



Revolutionizing Manufacturing: AI as the Game-Changer in Quality Management

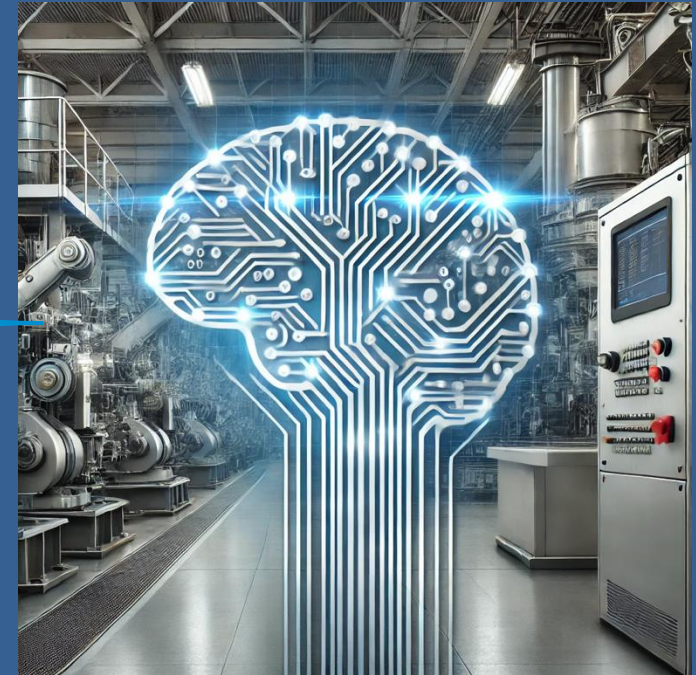
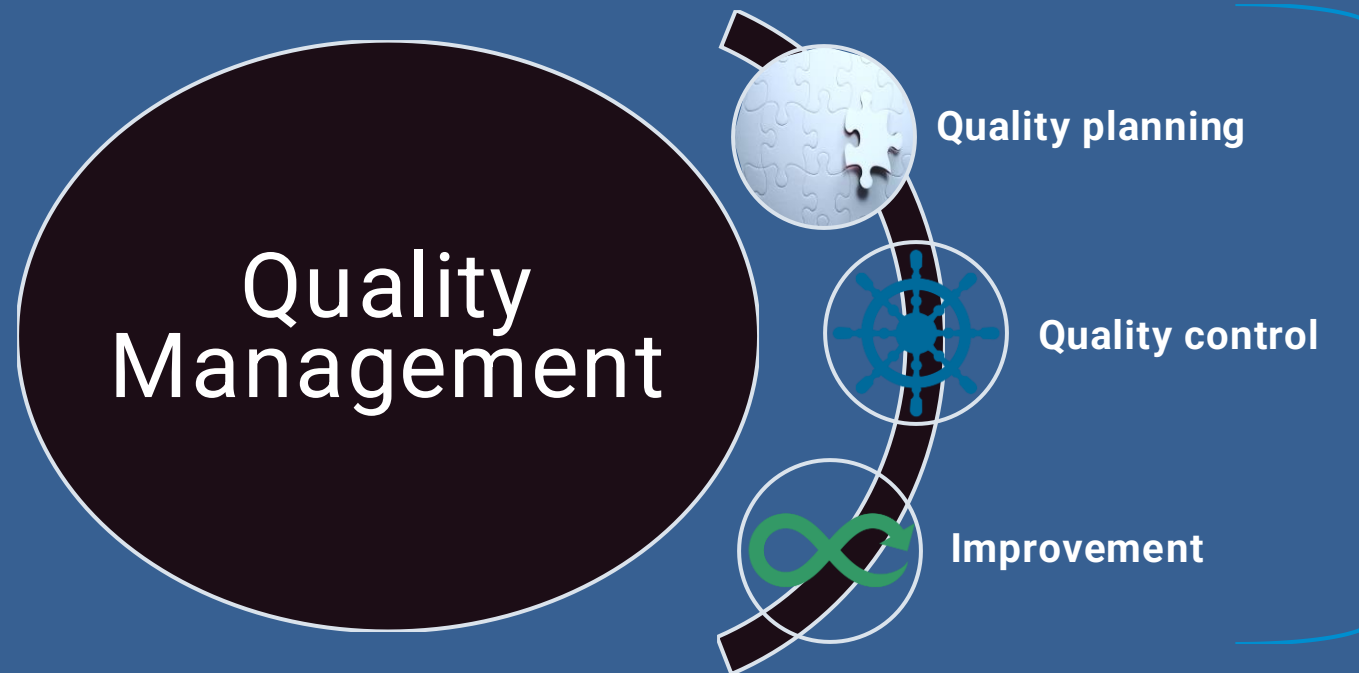
Adam Marsh
President of Ledge Inc.
CEO 80/20 Quality

