

 **FELC 2021**

# Data Navigation and Data Driven Strategies





DATA NAVIGATION FELC 2021

# What is data?

Defining data types and data structures

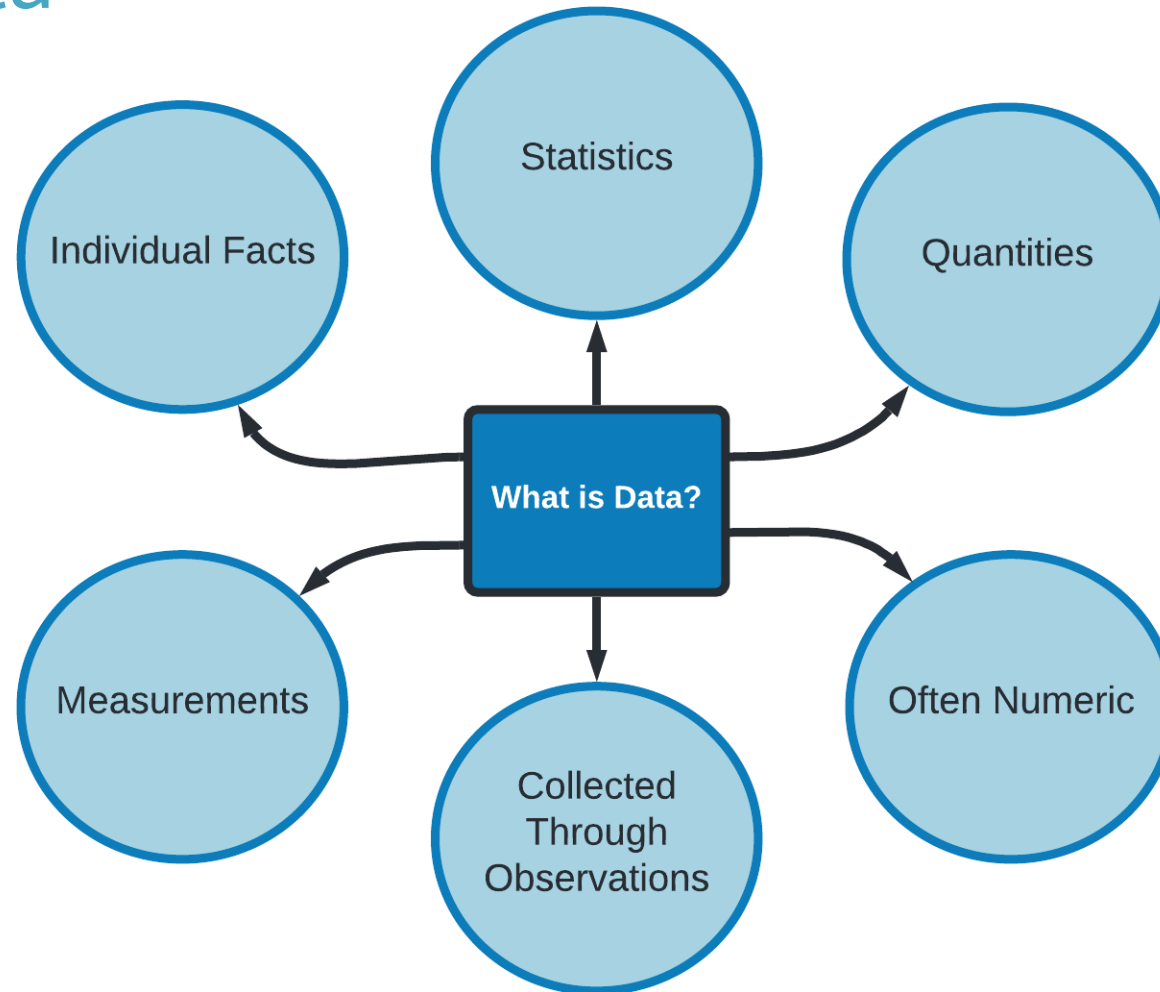


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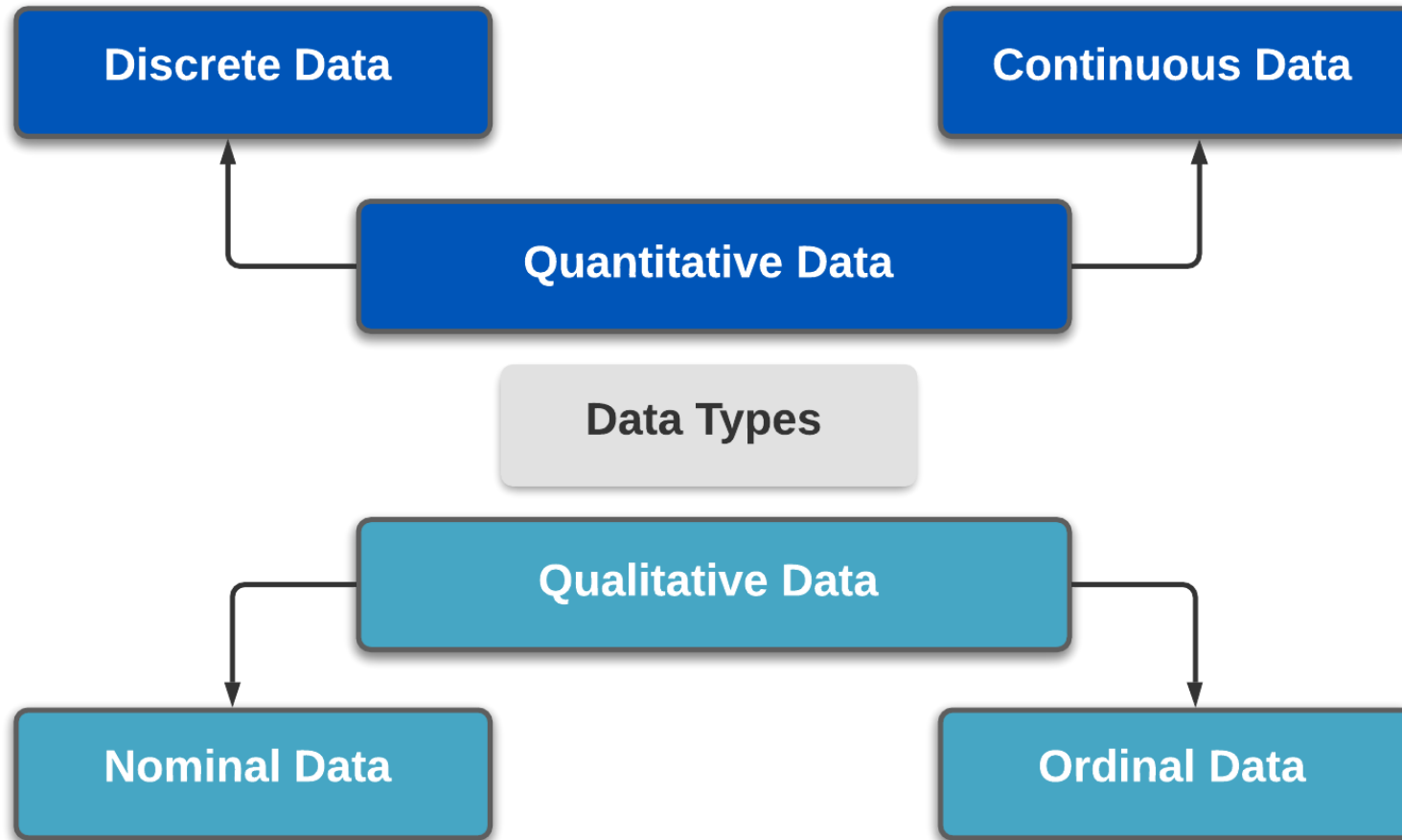
# Defining Data



