# DMAIC Dissected:

# Define

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# Six Sigma Methodology – Define

*"Our plans miscarry because they have no aim. When a man does not know what harbor he is making for, no wind is the right win."*

*Seneca (4 B.C. – 65 A.D.)*

# What Will Be Covered

- Review [Six Sigma](#)'s philosophy and goals

- Recognize when to use DMAIC

- Understand the importance of Define

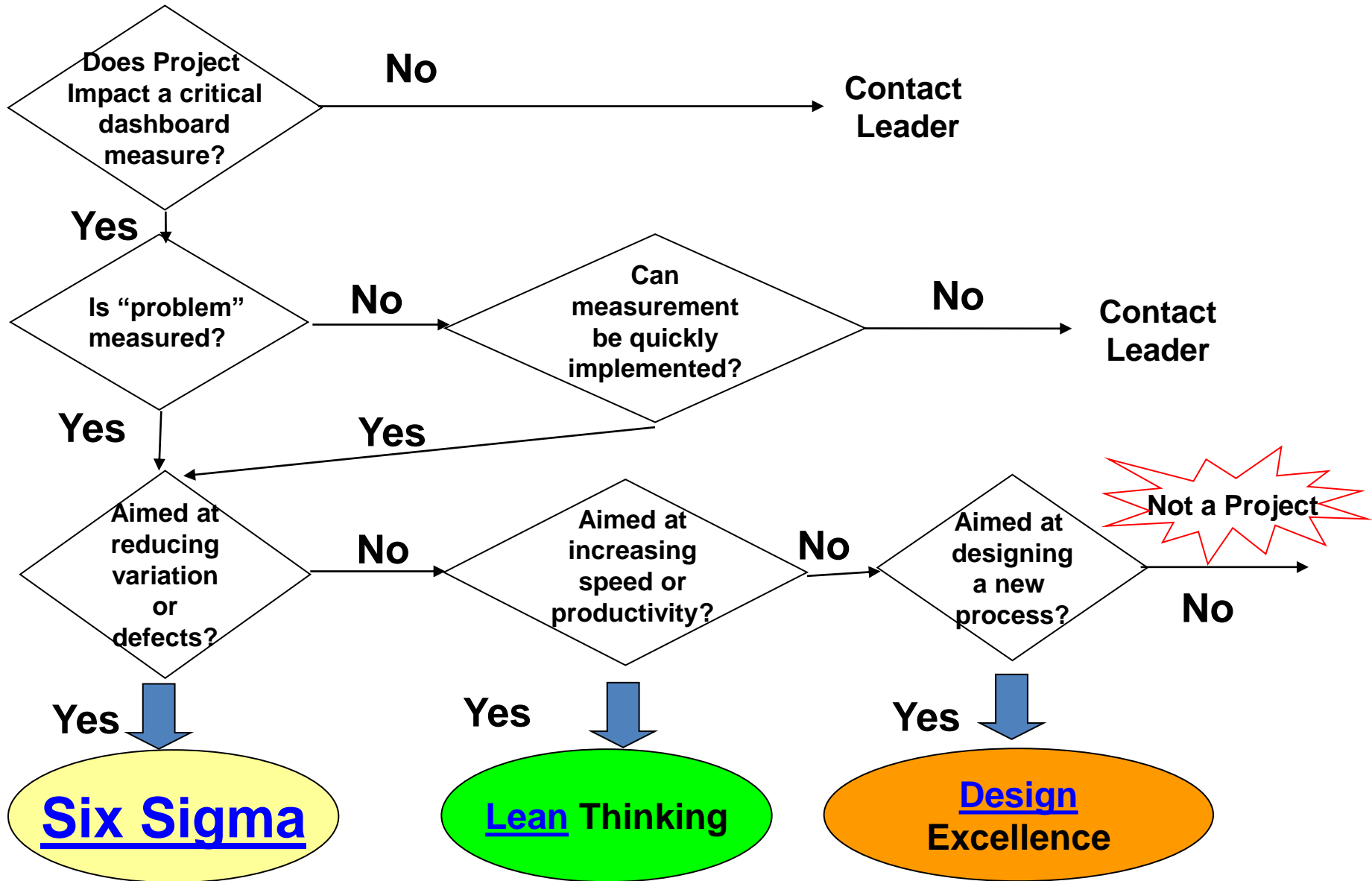- Learn of the various tools and techniques

