QUALITY IS A MOVING TARGET

where you are

where you want to be
“IF I HAD TO REDUCE MY MESSAGE FOR MANAGEMENT TO JUST A FEW WORDS, I’D SAY IT ALL HAD TO DO WITH REDUCING VARIATION”.

(W.E. Deming)
PRINCIPLES OF VARIATION

1. No two things are exactly alike.

2. Variation in a product or process can be measured.

3. Things vary according to a definite pattern.

4. Whenever things of the same kind are measured, a large group of the measurements will tend to cluster around the middle.

5. It's possible to determine the shape of the distribution curve for measurements obtained from any process.

6. Variations due to assignable causes tend to distort the normal distribution curve.
CAUSE OF VARIATION

Insidental

Sistemik
TYPE OF VARIATION

Normal distribution.

Measurements tail off to the right.

Measurements from two different groups.

Measurements from two different groups that overlap.

Measurements tail off to the left.

Tails of the distribution are chopped off. Something was probably sorted.
COMMON SOURCE OF VARIATION

Materials → Service Characteristics
Equipment → Service Characteristics
Methods → Service Characteristics
Environment → Service Characteristics
Employees → Service Characteristics
ELEMENTS OF EFFECTIVE QUALITY CONTROL SYSTEM

- Criticality designation
- Supplier control
- In-process control
- Outgoing quality assurance
STATISTICAL PROCESS CONTROL
RUN CHART & CONTROL CHART
## DMAIC Methodology

<table>
<thead>
<tr>
<th>Define</th>
<th>Measure</th>
<th>Analyze</th>
<th>Improve</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is the problem?</strong></td>
<td><strong>What data is available?</strong></td>
<td><strong>What are the root causes of the problem?</strong></td>
<td><strong>Do we have the right solutions?</strong></td>
<td><strong>What do we recommend?</strong></td>
</tr>
<tr>
<td><strong>What is the scope?</strong></td>
<td><strong>Is the data accurate?</strong></td>
<td><strong>Have the root causes been verified?</strong></td>
<td><strong>How will we verify the solutions work?</strong></td>
<td><strong>Is there support for our suggestions?</strong></td>
</tr>
<tr>
<td><strong>What key metric is important?</strong></td>
<td><strong>How should we stratify the data?</strong></td>
<td><strong>Where should we focus our efforts?</strong></td>
<td><strong>Have the solutions been piloted?</strong></td>
<td><strong>What is our plan to implement?</strong></td>
</tr>
<tr>
<td><strong>Who are the stakeholders?</strong></td>
<td><strong>What graphs should we make?</strong></td>
<td><strong>What clues have we uncovered?</strong></td>
<td><strong>Have we reduced variation?</strong></td>
<td><strong>Are results sustainable?</strong></td>
</tr>
</tbody>
</table>
BASIC PROBLEM SOLVING TOOLS
What is needed for effective brainstorming?

- A group willing to work together.
- A leader
- A meeting place.
- Equipment
- Prodding techniques
  - Encouraging Ideas: Priming the Pump Again.
    - Quick association methods
CAUSE AND EFFECT DIAGRAM:
Organizing the Brainstorming
PROCESS C&E DIAGRAM

METHOD -> MATERIALS

EMPLOYEE -> REMOVE DIRTY DISHES

METHOD -> WIPING UP TABLE

METHOD -> EMPLOYEE

EMPLOYEE -> SET TABLE

EMPLOYEE -> EQUIPMENT

EQUIPMENT -> MATERIAL
1. Assemble the team
2. Identify issue or problem for investigation.
3. Look for the cause and effect relationships between all issues
4. Assign the ‘relationship strength’ as: 3 – Significant; 2 – Medium; 1 – Weak
5. Draw the final ID in a matrix format and insert the ‘relationship strength’ given by members.
6. Total the relationship strength in each row to identify the strongest effect of an issue on the greatest number of issues.
PARETO ANALYSIS AND PARETO DIAGRAM

PARETO DIAGRAM OF SHORTAGES DURING WEEKEND CLEANING

- Sheets
- Pillow cases
- Towels
- Shampoo
- Toilet tissue
- Vacuum cleaners

FREQUENCY
HOW TO CREATE A PARETO DIAGRAM

Specify your goal clearly.

