is a prerequisite of any analysis chosen to explore the data.
- Any analysis completed can be no better than the pedigree of the original data.

What's the plan?

- Since the entire decision making process tends to start with data we should have a plan.



1. What's the goal?

If the following questions are not fully answered the results typically trend towards chaos very quickly:

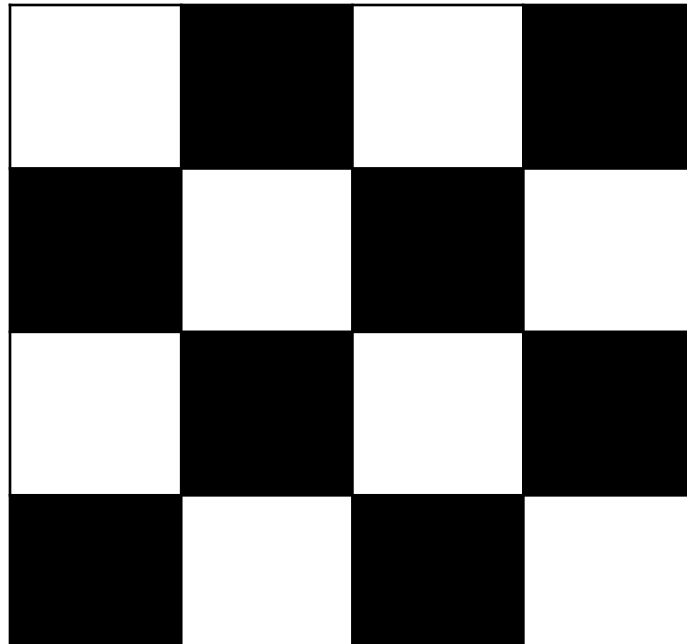
- What is the purpose of the data collection?
- Who is going to use the data?
- What specifically are they going to use the data for?
- What are the assumptions made concerning the data?
- How long will the data collection be necessary?

Key Point/Take Away – Never collect more data than you are willing to take action on!

2. By what method?

- Having a goal is not enough, we must also define the methods to be used. For example:

How Many Squares are there in the diagram below?*



* - Adapted from "See You at the Top" – Pelican Publishing, by Zig Ziglar, 1975.

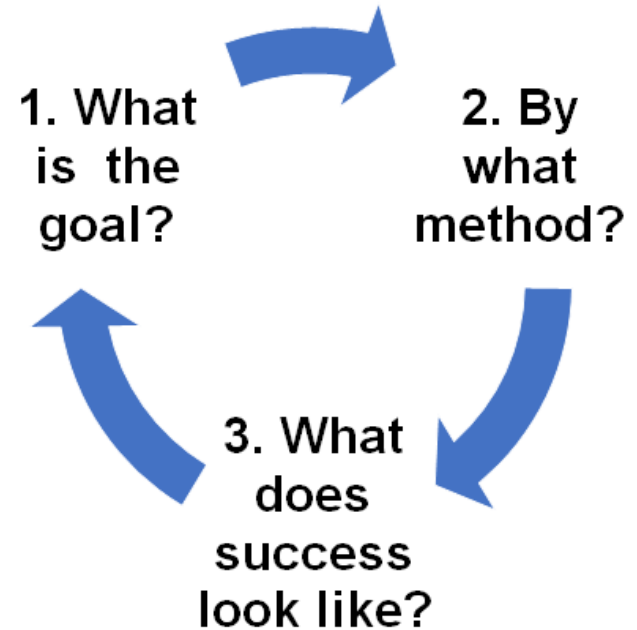
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2. By what method?

- Operational Definitions:

1. Criteria that can be applied,
2. specific test (of compliance) &
3. decision rule (method)

- Change any one of the above and your outcome (measure) will change.



2. By what method?

Operational Definitions

- **Criteria** – you may have 1x1, 2x2, 3x3, or 4x4 squares
- **Specific Test (of compliance)** – using the unaided eye (excluding glasses or contacts) a square must have equal sides
- **Decision Rule (method)** – for the entire 4X4 area total all the various size squares (1x1, 2x2...etc) to get the final answer

2. By what method?

Operational Definitions

- In your mind's eye, picture a bed sheet that is 50% silk and 50% cotton. What is the requirement?

* - Adapted from "Out of the Crisis" – MIT, by W. Edward Deming, 1986.

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2. By what method?



50% by weight

Criteria: Silk fibers evenly woven into the bed sheet ; 50% silk by weight when taking five 1” diameter samples from the four corners and middle. (See example #1.)