# Defining Data Types

Quantitative	Qualitative
<ul style="list-style-type: none"><li>• <b>Numerical</b></li><li>• <b>The type of data whose value is measured in the form of counts or numbers where each data-set has a unique numerical value associated with it.</b></li><li>• <b>Express a certain quantity, amount, or range</b></li><li>• <b>Can apply mathematical operations</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Categorical</b></li><li>• <b>Descriptive data based on observations</b></li><li>• <b>Categorical data is what numeric data is about</b></li><li>• <b>Can take on numerical values, but those numbers don't have mathematical meaning</b></li></ul>

# Defining Data Types



- **Quantitative**

- **Discrete** (counted)
  - Number of Firms
- **Continuous** (measured)
  - HPLC readings

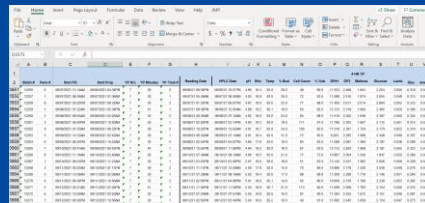
- **Qualitative**

- **Nominal** – mutually exclusive labeled categories
  - Phase
- **Ordinal** – ordered series
  - Batch#

# Defining Data Structure

## Structured Data

- **Conforms to a tabular format with relationship between the different rows and columns**
- **Comprised of clearly defined data types with patterns that make them easily searchable**
- **Common Example: Excel files**



## Unstructured Data

- **“everything else”**
- **Comprised of data that is not as easily searchable**
- **Includes audio, video, text streams, pictures**





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# Create a Data Architecture:

Categorize and Classify to make data more useable



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# Data Audit



What data is available?



How is data collected and recorded?



How is the data formatted?



Where is the data stored?



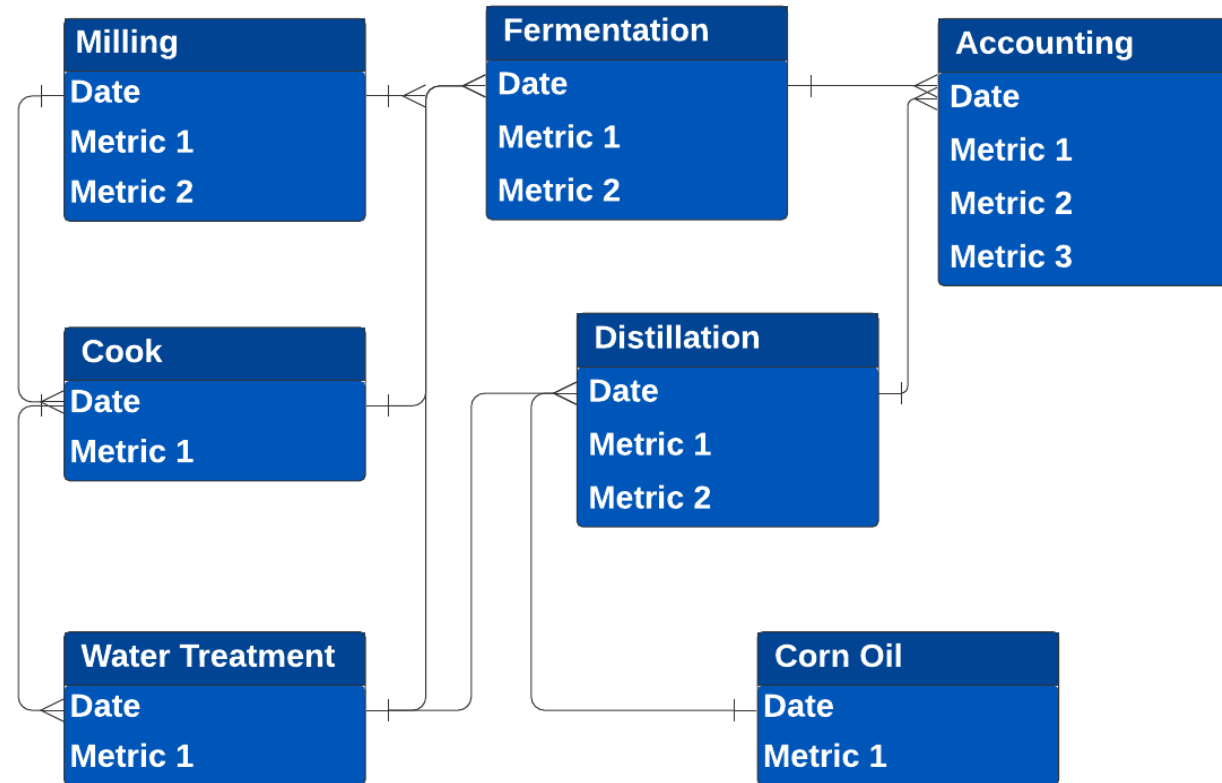
How is the data managed?