- Question and Answers

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# Definition: 'Six Sigma'

- A method that provides organizations tools to improve capability of their [processes](#)

- A disciplined improvement method for reducing process variability to eliminate defects in our products and services

- Also known by the acronym DMAIC for the phases of a Six Sigma project

# Six Sigma

- Philosophies
  - When defects occur look to process for the cause
  - Excellent processes will allow average people to consistently generate superior results

- Benefits
  - More loyal & satisfied customers (internal and external)
  - Financial savings through improved efficiency and effectiveness
  - Resolution of chronic problems

# Selecting the Right [Improvement](#) Method

**Does Project Impact a critical dashboard measure?** —**No**→ **Contact Leader**

↓ **Yes**

**Is "problem" measured?** —**No**→ **Can measurement be quickly implemented?** —**No**→ **Contact Leader**

↓ **Yes**

**Yes** (from "Can measurement be quickly implemented?")

**Aimed at reducing variation or defects?** —**No**→ **Aimed at increasing speed or productivity?** —**No**→ **Aimed at designing a new process?** —**No**→ **Not a Project**

**Yes** ↓ **Six Sigma**

**Yes** ↓ **Lean Thinking**

**Yes** ↓ **Design Excellence**

# Why and When to Use DMAIC

- Use DMAIC:
  - to reduce defects & variation in existing process
  - when the causes of the problem are uncertain
  - when solution is not already obvious or prescribed
  - when improvement will have a significant impact