Collect data

Tally the data

Rank the categories by size.

Prepare the chart for the data.
<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Cumulative Frequency</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHIPPING</td>
<td>1,583.00</td>
<td>1,583.00</td>
<td>74</td>
</tr>
<tr>
<td>ORDER ENTRY</td>
<td>378.00</td>
<td>1,961.00</td>
<td>37</td>
</tr>
<tr>
<td>BILLING</td>
<td>146.00</td>
<td>2,107.00</td>
<td>93</td>
</tr>
<tr>
<td>NO REASON GIVEN</td>
<td>107.00</td>
<td>2,214.00</td>
<td>99</td>
</tr>
<tr>
<td>OTHER</td>
<td>31.00</td>
<td>2,247.00</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL DOLLARS</td>
<td>2,147.00</td>
<td>2,147.00</td>
<td></td>
</tr>
</tbody>
</table>

PARETO DIAGRAM OF CREDITS
JAN.1 - JUNE 30
MULTIVOTING

<table>
<thead>
<tr>
<th>Idea #1</th>
<th>Idea #2</th>
<th>Idea #3</th>
<th>Idea #4</th>
<th>Idea #5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Idea #6
- Idea #27
- Idea #28
- Idea #29
- Idea #30
**SWOT**

- **Strengths**
  (areas you do well or advantages of your organization)

- **Opportunities**
  (external factors that may contribute to your organization and can build up your strengths)

- **Weaknesses**
  (areas to be improved)

- **Threats**
  (potential problems/risks caused by external factors that your organization may face)
<table>
<thead>
<tr>
<th>PESTLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political</td>
</tr>
<tr>
<td>Economic</td>
</tr>
<tr>
<td>Social/Cultural</td>
</tr>
<tr>
<td>Technology</td>
</tr>
<tr>
<td>Legal</td>
</tr>
<tr>
<td>Environment</td>
</tr>
</tbody>
</table>

**Political**
- Stability of Government
- Potential changes to legislation
- Global influences

**Economic**
- Economic growth
- Employment rates
- Inflation rates
- Monetary policy
- Consumer confidence

**Social/Cultural**
- Income distribution
- Demographic influences
- Lifestyle factors

**Technology**
- International influences
- Changes in information technology
- Take up rates

**Legal**
- Taxation policies
- Employment laws
- Industry regulations
- Health and Safety

**Environment**
- Regulation and restrictions
- Attitudes of customers
5 WHYS

Problem Statement

Why 1
- Why 2A
  - Why 3A
  - Why 4A
  - Why 5A

- Why 2B
  - Why 3B
  - Why 4B
  - Why 5B

- Why 2C
  - Why 3C
  - Why 4C
  - Why 5C

- Why 2D
  - Why 3D
  - Why 4D
  - Why 5D

- Why 2E
  - Why 3E
  - Why 4E
  - Why 5E

- Why 2F
  - Why 3F
  - Why 4F
  - Why 5F

- Why 2G
  - Why 3G
  - Why 4G
  - Why 5G

- Why 2H
  - Why 3H
  - Why 4H
  - Why 5H
Change is characterised by as a state of equilibrium between driving forces (e.g. new technology) and opposing or restraining forces (e.g. fear of failure). (Kurt Lewis)

Score 5 : most important
Score 1 : least important
VOICE OF THE CUSTOMER
1. Identify the customer.
2. Identify customers' general needs in Level 1.
3. Identify the first set of requirements for that need in Level 2.
4. Drill down to Level 3 if necessary to identify the specific behavioural requirements of the customer.
5. Validate the requirements with the customer. The process of validation could be one-to-one interviews, surveys or focus groups depending on the CTQ.
STORYBOARDING
AFFINITY DIAGRAM

• improving processes,
• developing ideas,
• finding causes of problems, and
• planning projects.
Nominal Group Technique

1. Introduce and explain
   - Members are introduced
   - Purpose and procedure of the meeting is explained

2. Let members generate ideas silently
   - Facilitator gives a paper to all
   - Group writes down as many ideas as they can think of
   - Done in silence, timeboxed

3. Share ideas
   - Participants share ideas
   - Facilitator records them
   - Round robin till everyone is done
   - New ideas at this stage are noted