 **Ledge Inc**

80/20
QUALITY

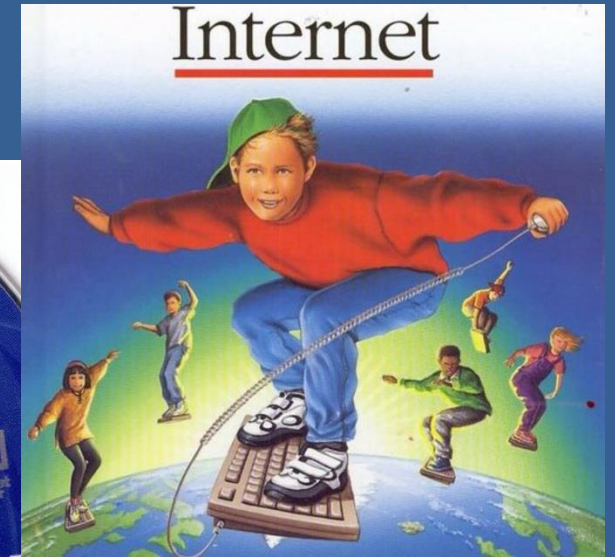
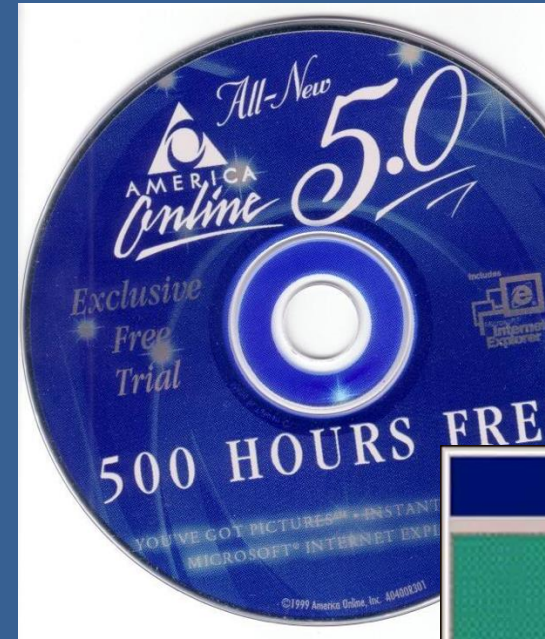
Understanding AI in Quality Management