# Laying the Foundation: Data Set Index

Department	File Name	File Type	File Location	Champion	Department
LAB	FERM_DATA	JMP	S DRIVE -> LAB -> DATA	Lab Manager	LAB
PRODUCTION	PRODUCTION_DATA	EXCEL	S DRIVE -> PRODUCTION -> DATA	Production Manager	PRODUCTION
ACCOUNTING	CHEM_COST_DATA	EXCEL	Bob's Desktop -> CHEMICALS -> COST_2021	Bob	ACCOUNTING

# Laying the Foundation: Data Set Connections



# Data Management QA/QC

**Good Data = Good Decisions**



## **QA/QC**

**Ensure the generation of precise, accurate and reproducible data**

**Strategies for preventing errors from entering a dataset**

**Actions to ensure quality of data before collection**

**Performed to data throughout its lifecycle**



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# The Data Analysis Process:

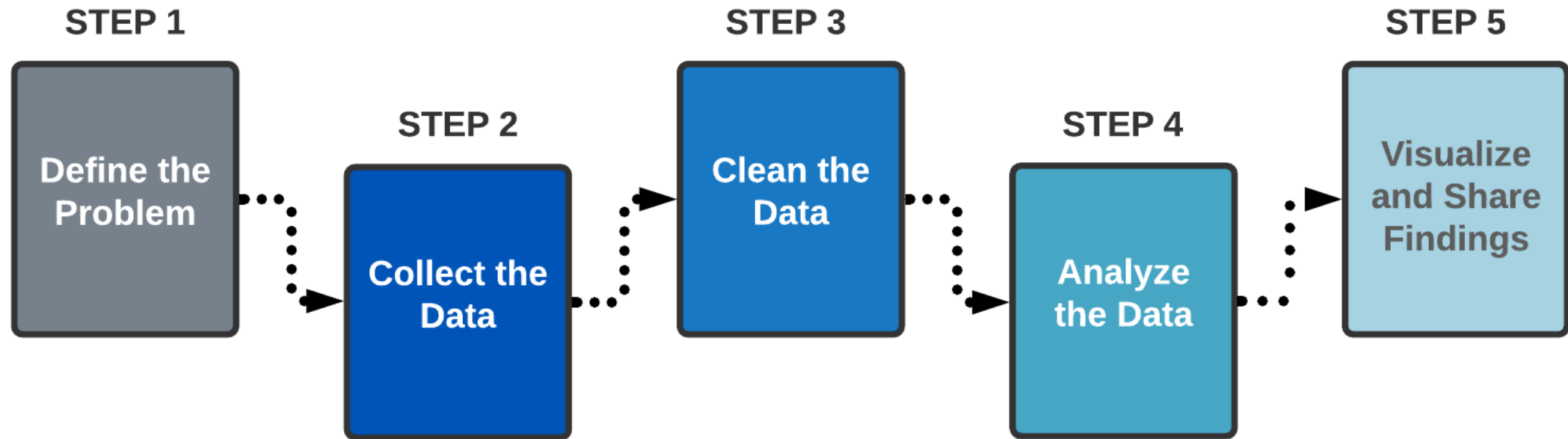
## 5 Steps to Enhanced Decision Making



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# The Five Steps of the Data Analysis Process



# Step 1: Defining the Problem

## Root Cause

- **5 Whys**
  - an iterative interrogative technique used to explore the cause-and-effect relationships underlying a particular problem.
- **Fishbone (Ishikawa) Diagrams**
  - Visualization tool for categorizing the potential root cause
  - Combines brainstorming with a mind map template

## Measurement Priorities

- **What to Measure**
  - Consider what kind of data you need to answer your key question
- **How to Measure it**
  - The measuring process backs up or discredits your analysis later on
  - Identify your: time frame, units of measure, and other factors to be included