4. Discuss each ideas as a group
   - Ideas can be combined, or new ones generated
   - No judgements passed
   - Facilitator to ensure that everyone gets fair chance and explain their ideas
   - No ideas eliminated

5. Vote and rank ideas
   - Group votes for the listed ideas
   - Based on votes ideas are prioritized
The Stages of the Nominal Group Technique

1) Individual responses
2) Clarification and consolidation
3) Ranking responses
DESIGN NEW KITCHEN

PURPOSE
- To make food service more efficient
- To make it easier to keep clean
- To meet Trustees' goal of training kids for jobs in food service

CODES
- Building
- Fire
- Safety
- Ventilation
- Building inspector
- Food handling
- Sanitary

EQUIPMENT
- Electrical
- Plumbing
- Trash removal
- Garbage removal
- Recycling
- Garbage to pigs
- Trash compactor
- Teen usage/training

LAYOUT
- Plenty of workspace
- Traffic flow
- Nonskid floor

STORAGE
- Dry goods
- Detergents
- Cleaning supplies
- Paper products
- Refrigerated foods/perishables
- Mops & brooms

COOKING UTENSILS & STORAGE
- Pots & pans
- Cooking utensils

FOOD PREPARATION
- Service centers
- Flatware
- Dishes/cups
- Serving dishes/utensils
- Paper products
- Detergents

SERVING UTENSILS & STORAGE
MIND MAPPING

Late delivery

- Systems
- Materials
- Operator
- Role
- Manpower
- Skills
- Quality
- Out of stock
- Location
- Distance
- Accident
- Congestion
- Union
- Manpower
- Traffic
- Vehicle
- Driver
- Transport
- Documents
- People
- Supervision
- Ownership
- Description
- SKU
- Telephone
- Verbal
- Quantity
- E-mail
- Software
- Communication
- Computer
- Procedure
- Hardware

- Late delivery
- Systems

- Materials
- Operator
- Role
- Manpower
- Skills
- Quality
- Out of stock
- Location
- Distance
- Accident
- Congestion
- Union
- Manpower
- Traffic
- Vehicle
- Driver
- Transport
- Documents
- People
- Supervision
- Ownership
- Description
- SKU
- Telephone
- Verbal
- Quantity
- E-mail
- Software
- Communication
- Computer
- Procedure
- Hardware
**SPAGHETTI DIAGRAM**

- Diagrams that depict the physical flow of work or material in a process
- Used to improve the physical layout of a workspace

---

**Drug round information: Site S01, DR06, N06**

Wednesday 6am, 6 patients on round, 6 given medications

- **Doses:** 35 (includes 2 intravenous doses)
- **Duration:** 109 min (18 min/patient, 3.1 min/dose)
- **Pedometer:** 1703 steps (283 steps/patient, 49 steps/dose)

---

**KEY**

- ○ ○ Travel
- ● Start of drug round
- ✗ End of drug round
- ▴ Drug trolley
- ▼ Worktop
- □ Bed
### SWIMLANE DIAGRAM

- A flowchart that emphasizes the “who” in “who does what”
- Makes it easy to study handoffs between people and/or work groups in a process
SCATTER DIAGRAM

- Strong positive correlation
- Moderate positive correlation
- No correlation
- Moderate negative correlation
- Strong negative correlation
- Curvilinear relationship
FREQUENCY HISTOGRAM