Juran Trilogy & Totals Applications

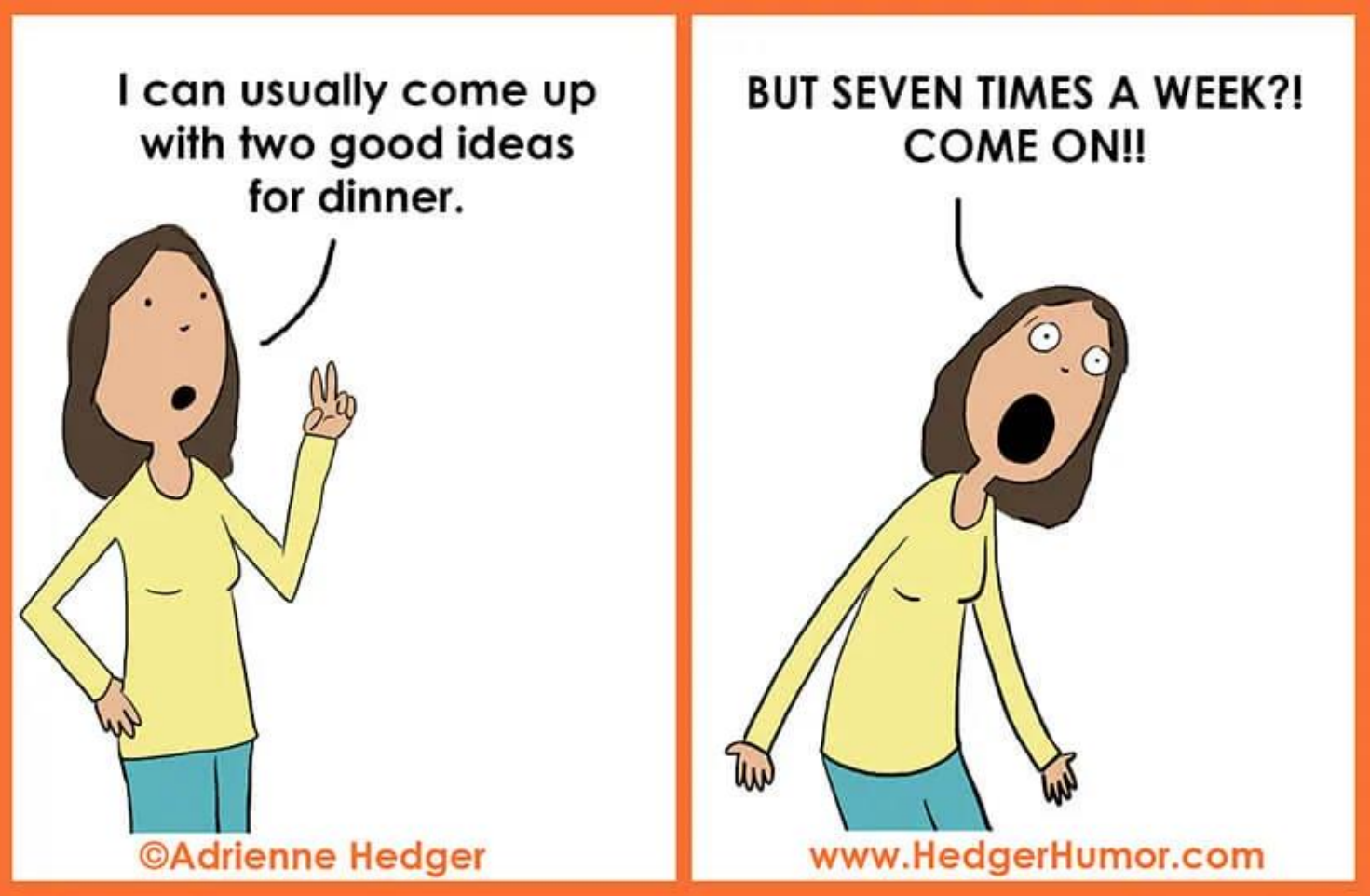


Where are we with AI today and who is it designed for?

- GPT STANDS FOR.....
- THIS WAS DESIGNED BY PROGRAMMERS
- FOCUSED ON WHITE COLLAR JOBS (SAFER)
- STILL EARLY AND IN THE...HERE IS THE TOOL, HOW CAN WE APPLY IT STAGE
- IT IS GREAT AT TEXT AND COMING ALONG WITH IMAGES



Let's Reframe the discussion -



Here is the menu for the week...

Prompt : Help me to create a healthy meal plan for a family of 5 for 5 days. Focus on things that can be used the next day for lunch for the dinners and make sure each meal has some meats with it. The meals should be kid friendly and simple to cook (less than 1 hour) or prepared in a crockpot.

Day 1: Lemon Garlic Shrimp Pasta

- **MAIN DISH:** SHRIMP SAUTÉED WITH GARLIC AND LEMON, TOSSED WITH SPAGHETTI AND A SPRINKLE OF PARSLEY. - **SALAD:** ARUGULA SALAD WITH CHERRY TOMATOES, SHAVED PARMESAN, AND A LEMON-OLIVE OIL DRESSING.

Day 2: Chicken Fajitas

- **MAIN DISH:** SLICED CHICKEN BREAST MARINATED IN LIME JUICE, CHILI POWDER, AND CUMIN, THEN SAUTÉED WITH BELL PEPPERS AND ONIONS. SERVED WITH FLOUR TORTILLAS. - **SIDES:** GUACAMOLE AND SOUR CREAM.

Day 3: Honey Mustard Salmon

- **MAIN DISH:** SALMON FILLETS GLAZED WITH HONEY MUSTARD AND BAKED. - **SIDE:** QUINOA COOKED IN VEGETABLE BROTH. - **VEGETABLE:** ROASTED ASPARAGUS.

Day 4: Stuffed Bell Peppers

- **MAIN DISH:** BELL PEPPERS STUFFED WITH A MIXTURE OF GROUND BEEF, COOKED RICE, TOMATOES, AND SPICES, THEN BAKED. **SALAD:** GREEK SALAD WITH CUCUMBERS, TOMATOES, FETA CHEESE, AND OLIVES.

Day 5: Pork Loin Roast

- **MAIN DISH:** PORK LOIN ROAST MARINATED IN GARLIC, ROSEMARY, AND OLIVE OIL, THEN ROASTED. **SIDE:** MASHED SWEET POTATOES. **VEGETABLE:** SAUTÉED SPINACH WITH GARLIC.