- Don't Use DMAIC:
  - to design new processes from scratch
  - when the causes of the problem are known
  - when the solution is obvious or prescribed
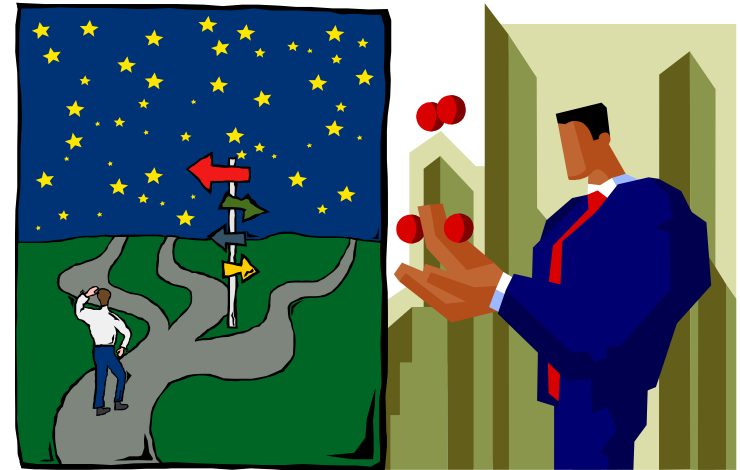  - when