Days to Pay Insurance Claims

- Mean: 33.25
- Median: 33.50
- Mode: 36.00

Skewness: 0.17
Stddev: 9.37
Min: 15.00
Max: 56.00

Number of Claims vs. Days to Pay
# Checklist Checksheet

**Car Servicing Checksheet**

<table>
<thead>
<tr>
<th>Exterior:</th>
<th>Trunk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean</td>
<td>Clean</td>
</tr>
<tr>
<td>Headlights O.K.</td>
<td>Spare tire pumped up</td>
</tr>
<tr>
<td>Parking lights O.K.</td>
<td>Jack in place</td>
</tr>
<tr>
<td>Signal lights O.K.</td>
<td>内饰:</td>
</tr>
<tr>
<td>Tires inflated</td>
<td>Clean</td>
</tr>
<tr>
<td>Tires visibly O.K.</td>
<td>Ashtrays clean</td>
</tr>
<tr>
<td>Gas tank full</td>
<td>All windows clean</td>
</tr>
<tr>
<td>Scratches/dents recorded</td>
<td>All damages repaired</td>
</tr>
<tr>
<td>Engine compartment:</td>
<td>Panel lights work</td>
</tr>
<tr>
<td>Oil level O.K.</td>
<td>Radio works</td>
</tr>
<tr>
<td>Transmission fluid O.K.</td>
<td>Air conditioner works</td>
</tr>
<tr>
<td>Radiator fluid O.K.</td>
<td>Engine starts &amp; runs O.K.</td>
</tr>
<tr>
<td>Belts tight</td>
<td>Transmission O.K.</td>
</tr>
<tr>
<td>Air conditioner O.K.</td>
<td>Brakes O.K.</td>
</tr>
<tr>
<td>Visual check O.K.</td>
<td>Power steering O.K.</td>
</tr>
</tbody>
</table>
ITEM CHECKSHEET

<table>
<thead>
<tr>
<th>Type of Billing Error</th>
<th>Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price error</td>
<td>### //</td>
</tr>
<tr>
<td>Quantity incorrect</td>
<td>#### #    //</td>
</tr>
<tr>
<td>Color incorrect</td>
<td>### //</td>
</tr>
<tr>
<td>Wrong item</td>
<td>### ///</td>
</tr>
<tr>
<td>Customer address in error</td>
<td>//</td>
</tr>
</tbody>
</table>
LOCATION CHECKSHEET

Reject shirts Check Sheet

Date: 22-May  Batch: 23

Shirts rejected

Front

Back

○ = flaw
□ = tear
△ = mark
# Matrix Checksheet

<table>
<thead>
<tr>
<th>BRANCH BANK</th>
<th>ATM</th>
<th>Drive-Through</th>
<th>Teller</th>
<th>Safe Deposit Box</th>
<th>Lobby</th>
<th>Home Mortgage Loan</th>
<th>Business Loan</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>D</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
## Stratified Data Chart

<table>
<thead>
<tr>
<th>Time (in mins)</th>
<th>Facility A</th>
<th>Facility B</th>
<th>Facility C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 9</td>
<td>XXX</td>
<td>X</td>
<td>XX</td>
</tr>
<tr>
<td>10 – 19</td>
<td>XXXXXXX</td>
<td>XXXXXXX</td>
<td>XXXXXXXXXX</td>
</tr>
<tr>
<td>20 – 29</td>
<td>XXXXXXX</td>
<td>XXXXXXX</td>
<td>XXXXXXXXXX</td>
</tr>
<tr>
<td>30 – 39</td>
<td>XXXXXXXXX</td>
<td>XXXXXXX</td>
<td>XXXXXXXXXX</td>
</tr>
<tr>
<td>40 – 49</td>
<td>XXXXXXX</td>
<td>XXXXXXXXXX</td>
<td>XXXXXXXXXX</td>
</tr>
<tr>
<td>50 – 59</td>
<td>XXXXXXX</td>
<td>XXXXXXXXXX</td>
<td>XXXXXXXXXX</td>
</tr>
<tr>
<td>60 – 69</td>
<td>XX</td>
<td>XXXX</td>
<td>X</td>
</tr>
<tr>
<td>70 – 79</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
IPO DIAGRAM  INPUT-PROCESS-OUTPUT

Inputs (factors)
- Pressure
- Temperature
- Time
- Substance A
- Substance B

Process

Tablet manufacturing

Outputs (responses)
- Table weight
- Tablet hardness
- Potency
- Production rate
A SIPOC helps teams verify that process inputs match outputs of the upstream/downstream process.
a special kind of diagram that pictures the steps of a particular job in sequence
to identify the points in the system that need to be controlled.
To find ways to combine or eliminate unnecessary process
CONSTRUCTING PROCESS FLOW CHART

Step 1. Define the process.

Step 2. Identify the steps in the process.

Step 3. Draw the flow chart.

Step 4. Determine the time or distance for each step.