Here is the shopping list:

Proteins

- Shrimp (1 lb, peeled and deveined)
- Chicken breasts (1.5 lbs for fajitas)
 - Salmon fillets (1.5 lbs)
- Ground beef (1 lb for stuffed peppers)
 - Pork loin roast (2-3 lbs)

Dairy & Eggs

- Sour cream (for fajitas)
- Shaved Parmesan cheese
- Feta cheese (for Greek salad)

Grains & Bread

- Spaghetti (1 lb)
- Flour tortillas (1 pack)
 - Quinoa (1 lb)
- Rice (1 lb for stuffed peppers)

Fruits & Vegetables

- Garlic (1 bulb)
- Bell peppers (6 for fajitas and stuffed peppers)
 - Onions (2 for fajitas and stuffed peppers)
 - Lemons (4)

- Arugula (1 bag)
- Cherry tomatoes (1 pint)
 - Asparagus (1 lb)
 - Sweet potatoes (2 lbs)
 - Spinach (1 lb)
- Cucumbers (1 for Greek salad)
- Olives (1 jar for Greek salad)

Canned & Jarred Goods

- Canned diced tomatoes

Spices & Oils

- Olive oil
 - Honey
 - Mustard
 - Chili powder
 - Cumin
 - Dried rosemary
 - Salt and pepper
- ### Miscellaneous
- Vegetable broth

Now how do we get started at work...

We have to feed the system so it can learn, so let's start with the low hanging fruit -

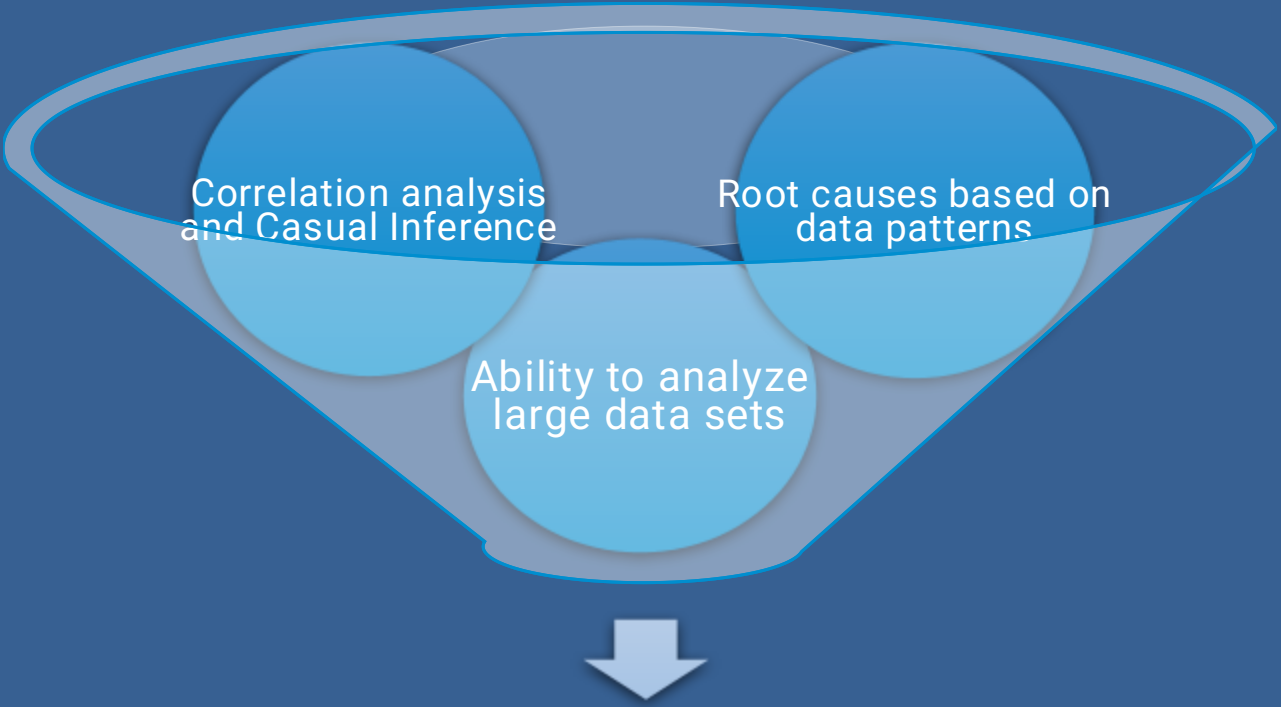
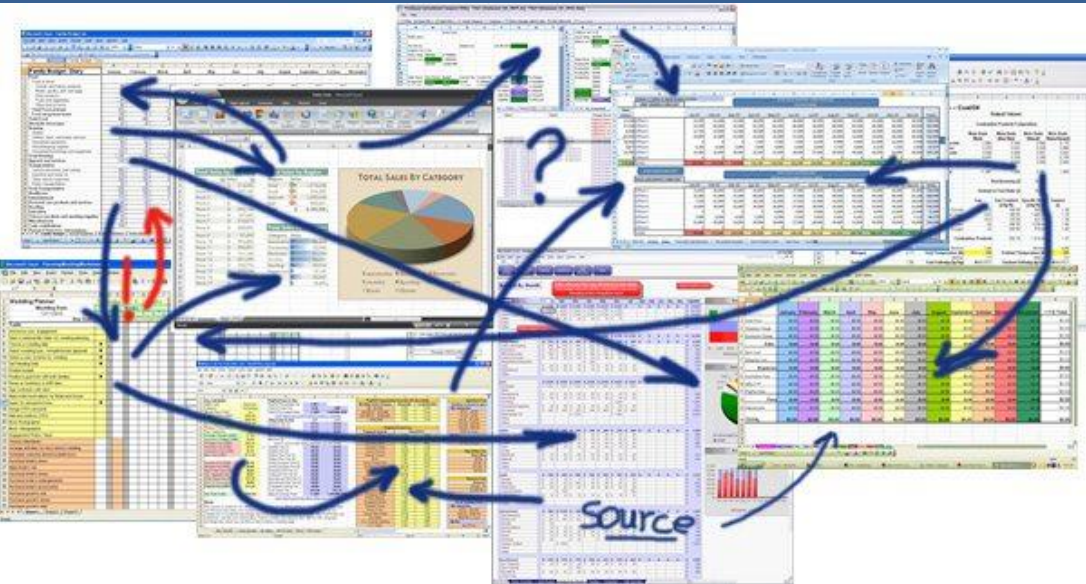
HOW ARE YOU CAPTURING YOUR ERRORS?