improvement will have little impact
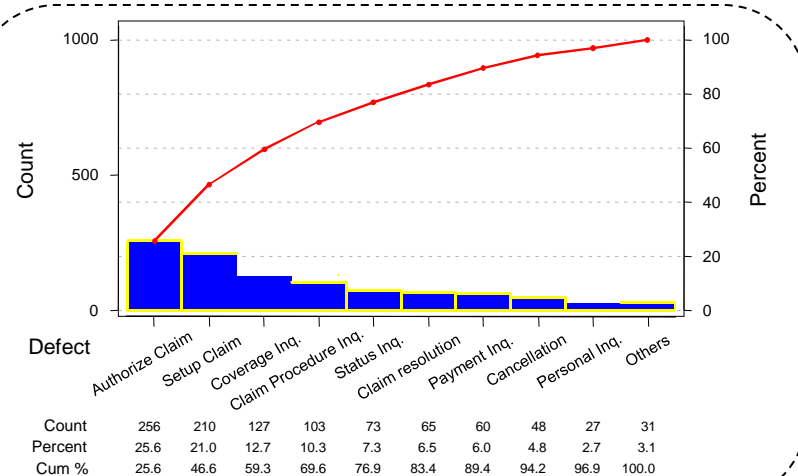
# Overview of the DMAIC Method
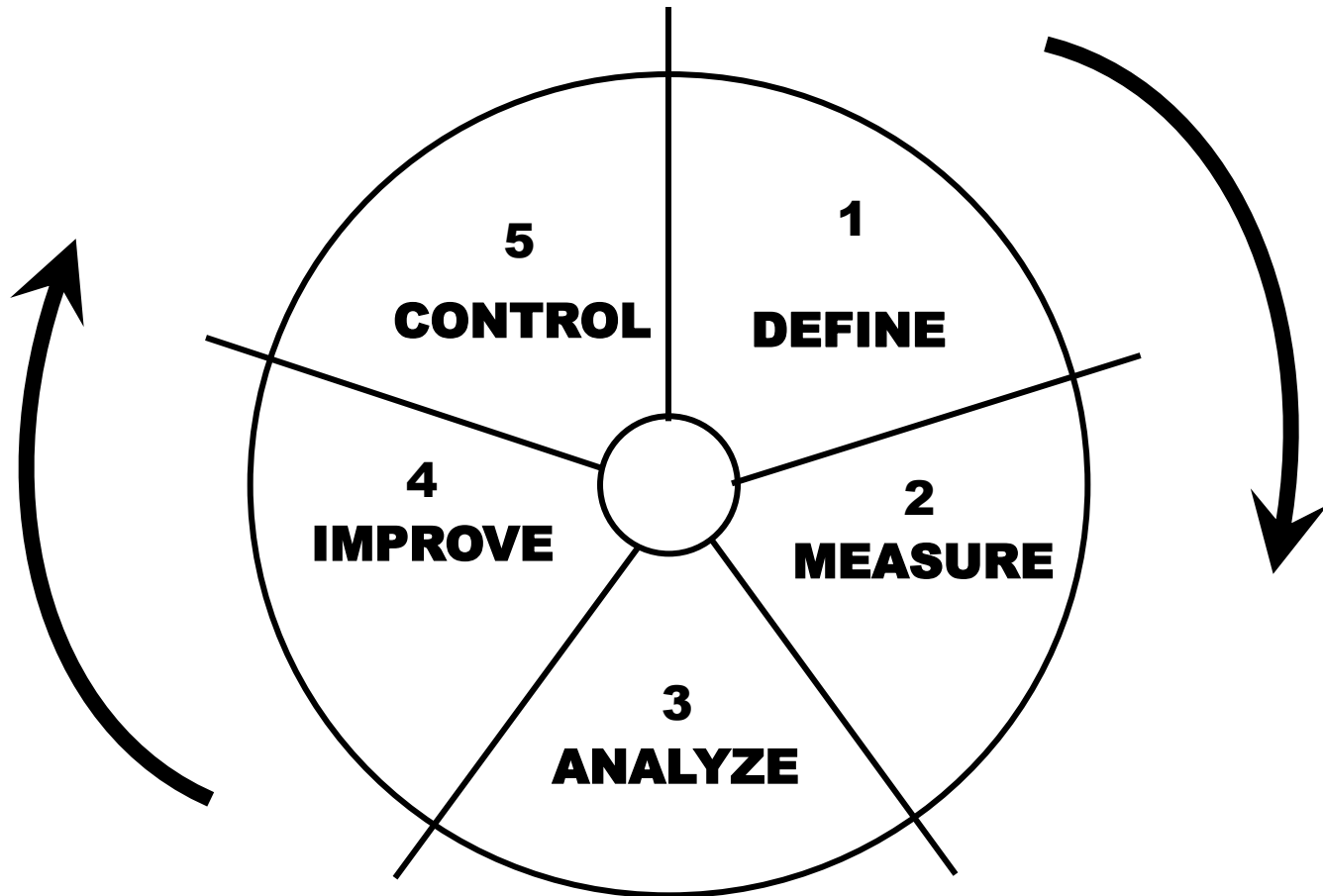
# Key Elements
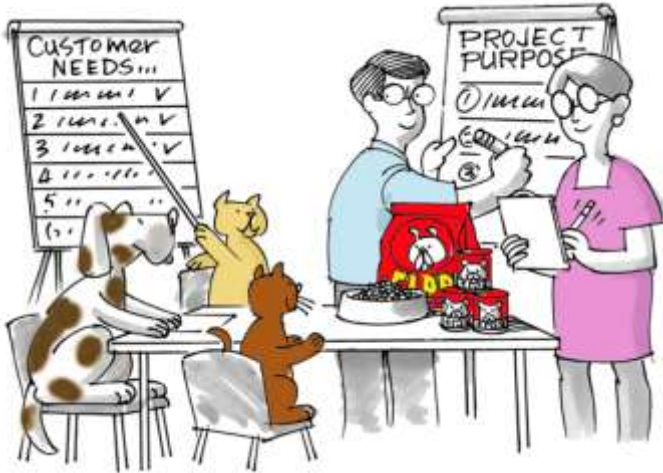