Step 5. Assign a cost for each step.
Example flowchart: maintaining active medication lists

Medication reconciliation itself is a separate process that will not be discussed here.
POINTS TO KEEP IN MIND

- Is there a point in the process that slows or restricts the flow of work, information, or people? What can we do to improve this situation?
- How can we improve the sequence of the operations to make the process more effective? Would a change in the workplace or the people increase effectiveness?
- Can we improve how we do the operation or activity?
- Can we reduce or eliminate having to correct change, add, or recycle something in the process?
- Is there a better way?
5 PRINCIPLES OF LEAN

1. Pursue Perfection
2. Identify Customers and Specify Value
3. Respond to Customer Pull
4. Identify & Map the Stream
5. Create Flow by eliminating waste
VALUE STREAM MAPPING

Patient Arrival With Care Needs

Dashboard

Registration info entered into DB

Lab info entered on DB

Patient Departure shown in DB

DB tells RN patient has arrived

DB notifies MD of patients arrival

DB shows when labs, other requisitions are complete

Labs collected are shown on DB

Patient Care Received, Patient Departs System

Triage

Vitals

Patient History

C/T = 4 min

Waste = 2 min

Registration

C/T = 3 min

Waste = 4 min

RN Exam

C/T = 5 min

Waste = 28 min

Provider Exam

C/T = 8 min

Waste = 15 min

Provider Orders

C/T = 4 min

Waste = 10 min

RN Collects Lab

C/T = 10 min

Waste = 20 min

Completion of Labs and Reqs

Labs Sent Therapy Begins

C/T = 12 min

Waste = 40 min

Lead time = 165 minutes

Value-Added time = 46 minutes
VALUE IS WHAT THE CUSTOMER IS BUYING

\[ V = \frac{Q + S}{S} \]
Remove Waste
Revamping processes for least waste

Value-Add
Activities that the customer is willing to pay for and that change form, fit or function.

Business-Non-Value-Add
Activities that must be performed for legal or regulatory requirements.

Non-Value-Add
Activities that the customer would be unwilling to pay for.

Optimize
Minimize
Eliminate
Value-Added time is only a very small percentage of the total Time.
VALUE ADDED CHART

Takt Time = 55 min

- Value-add time
- NVA
- BNVA time

Time (in min)

Task

1 2 3 4 5 6 7 8 9 10
Tack-Time & Cycle-Time

Cycle Time: Actual time required for a worker to complete one cycle of a process

Takt Time: Available Time per day

Daily Production Requirement
current state VSM + Lean Basics = future state VSM
**PROCESS CAPABILITY MEASUREMENT**

**CAPABILITY INDEX (**$C_p$ & $C_{pk}$**)**

\[
C_p = \frac{USL - LSL}{6\sigma}
\]

\[
C_{pk} = \text{minimum}\left(\frac{\mu - LSL}{3\sigma}, \frac{USL - \mu}{3\sigma}\right)
\]

$C_p$ index measures the potential or inherent capability of process

$C_{pk}$ index measures the realised process capability relative to the actual operation

$\sigma$ = Standard deviation; USL= Upper Specification Limit; LSL= Lower Specification Limit

$C_{pk}$ > 1 = process is capable

$C_{pk}$ < 1 = process is incapable
DPMO  DEFECT PER MILLION OPPORTUNITY

If the proportion of production outside the specification limit = 3.5%

\[
DPMO = 1,000,000 \times \frac{3.5}{100} = 35,000
\]
OVERALL EQUIPMENT EFFECTIVENESS (OEE)

An index of measuring the delivered performance of a plant or equipment based on good output. It can be applied to a single equipment, a packing line, a production plant or processes.

Overall OEE is defined by the following formula:

\[
\text{OEE\%} = \frac{\text{Actual Good Output}}{\text{Specified Output}} \times 100
\]

where Specified Output = Specified Speed × Operation Time.
EQUIPMENT TIME ANALYSIS.

<table>
<thead>
<tr>
<th>T</th>
<th>TOTAL TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AVAILABLE TIME</td>
</tr>
<tr>
<td>O</td>
<td>OPERATION TIME</td>
</tr>
<tr>
<td>P</td>
<td>PRODUCTION TIME</td>
</tr>
<tr>
<td>E</td>
<td>EFFECTIVE TIME</td>
</tr>
</tbody>
</table>
Week Number: 31
Operation Time: 128 hours
Specified Speed: 150 tablets per minute
Good Output: 4232 cases
Routine Stoppages: 11 hours 30 minutes
Unexpected Stoppages: 27 hours 15 minutes