- VENDOR, INTERNAL AND CUSTOMER RELATED ISSUES
- KEEP IT SIMPLE AND KEEP YOUR DATA RELATIVELY CLEAN
- IS IT IN A FORMAT THAT CAN BE ANALYZED?



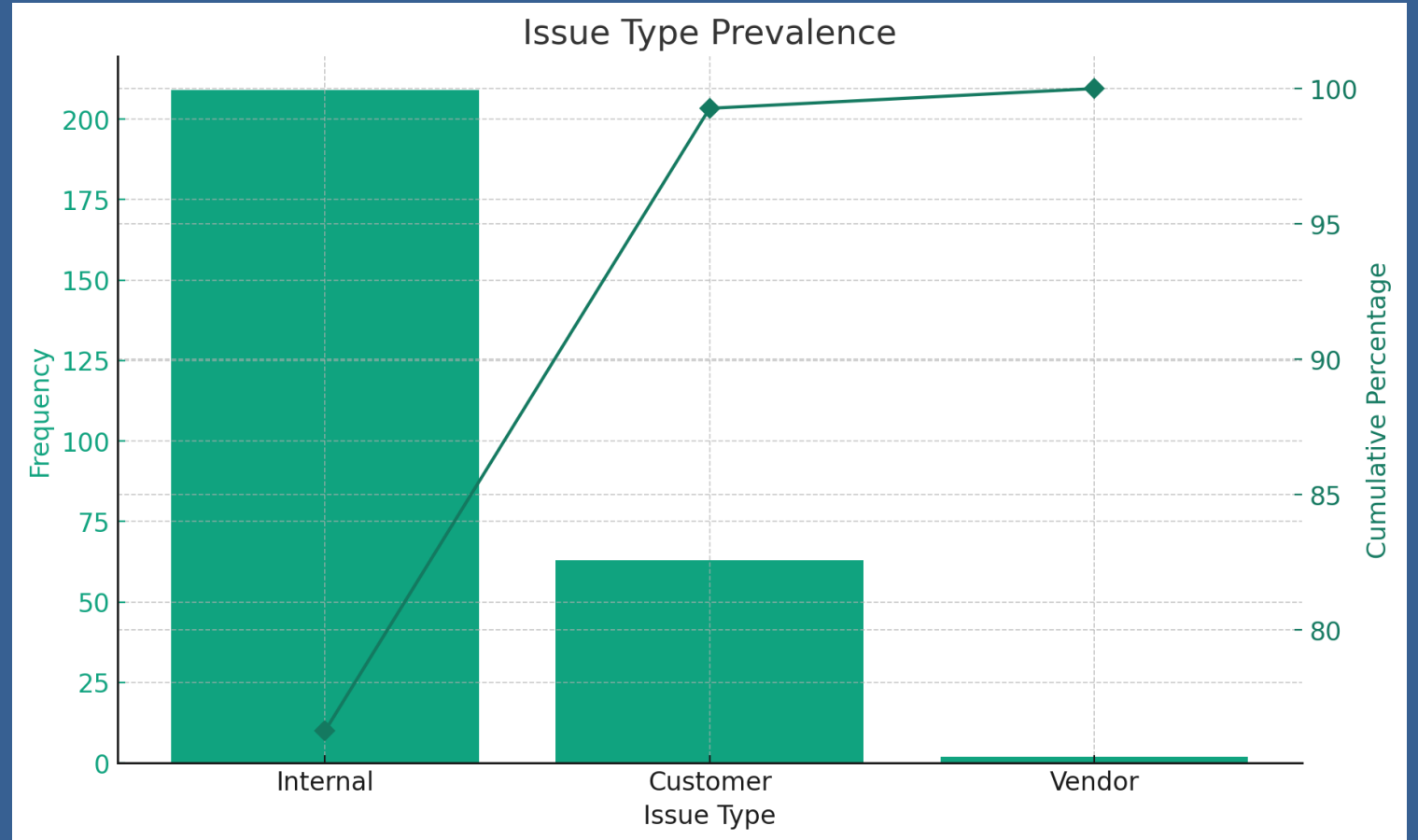
AI-Assisted Error Trend and Root Cause Analysis