***Customer* Focus**



***Role of Leadership***

| | |
|---|---|
| Deliver high impact results | 🟩 |
| Improve service levels | 🟨 |
| Establish PE Culture and Capability | 🟥 |
| Achieve high satisfaction from leaders/participants | 🟩 |



| | Authorize Claim | Setup Claim | Coverage Inq. | Claim Procedure Inq. | Status Inq. | Claim resolution | Payment Inq. | Cancellation | Personal Inq. | Others |
|---|---|---|---|---|---|---|---|---|---|---|
| Count | 256 | 210 | 127 | 103 | 73 | 65 | 60 | 48 | 27 | 31 |
| Percent | 25.6 | 21.0 | 12.7 | 10.3 | 7.3 | 6.5 | 6.0 | 4.8 | 2.7 | 3.1 |
| Cum % | 25.6 | 46.6 | 59.3 | 69.6 | 76.9 | 83.4 | 89.4 | 94.2 | 96.9 | 100.0 |

***Fact-Based *Management* & Evaluation***

# Six Sigma Methodology – Define

- ***Voice Of the Customer:*** **Expressed requirements and expectations of customers relative to products or services, as documented and disseminated to the providing organization's members.**

- ***Project Charter:*** A written commitment approved by management stating the scope of authority for an improvement project or team.

- ***Project Tracking***: provides guidelines for evaluating, documenting, and closing down the project