Given that each case contains 144 tablets

Good Output = 4232 \times 144 = 609,408 tablets

Effective Time = \frac{\text{Good Output}}{\text{Specified Speed}} = \frac{609,408}{150 \times 60} = 67.71 hours

Production Time = Operation Time – Routine Stoppages
= 128 – 11.5 = 116.5 hours

Total Time = 7 \times 24 = 168 hours

\[
OEE = \frac{\text{Effective Time}}{\text{Production Time}} = \frac{67.71}{128} = 0.53 = 53\%
\]

\[
\text{Production Efficiency} = \frac{\text{Effective Time}}{\text{Production Time}} = \frac{67.71}{116.5} = 58\%
\]

\[
\text{Operation Utilisation} = \frac{\text{Operation Time}}{\text{Total Time}} = \frac{128}{168} = 76\%
\]
16. **SORT** When in doubt, move it out

**SET IN ORDER** A place for everything, and return everything to its place

**SHINE** Clean up your work area

**STANDARDIZE** Set rules for that the entire team supports and agrees to

**SUSTAIN** Make 5S a habit by integrating it into your daily work routines
SORT - RED TAG EVENT
SET IN ORDER
# 5S Floor Taping Standards

<table>
<thead>
<tr>
<th>Tape Color</th>
<th>Application</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Permanent location for equipment</td>
<td>Equipment, cabinets, furniture, waste baskets</td>
</tr>
<tr>
<td>Orange</td>
<td>Temporary storage location</td>
<td>WIP, Finished Goods, Carts</td>
</tr>
<tr>
<td>Red</td>
<td>Biohazards</td>
<td>Biohazard waste collection containers</td>
</tr>
<tr>
<td>Purple</td>
<td>Hazardous chemical waste</td>
<td>Chemical waste collection containers</td>
</tr>
<tr>
<td>Green</td>
<td>Safety equipment</td>
<td>Eye wash stations, safety showers, spill kits, respirators</td>
</tr>
<tr>
<td>Yellow</td>
<td>Radiation</td>
<td>Radioactive waste collection containers</td>
</tr>
<tr>
<td>Black &amp; Yellow</td>
<td>Electrical equipment access</td>
<td>Area in front of electrical panels and switch gear</td>
</tr>
<tr>
<td>Red &amp; White</td>
<td>Fire and emergency equipment</td>
<td>Fire extinguishers, doors, panels</td>
</tr>
<tr>
<td>Red &amp; White</td>
<td>Change in protective equipment requirements</td>
<td>Designated PPE (safety glasses, lab coats, etc.) required past line</td>
</tr>
</tbody>
</table>
### Example 5S Audit Sheet

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Sort</td>
<td>1. Are there unnecessary items (peripherals, supplies) on the setup desk</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>2. Are there scrap supplies in the supply bins</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>3. Are there old computers (off lease) in the swap cabinet</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>4. Is there more furniture than necessary in the office</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Score</strong></td>
<td>0 0 0 0 0 0 20</td>
</tr>
<tr>
<td>B. Set in Order</td>
<td>Is the supply table arranged per drawing/layout</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>5. Is the setup desk arranged per layout (incl. a single computer)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>6. Is swap cabinet arranged per layout</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>7. Can anyone determine normal from abnormal</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Score</strong></td>
<td>0 0 0 0 0 0 20</td>
</tr>
<tr>
<td>C. Shine</td>
<td>9. Is the desk clean and maintained or is there clutter (unnecessary</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>supplies, etc.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Is Supply Table/Bins clean and organized</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>11. Has the shine check sheet been updated (assignments been worked)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>12. Is dust filter clean</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Score</strong></td>
<td>0 0 0 0 0 0 20</td>
</tr>
<tr>
<td>D. Standardize</td>
<td>Is the IT Dept Process Handbook in plain view</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>13. Is the IT Dept Process Handbook updated</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>14. Are all supply bin, swap cabinet, and software shelf labels intact</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>15. Have all setups gone accordingly to instructions this week</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Score</strong></td>
<td>0 0 0 0 0 0 20</td>
</tr>
<tr>
<td>E. Sustain score</td>
<td>Was the last audit less than two weeks ago</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>17. Was the last departmental audit less than one month ago</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>18. Is the 5S board up to date (pics, metrics, shine, etc.)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>19. Has anyone complemented the area on its cleanliness &amp; organization</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Score</strong></td>
<td>0 0 0 0 0 0 20</td>
</tr>
</tbody>
</table>