AVOID THE SPREAD SHEETS OF DOOM & THE BLANK PAGE OF FUSTRATION



Case Study Analysis with Chat GPT Prompt:

Use the attached data set for a company called ECorp. The data is error data with each line being a different issue. Identify 5 trends that the company should look at to work on for continuous improvement.



Case Study Analysis

Top 3 reason codes

The analysis of the 'Reason Code' in the dataset reveals several trends that ECorp should consider for continuous improvement:

1. OPERATOR ERROR (106 OCCURRENCES): THIS IS THE MOST COMMON REASON FOR ISSUES, SUGGESTING A NEED FOR ENHANCED TRAINING, BETTER OPERATING PROCEDURES, OR POSSIBLY IMPROVEMENTS IN EQUIPMENT USABILITY.
2. MISSED OPERATION (32 OCCURRENCES): THIS INDICATES INSTANCES WHERE A STEP IN THE PROCESS WAS SKIPPED OR OVERLOOKED, POINTING TO POTENTIAL IMPROVEMENTS IN PROCESS ADHERENCE OR MONITORING.
3. LASER PROGRAM ERROR (23 OCCURRENCES): ISSUES IN LASER PROGRAMMING ARE SIGNIFICANT. THIS COULD BE ADDRESSED THROUGH BETTER SOFTWARE TOOLS, TRAINING, OR QUALITY CHECKS IN THE PROGRAMMING PHASE.

For addressing issues related to 'Operator Error', Ecorp should prioritize training in the following departments, listed in order of the frequency of operator error occurrences:

- 1. BRAKE DEPARTMENT (48 OCCURRENCES):** THIS DEPARTMENT HAS THE HIGHEST NUMBER OF OPERATOR ERROR ISSUES, INDICATING A STRONG NEED FOR FOCUSED TRAINING AND POSSIBLY PROCESS IMPROVEMENTS.
- 2. WELD DEPARTMENT (24 OCCURRENCES):** ALSO EXPERIENCING A SIGNIFICANT NUMBER OF OPERATOR ERRORS, THIS DEPARTMENT WOULD BENEFIT FROM ENHANCED TRAINING AND PROCESS REVIEWS.
- 3. TECHNICAL DEPARTMENT (14 OCCURRENCES):** ADDRESSING OPERATOR ERRORS THROUGH TRAINING AND OPERATIONAL ADJUSTMENTS IN THIS DEPARTMENT IS ALSO IMPORTANT.

Case Study Analysis

Let's Dive into Operator Error

Case Study
Analysis
Give me a
5 Why
for Root Cause
on Operator
Error

1. Why are there frequent operator errors in the Brake & Weld departments?

Answer: Operators are often making mistakes due to insufficient training on the specific machinery and processes used in these departments.

2. Why is the training insufficient?

Answer: The current training program is outdated and does not cover all the nuances of the machinery or updated procedures. Additionally, there is limited hands-on training with real-time feedback.

3. Why is the training program outdated and lacking in hands-on elements?

Answer: There has been a lack of investment in updating training materials and programs, partly due to resource constraints and partly because training has not been prioritized as a critical aspect of operational efficiency.

4. Why has training not been prioritized?

Answer: There is a belief that operators should learn on the job, which has led to underestimating the importance of formal, structured training programs. This approach has resulted in knowledge gaps contributing to operator errors.

5. Why is there a reliance on on-the-job learning rather than formal training?

Answer: The company culture has traditionally focused on production output over process improvement, leading to the assumption that time spent on training is time taken away from production.

1. Containment Action: Immediate Re-training and Mentorship Program

Action: Implement an immediate re-training program for all operators in the Brake and Weld departments. This program will be supplemented with a mentorship system where experienced operators guide less experienced ones.

2. Inspection Enhancement: Implement Enhanced In-process Inspections

Action: Develop and deploy enhanced in-process inspection checkpoints specifically for the Brake and Weld departments. These inspections should focus on common errors identified from previous issues and be conducted more frequently.