# Phase 1: Define

- Set project goals and boundaries

- Priorities are based on organization's business goals, customer needs, and the process that needs to be improved.
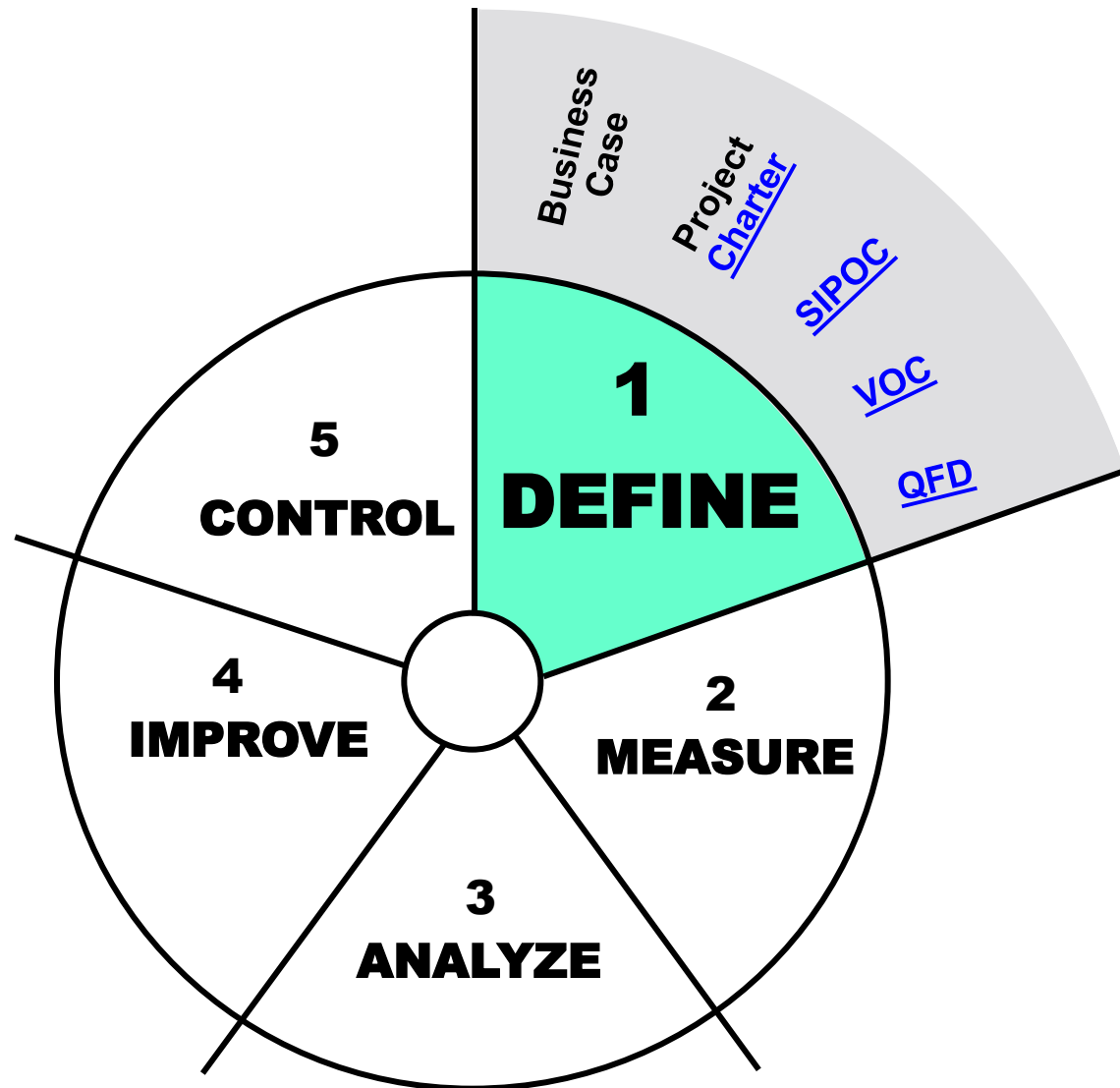
# Voice Of the Customer

- Voice of the Customer includes topic areas:

  - Customer Identification

    - *Stakeholder Analysis = Any party that MAY be affected*

  - Customer Feedback

    - *Gather /collect customer needs & customer perceptions*

  - Customer Requirements

    - *Translate stated requirements to detailed deliverables*

- Six Sigma: quality built around the customer

  - They define quality and set expectations

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# Business Case

- Short summary of strategic reason for project
- General rationale for a business case would normally involve:
  - Quality
  - Cost
  - Delivery
- Of a product with a financial justification

# Customer Identification

- Customers rightfully expect performance, reliability, competitive process, on-time delivery, service, and clear and accurate transaction processing (Harry, 2000)

- Kaoru Ishikawa (1985) coined "the next operation as customer" in order to remove sectionalism of departments

# Customer Feedback

- Tools do not have to be complicated but SHOULD ask the right questions:
  - **What** attributes are of value?
  - **How** desirable is each attribute (using some of rating?)
  - How do we **compare** with competitor's products?
  - What other **features / services** would be of value?