**Area:**

**Auditor(s):**

**Date:**

**Section**

**Sub-total Score**

20 20 20 20 20
MISTAKE PROOFING / POKA-YOKE

- Redesign the process to eliminate or reduce the possibility of a particular failure mode
- A way to avoid mistakes
- Make the error impossible
- If you cannot prevent the error, modify the process to make the error obvious (detection)
ACTIVITY NETWORK DIAGRAM

A process map that does not use symbols like a Flow Process Chart As a control tool to determine and monitor the most efficient path

Table 8.1 List of project activities for production of a technical book

<table>
<thead>
<tr>
<th>Source</th>
<th>Activity</th>
<th>Description</th>
<th>Predecessor</th>
<th>Duration (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>A</td>
<td>Prepare proposal</td>
<td>–</td>
<td>2</td>
</tr>
<tr>
<td>Editor</td>
<td>B</td>
<td>Approve proposal</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>Author</td>
<td>C</td>
<td>Preliminary research</td>
<td>A</td>
<td>2</td>
</tr>
<tr>
<td>Author</td>
<td>D</td>
<td>Detailed research</td>
<td>C</td>
<td>10</td>
</tr>
<tr>
<td>Author</td>
<td>E</td>
<td>Write Chapters 1–3</td>
<td>B</td>
<td>3</td>
</tr>
<tr>
<td>Author</td>
<td>F</td>
<td>Write Chapters 4–6</td>
<td>E</td>
<td>3</td>
</tr>
<tr>
<td>Author</td>
<td>G</td>
<td>Write remaining chapters</td>
<td>F</td>
<td>4</td>
</tr>
<tr>
<td>Author</td>
<td>H</td>
<td>Type Chapters 1–3</td>
<td>E</td>
<td>2</td>
</tr>
<tr>
<td>Author</td>
<td>I</td>
<td>Type Chapters 4–6</td>
<td>F, H</td>
<td>2</td>
</tr>
<tr>
<td>Author</td>
<td>J</td>
<td>Type remaining</td>
<td>G, I</td>
<td>3</td>
</tr>
<tr>
<td>Author</td>
<td>K</td>
<td>Compile full draft</td>
<td>D, J</td>
<td>2</td>
</tr>
<tr>
<td>Author</td>
<td>L</td>
<td>Obtain copyright clearance</td>
<td>B</td>
<td>12</td>
</tr>
<tr>
<td>Author</td>
<td>M</td>
<td>Submit manuscript</td>
<td>K, L</td>
<td>1</td>
</tr>
</tbody>
</table>

The Activity Network Diagram is shown in Figure 8.2.

Critical path: ABEFGJkM 22 weeks
Competitor Profiles

2004 Revenue (millions)

Customer Satisfaction

Number of Employees

Current Stock Price

2004 Profit (%)

Company A
Company B
Company C
Company D
Company E
ANNT CHART

1. Management Awareness
2. Initial Assessment
3. Programme Chief and Organisation
4. Leadership Workshop
5. Learning Deployment
6. Project Selection and Delivery
7. Measurement of Success
8. Improve and Sustain
**STEPS:**

1. Identify the key activities or the tasks related to the project and describe each activity by selective key words.

2. Prepare a scheduling board, and depending on the duration of the project, draw vertical lines to divide the board in monthly, weekly or daily intervals.

3. Arrange the activities in a sequence of estimated start dates and post them on the extreme left-hand column of the board.

4. Estimate the start and finish dates of each activity and draw horizontal bars or lines along the time scale to reflect the start and duration of each of the activities.

5. On completion of each activity, show the actual start and duration of the activity by a bar of a different colour.

6. Include a ‘Time Now’ marker on the chart; review and maintain the chart until the end of the project.
MILESTONE TRACKER DIAGRAM
FAILURE MODE AND EFFECT ANALYSIS

FMEA is a systematic and analytical quality planning technique at the product, design, process and service stages assessing what potentially could go wrong and thereby aiding faulty diagnosis. The objective is to classify all possible failures according to their effect measured in terms of severity, occurrence and detection and then find solutions to eliminate or minimise them.