3. Systemic Improvement: Revise and Standardize Training Programs

Action: Invest in revising and standardizing the training programs across all departments, with a particular focus on the Brake and Weld departments. This includes updating training materials, incorporating hands-on learning, and regular assessments to ensure comprehension and skill retention.

Case Study
Analysis
Let's take
Corrective
Action

The Positive Impact of AI on Quality Teams



Team
empowerment

Freedom to
explore new
solutions and
innovate

Encourages a
mindset of
experimentation

Other Applications in Quality Management

Quality Planning

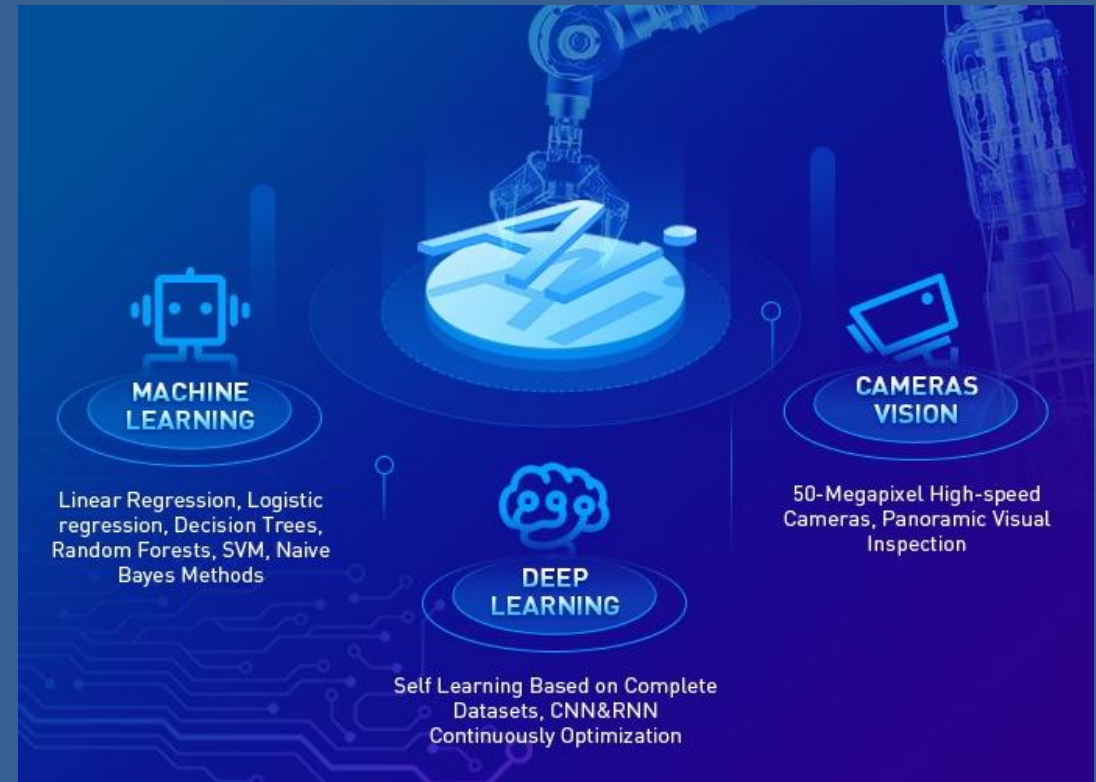
- MEASUREMENT ANALYSIS
- CONTRACT/MODEL REVIEW