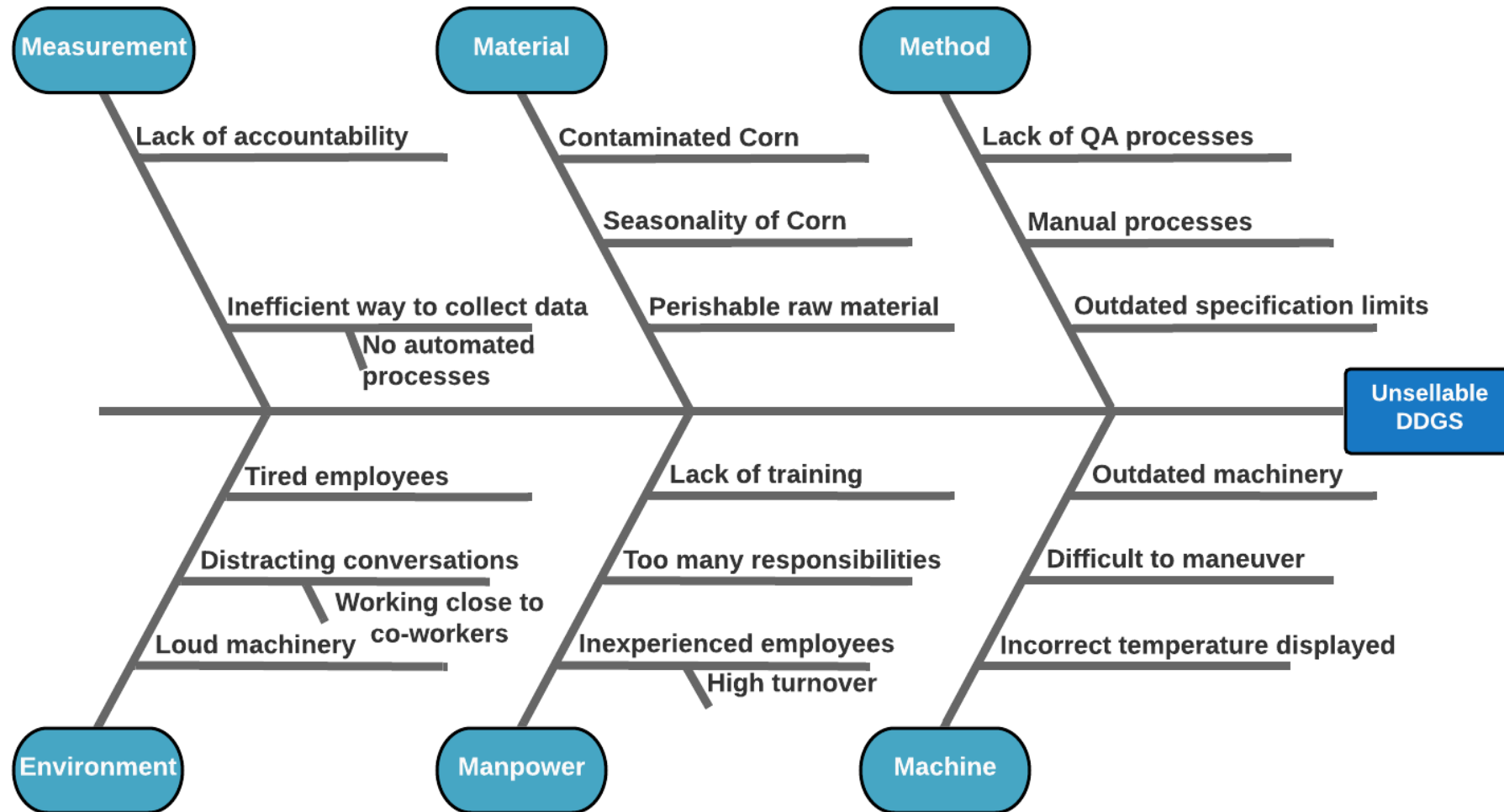
# Defining the Problem

- **5 Whys Example**



# Defining the Problem

## • Fishbone Example





## Step 2: Collect the Data

1

- **First-Party Source**

- You collected directly
- Usually structured and organized

2

- **Second-Party Source**

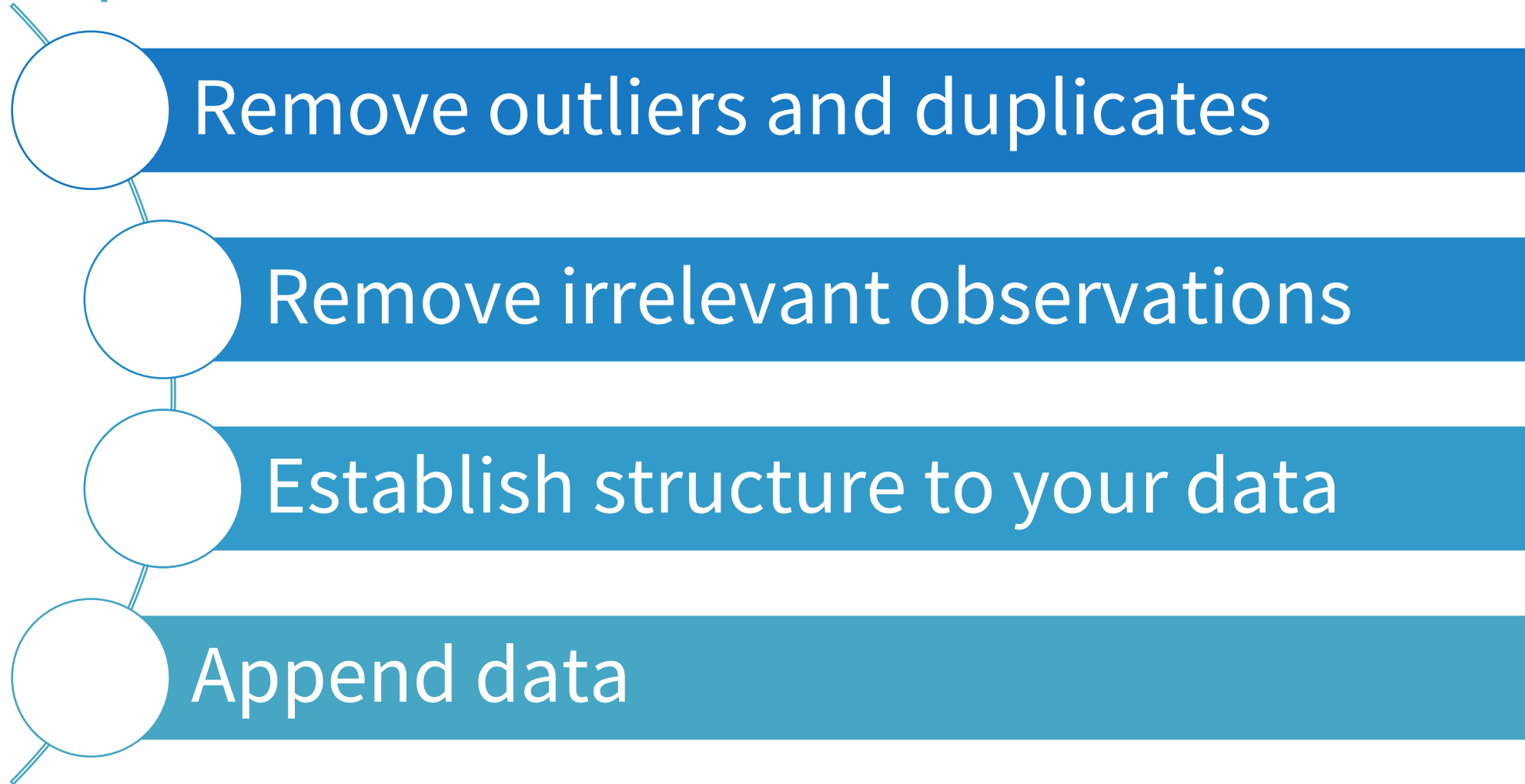
- Someone else's first party data
- Usually structured and reliable