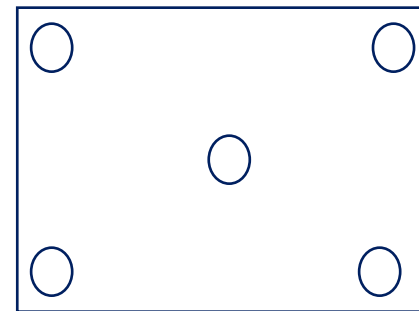
Test (of compliance): Measure the distribution & percentage of silk fibers.

Decision Rule: Our 50% silk sheet will have silk fibers evenly woven into the blanket and contain 50% silk by weight.



One side cotton; one side silk

Example #1



3. What does success look like?

Measures → Data (+ math) → **Statistics** → Information → Decisions

- Dr. Walter Shewhart concluded that collecting data is basically done for one of two reasons:
 1. “To obtain quantitative information.” In other words, to help us understand our PAST performance.
 2. “To obtain a causal explanation of observed phenomena.” In other words to understand or predict the FUTURE based on the past.

* - Adapted from “Economic Control of Quality of Manufactured Product” – 50th anniv. edition, Quality Press Inc. by Walter Shewhart, 1980.

3. What does success look like?

Measures → Data (+ math) → **Statistics** → Information → Decisions

Example:

Your significant other has to have a major surgery as soon as possible as their health/life is at risk. You are given the following information about the available surgeons able to do the surgery in the needed time frame.

- Surgeon One has a 70% success rate.
 - Surgeon Two has a 80% success rate.
 - Surgeon Three has a 100% success rate.
- **Which Surgeon do you choose?**

3. What does success look like?

*Dr. Walter Shewhart gave us Two rules for understanding data:

Rule 1: Context – when presenting data the context of the data must be included in the presentation to make sure the original assumptions are clearly understood and communicated.

As a minimum Context should include:

- Each of the individual values
- A complete description of Who, What, When, Where, Why and How the data was collected.
- Finally, the original time order of the data.

* - Adapted from “Understanding Variation- The Key to Managing Chaos” – 2nd edition, SPC Press Inc. by Donald Wheeler, 1999.

3. What does success look like?

*Dr. Walter Shewhart gave us Two rules for understanding data:

Rule 2: Summary - any summary should not misinform those using the data into taking any action that is different than if the original time series data had been used.

* - Adapted from “Understanding Variation- The Key to Managing Chaos” – 2nd edition, SPC Press Inc. by Donald Wheeler, 1999.

Summary

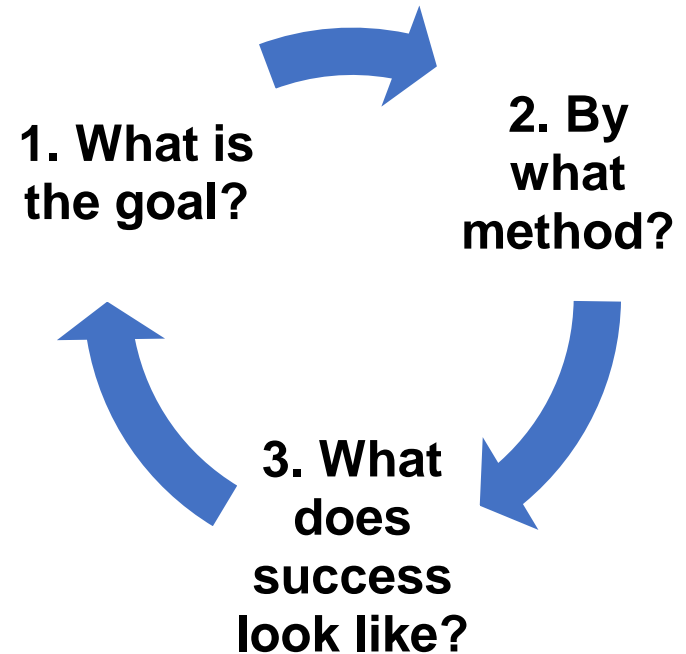
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Summary

Dr. Shewart has provided us:

- The reasons for why we collect data (describe past or predict future) &
- Rules of understanding data (Context and Summary)



Measures → Data (+ math) → Statistics → Information → Decisions

References

- “Making Sense of Data” by Donald J. Wheeler, SPC Press, 2003.
- “Guide to Data Analysis” by Donald J. Wheeler, SPC Press 2005.
- “A Theory of a System for Educators and Managers” video featuring Dr. Russell Ackoff and Dr. W. Edwards Deming.
<https://www.youtube.com/watch?v=2MJ3IGJ4OFo>