Quality Control

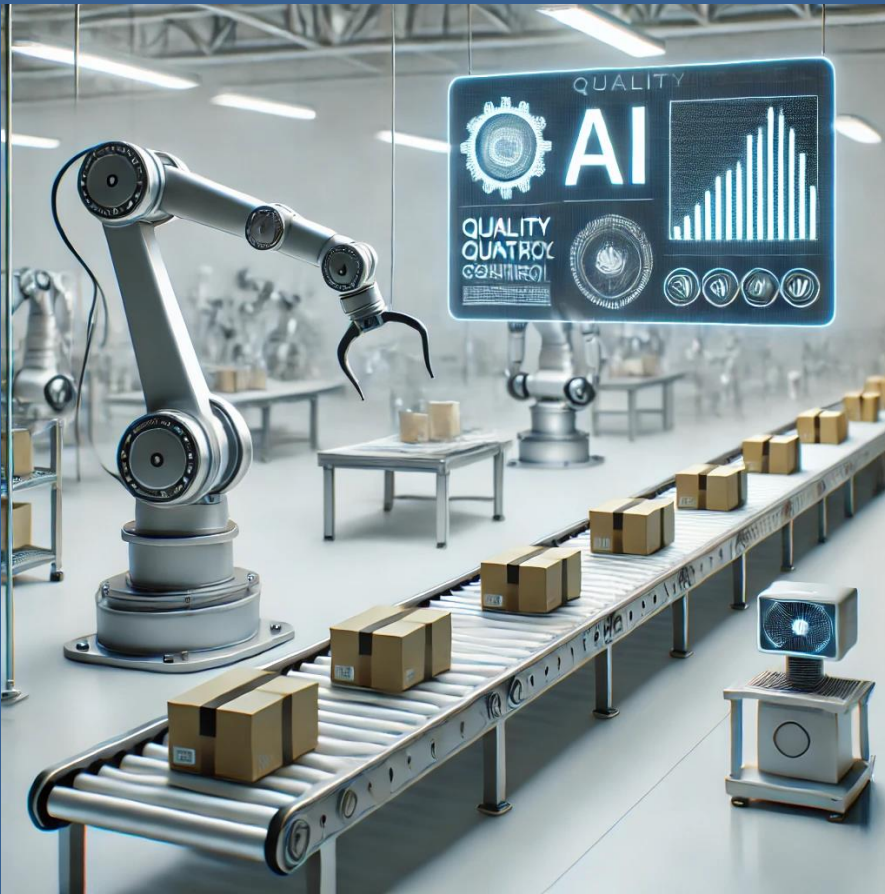
- VISUAL INSPECTION IMPROVEMENTS
- REAL TIME MONITORING FOR TRENDS

Improvement

- GUIDED PROBLEM SOLVING
- KNOWLEDGE BASE!!! YOUR OWN GPT.



Future of AI in Quality Management



1. MACHINE LEARNING AND BUILDING DATA SETS WILL BE KEY
2. INCREASED USAGE IN SCHEDULING AND PLANNING WITH TOOLS THAT COULD ACTUALLY WORK AS THE MACHINE LEARNS
3. FASTER VALIDATIONS, INTERPRETATIONS AND DATA ANALYSIS WILL INCREASE OUR ABILITY TO ITERATE AND INOVATE

Now Let's Have some fun...

CHAT GPT - HELP ME MAKE A NEW SUPERHERO WHO IS DEDICATED TO HELPING MANUFACTURERS IN SOUTH CENTRAL PA.



- HIS NAME...
- HIS POWERS...
- PRECISION VISION: MANTEC CAN INSTANTLY DETECT INEFFICIENCIES OR DEFECTS IN MANUFACTURING PROCESSES.
- TECH INTEGRATION: MANTEC CAN INTEGRATE WITH ANY MANUFACTURING SYSTEM OR MACHINE USING HIS FUTURISTIC GAUNTLET.
- PROBLEM-SOLVING FORCEFIELD OF INNOVATION AROUND MANUFACTURING CHALLENGES. WITHIN THIS FIELD, HE CAN SIMULATE COUNTLESS POTENTIAL SOLUTIONS, IDENTIFYING THE BEST PATH FORWARD TO OVERCOME PRODUCTION DELAYS.



Conclusion

AI Is an Opportunity for Improvement

Engage, Empower
and Embrace the
new tools

Focus on
streamlining the
simple things

Encourage, look
forward and listen
to your team

Questions –



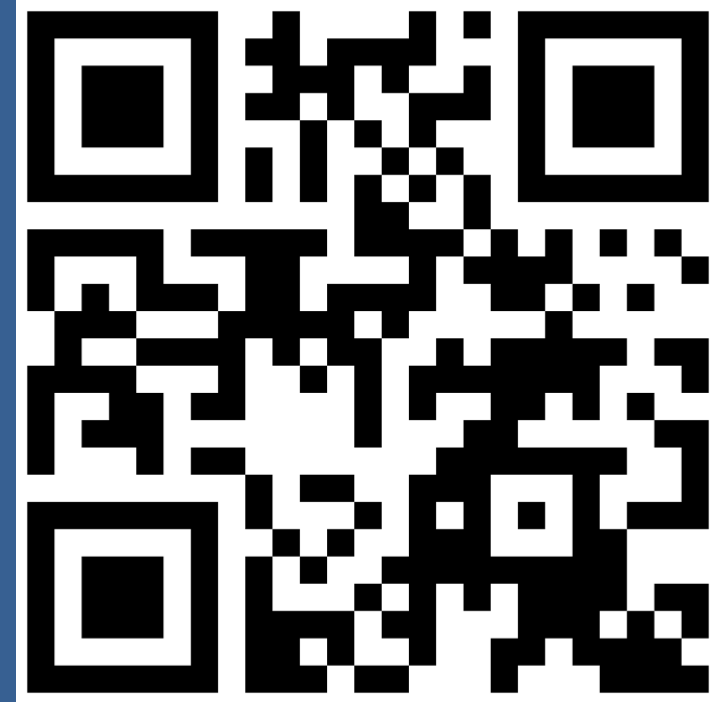
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