3

- **Third-Party Data**

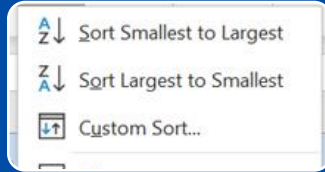
- Collected and combined from numerous sources
- Consists of a vast amount of unstructured data

## Step 3: Clean the Data

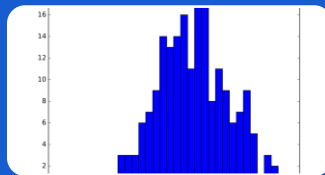


# Clean the Data

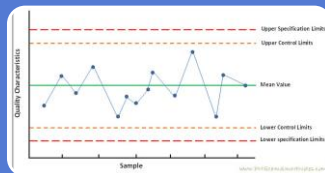
- **Identify outliers**



Sort High to Low



Histogram



Control Chart



Advanced Analytics

## Step 4: Analyze the Data

# The Four Main Types of Data Analysis

### Descriptive

- Tells us **WHAT** has happened
- Helpful for operations and management
- Easy to visualize

### Diagnostic

- Assists in Root Cause Analysis
- Explains **WHY** things are happening
- Helps trouble shoot issues

### Predictive

- Tells **what is likely** to happen
- Based on historical data
- Helps build algorithms for automation

### Prescriptive

- Helps **determine future actions**
- Based on current data analytics and future plans
- Can help develop advanced algorithms to test potential outcomes

## Step 5: Visualize and Share Findings

# Interpretation of Results

?

**Does the data answer your original question? How?**

?

**Does the data help you defend against any objections? How?**

?

**Are there any limitation on your conclusions, any angles you haven't considered?**

# Visualize and Share Findings

## Visualization – Charts and Graphs



Distribution



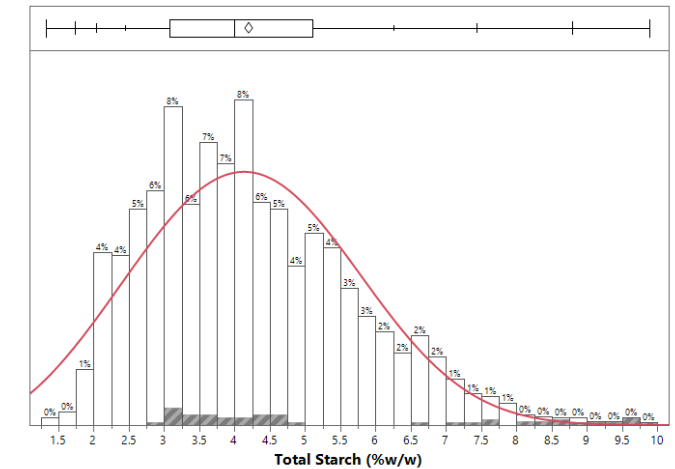
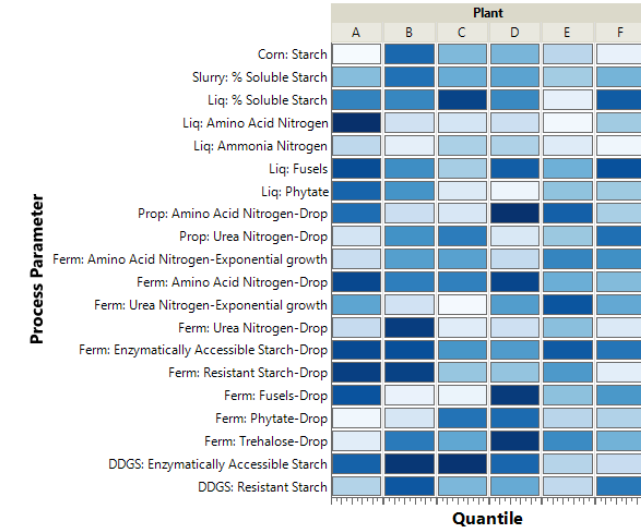
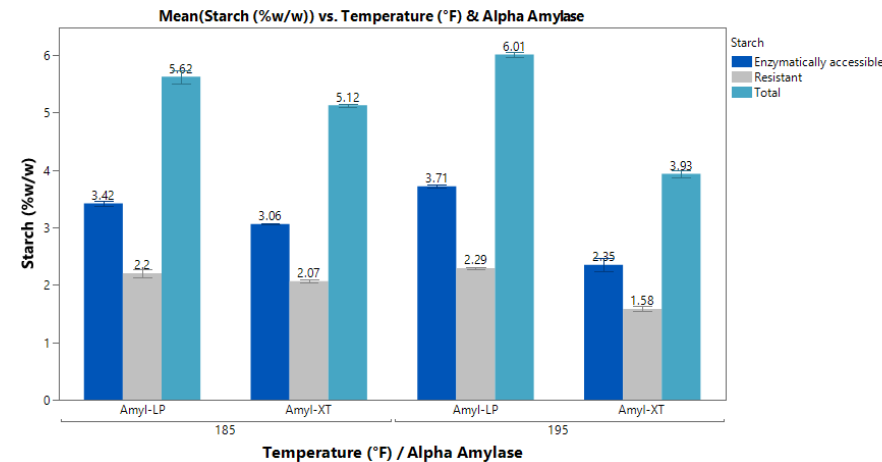
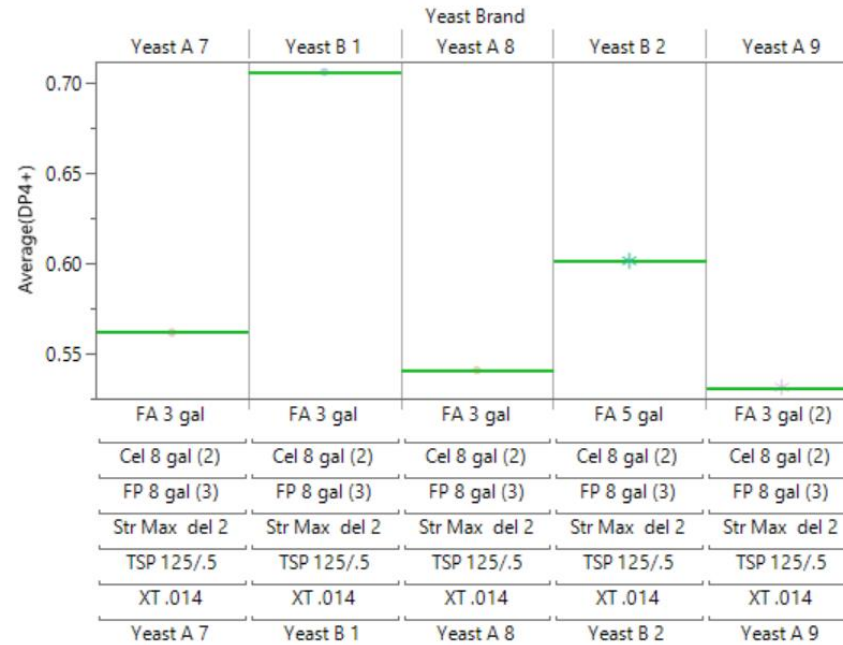
Relationship