Risk Priority Number = Severity x Occurance x Detection
# Failure Mode Effect Analysis (FMEA)

**Item:** Vacuum cleaner Model #321  
**Function:** Remove dirt effectively  
**Reference:** FMEA  
**Responsible:** Enter Name  
**Date:** 01/02/20

<table>
<thead>
<tr>
<th>Process Step</th>
<th>Failure Mode (Local)</th>
<th>Failure Effects (System)</th>
<th>SEV</th>
<th>OCC</th>
<th>Present Controls</th>
<th>DET</th>
<th>RPN</th>
<th>Correction (Action)</th>
<th>Responsible (Owner)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum floor</td>
<td>low vacuum</td>
<td>dirt-removal is slow and inefficient</td>
<td>7</td>
<td>7</td>
<td>open vacuum cleaner and check if bag is full</td>
<td>5</td>
<td>441</td>
<td>add “Bag-Exit” indicator (blinking LED) to advise user to change the bag</td>
<td>Engineering Department, M. Jansson by 1/1/2020</td>
</tr>
<tr>
<td>Vacuum floor</td>
<td>low vacuum</td>
<td>dirt-removal is slow and inefficient</td>
<td>7</td>
<td>6</td>
<td>none</td>
<td>10</td>
<td>420</td>
<td>add warning in operation manual</td>
<td>Documentation Department, K. Morrison by 1/1/2020</td>
</tr>
<tr>
<td>Vacuum floor</td>
<td>loss of vacuum, motor turns</td>
<td>loss of vacuum, motor overheats, motor burns out - total failure</td>
<td>5</td>
<td>6</td>
<td>none, detected only by change of sound (motor works louder)</td>
<td>8</td>
<td>340</td>
<td>add mesh in front of the vacuum inlet to prevent finger items to be sucked into the hose</td>
<td>Engineering Department, M. Jansson by 1/1/2020</td>
</tr>
<tr>
<td>Vacuum floor</td>
<td>loss of vacuum, motor not runs</td>
<td>total loss of function, requires repair</td>
<td>5</td>
<td>2</td>
<td>none, detected only by smell of overheated motor</td>
<td>8</td>
<td>162</td>
<td>add thermal fuse to prevent the motor from overheating/failure</td>
<td>Engineering Department, M. Jansson by 1/1/2020</td>
</tr>
<tr>
<td>Vacuum floor</td>
<td>loss of vacuum, motor does not run</td>
<td>broken due to excessive non-stop use over several hours</td>
<td>6</td>
<td>7</td>
<td>none</td>
<td>112</td>
<td>80</td>
<td>redesign fitting, include bag-release clamps</td>
<td>For review with product designer J. Pittner, due by 1/1/2020</td>
</tr>
<tr>
<td>Vacuum floor</td>
<td>loss of vacuum, motor does not run</td>
<td>broken due to excessive non-stop use over several hours</td>
<td>6</td>
<td>7</td>
<td>none</td>
<td>112</td>
<td>80</td>
<td>redesign fitting, include bag-release clamps</td>
<td>For review with product designer J. Pittner, due by 1/1/2020</td>
</tr>
</tbody>
</table>

**Note:** This FMEA table lists potential failure modes, their effects, and suggested corrective actions for a vacuum cleaner model. It includes steps to ensure effective removal of dirt and mitigate any potential issues.
BENCHMARKING

The Benchmarking process

1. Define the process
2. Data collection
3. Data comparison
4. Analysis
5. Action
6. Repeat
## Balanced Score Chart

### Vision and Strategy

**Customer**

- To achieve our vision, how should we appear to our customers?
  - Objectives: Measures | Targets | Initiatives

**Learning and Growth**

- To achieve our vision, how will we sustain our ability to change and improve?
  - Objectives: Measures | Targets | Initiatives

**Financial**

- To succeed financially, how should we appear to our shareholders?
  - Objectives: Measures | Targets | Initiatives

**Internal Business Process**

- To satisfy our shareholders and customers, what business process must we excel at?
  - Objectives: Measures | Targets | Initiatives
STANDARDIZATION

Akreditasi Puskesmas

EFQM
Committed to excellence

Certified Company
ISO 9001:2008

Joint Commission International

IMPROVING THE QUALITY AND SAFETY OF HEALTHCARE FOR EVERY PATIENT ACROSS THE GLOBE