Composition

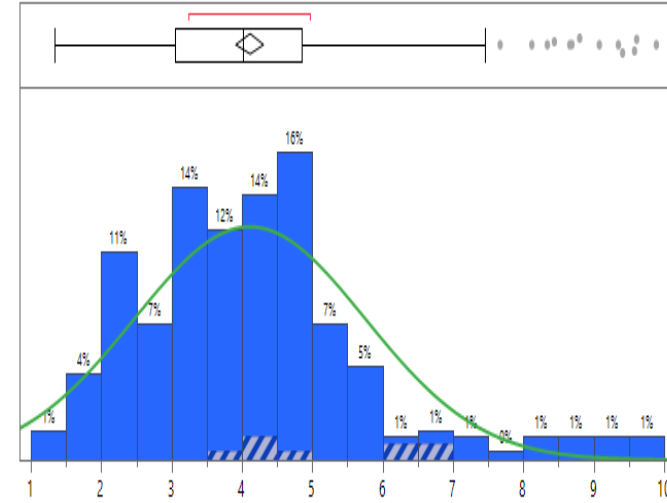
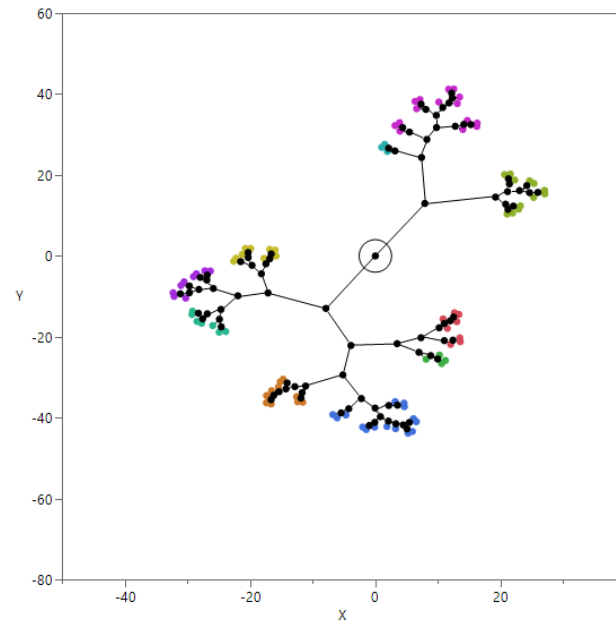
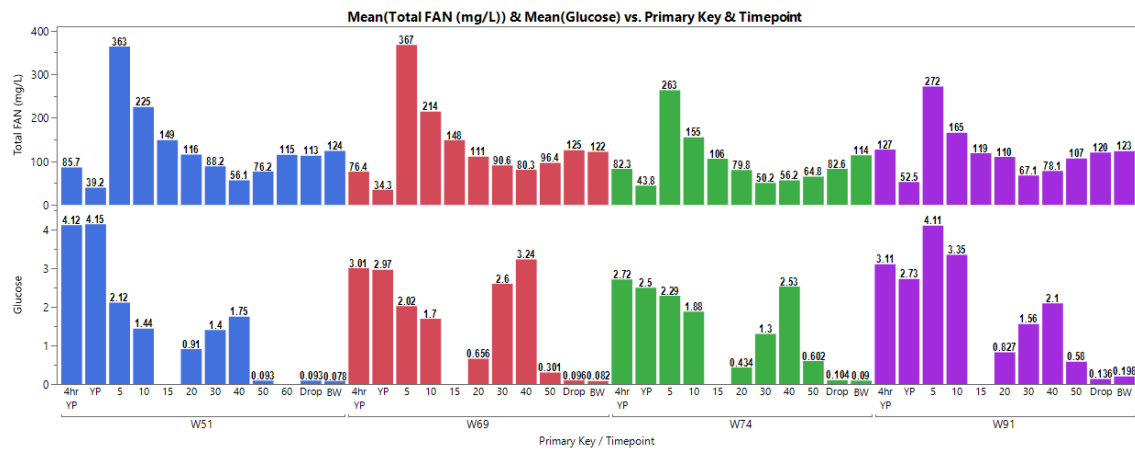
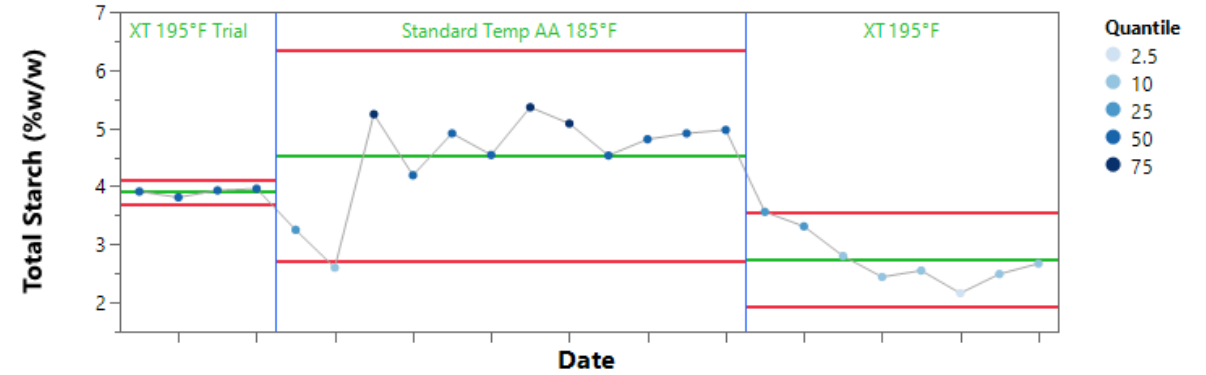
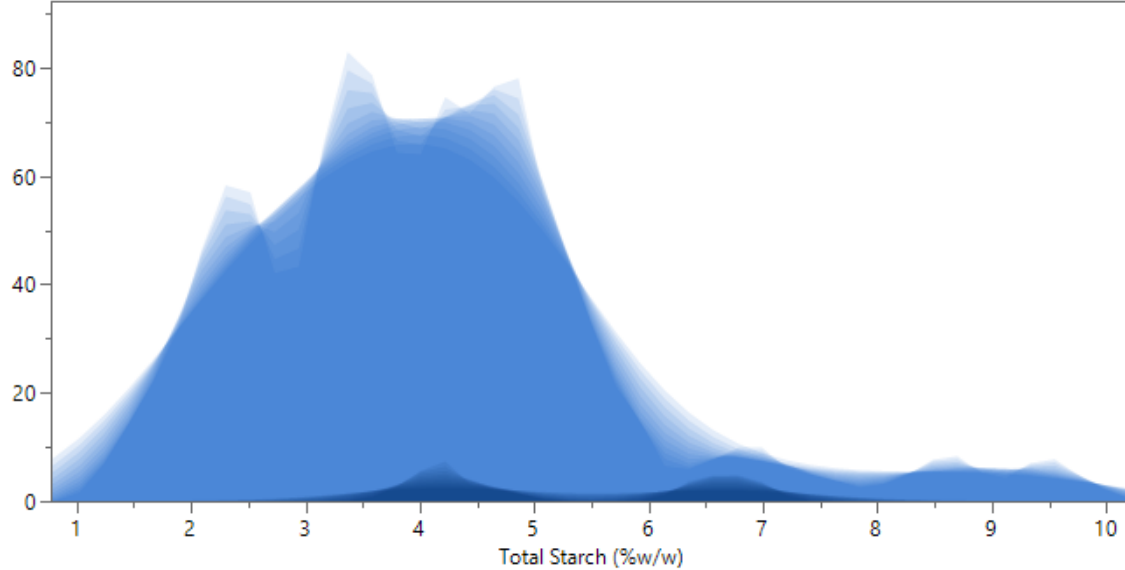


Comparison



# Visualize and Share Findings

2020-2021 Total Starch (%w/w)



# Visualize and Share Findings

## Visualization- Presentation Formats



Reports



Dashboards



Interactive Visualizations





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# Data Driven Transformation:

## Key Traits



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# Key Traits

## Data-Driven Approach



**Build a history of making decisions based on data insights – rather than gut feeling or intuition**



**Use The Data Analysis Process as the framework to tackle problems and make decisions**



**Cultivate a culture in which data is valued by ALL as a primary vehicle for decision making**



**Develop policies for Data Architecture and Data Management to improve your organizational agility**



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# CTE InSight:

## Implementing a Data Driven Approach



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# Providing value with CTE InSight™



Deep understanding of your process and industry to provide best value possible



Improved understanding supports capability to optimize process and profitability

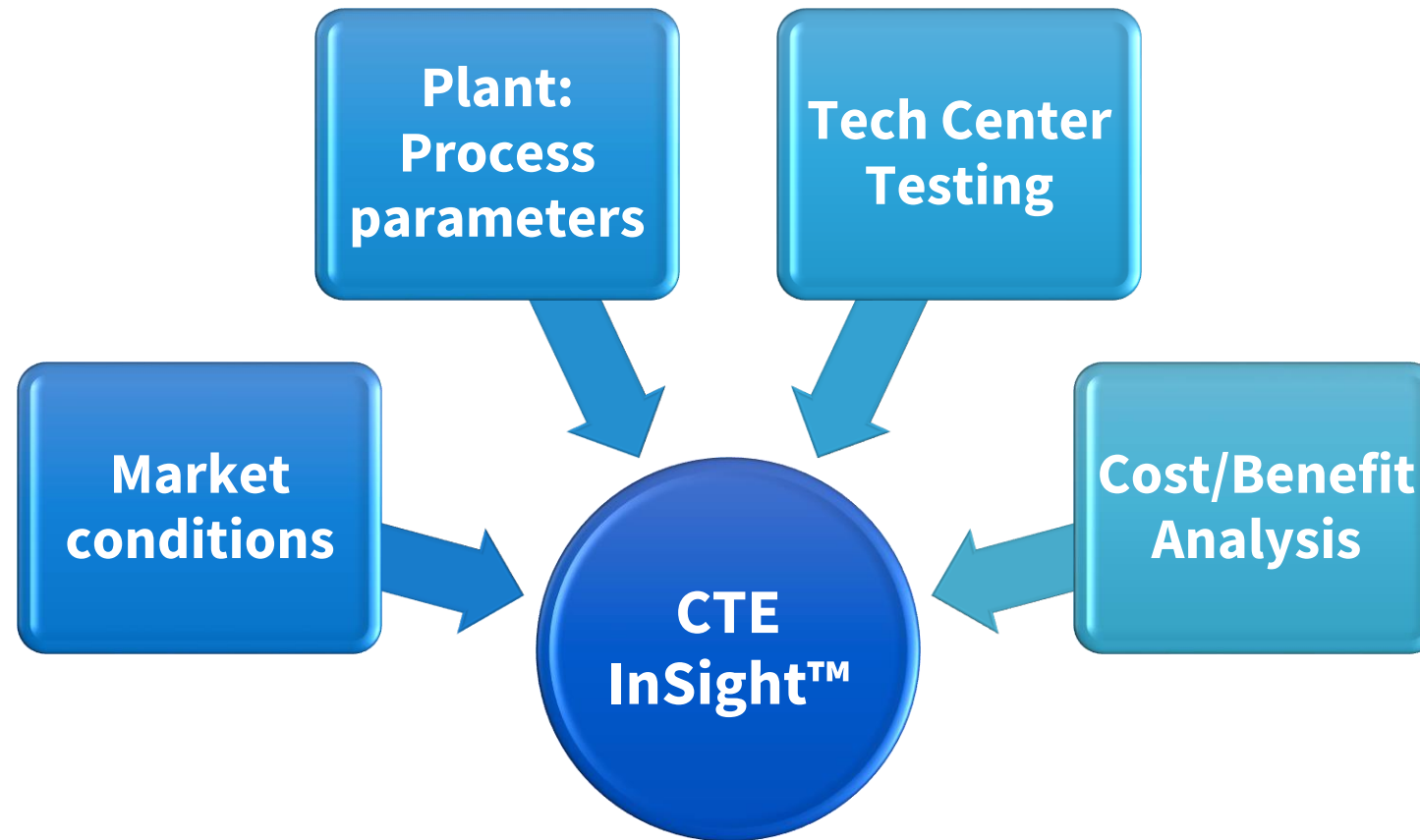


Develop process strategies to meet evolving goals



Troubleshoot within the context of rich background of process information

# Interconnecting data to improve performance



# Maximizing the value of our Tech Center Data:



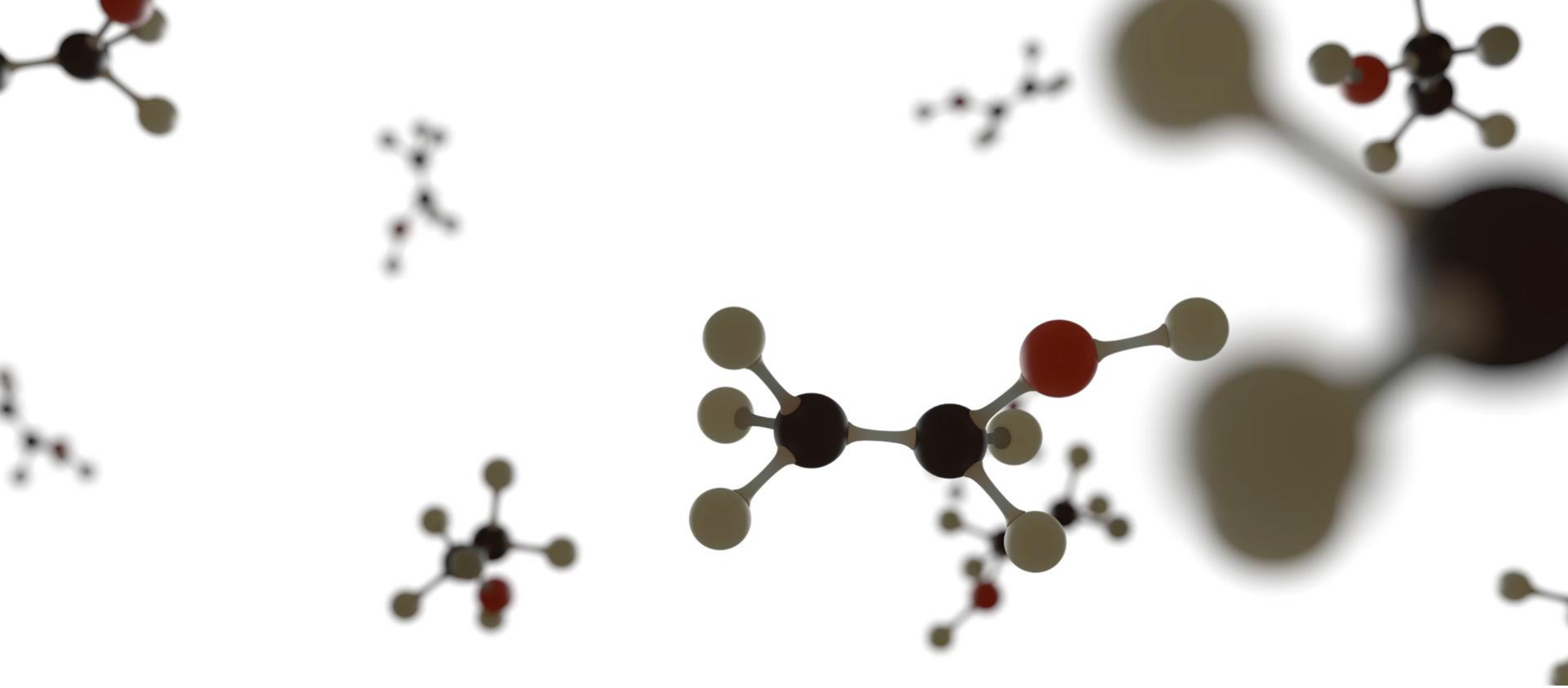
**Linking process performance metrics and lab analytics to improve value of data**



**Industry-wide or regional comparison of key performance metrics**



**Data-targeted improvement**



We can help—contact us today.



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