(Albrecht, 1992)

# Critical to Quality (CTQ) Tree

- The following levels of the tree are determined during the define step:

    - The needs of the customer

    - The basic drivers for the customer

    - The potential third level CTQ metrics

- Eckes indicated the exact metrics are not determined for the CTQ's during define step

# Kano Model

- Kano model is referred to as Kano Analysis and is used to analyze customer requirements

- Model is an indicator of customer satisfaction

- Following are considered Kano model categories:
  a) Dissatisfies
  b) Delighters
  c) Satisfiers

# Customer Metrics Selection

- During Define, primary and more detailed metrics are developed but not finalized

- Metrics affecting projects involving suppliers, internal processes, and customers would be:
  - quality
    - cycle time
      - cost
        - value
          - labor (Eckes, 2001)

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# QFD Process
## HOUSE OF QUALITY

**INTERRELATIONSHIPS BETWEEN TECHNICAL DESCRIPTORS**

**TECHNICAL DESCRIPTORS (VOICE OF THE COMPANY)**

**CUSTOMER REQUIREMENTS (VOICE OF THE CUSTOMER)**

**PRIORITIZED CUSTOMER REQUIREMENTS**

**IMPORTANCE
X
COMPETITIVE ANALYSIS
X
MARKET POTENTIAL**

**RELATIONSHIPS BETWEEN REQUIREMENTS & DESCRIPTORS**

**PRIORITIZED TECHNICAL DESCRIPTORS**
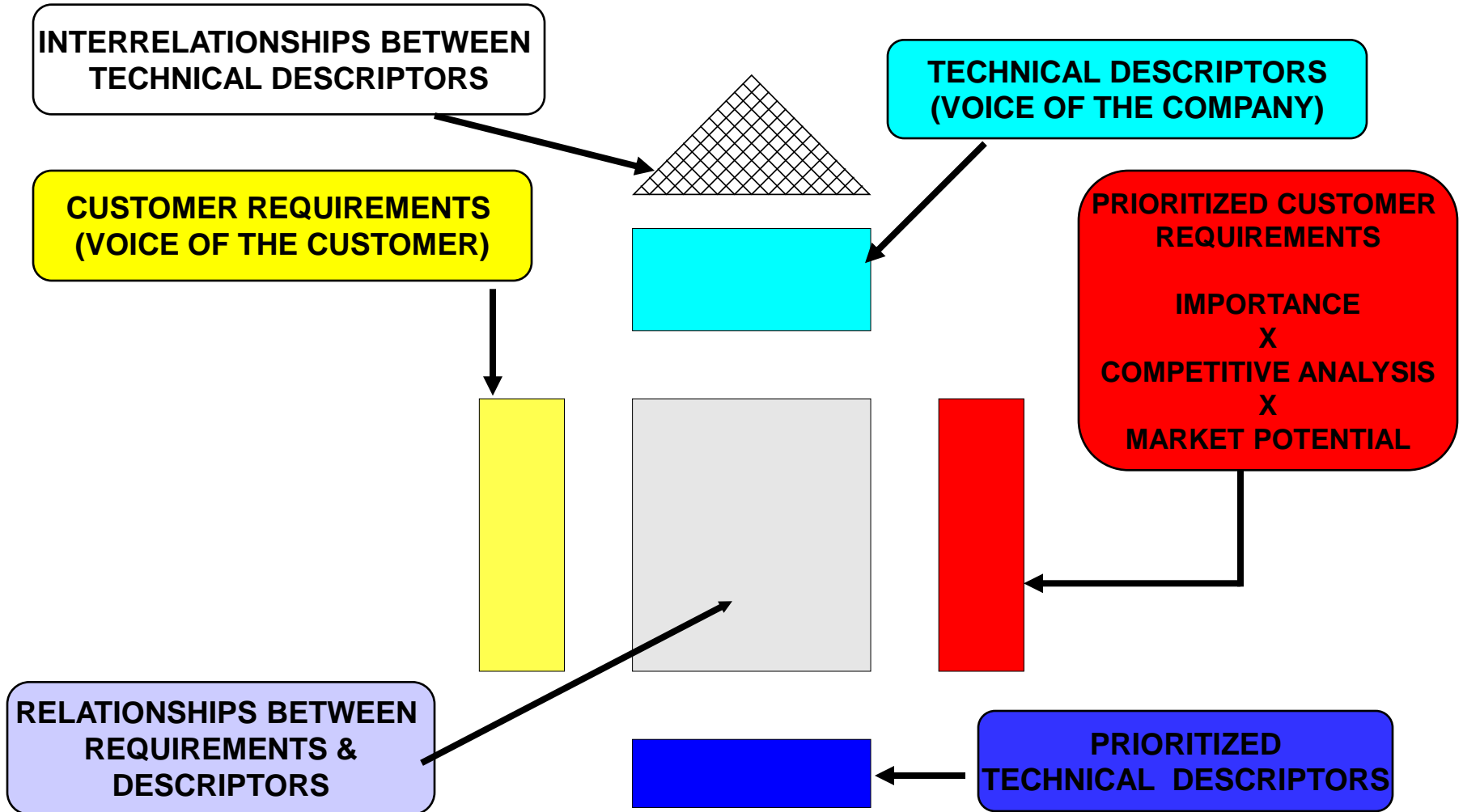
**A basic QFD matrix showing the various components**

# Quality Function Deployment

- A process to ensure that customers' wants and needs are heard and translated into technical characteristics

- QFD is a customer driven process which is implemented by the organization

- Desires of customer & how to make a product or process meet them is underlying concept

**Product Flow SIPOC**

| Supplier | Input | Process | Output | Customer |
|----------|-------|---------|--------|----------|

**Supplier**
- Planning
- Engineering
- Quality
- JCIT
- Marketing Forecast

**Input**
- Capacity Requirements
- Line Design
- Compliance Issues
- Consulting

**Output**
- Level Build Plan
- Improved Cycle Times /WIP Reductions
- Reduced QNC's
- Improved Efficiency/ Improved Compliance

**Customer**
- Doctors
- Shareholders
- Quality
- Regulatory

Process flow:

Receive Finished Goods Trigger → Cut Work Order to Line → **Sequence WO's Through Single Prod. Line** → Sterilize → Release Product to Finished Goods

**EXISTING PROCESS FLOW**

Define ＞ Measure ＞ Analyze ＞ Improve ＞ Control

# Project Charter

- Project Charter covers these topic areas:
  - Charter Content
    - *Scope, Time, & Money (Iron Triangle)*
  - Charter Negotiation
    - *Stakeholder alignment*
  - Project Management
    - *Control of project plan execution*
  - Project Measures
    - *Earned Value and [Variation Analysis](#)*

# Charter Content

- It establishes the [team's](#)
  - Mission – *Problem Addressing*
  - Scope – *Team subject boundaries*
  - Objectives – *Business Case*

- Those involved: [Team](#) Champion, Team Leader, Team Members

- Eckes (2001) suggests each team work very hard in its first meetings to clarify

# Project Measures

- <u>Budget:</u> An approved written plan of the total costs and cash inflows for a project

- <u>Forecast:</u> Predicted total revenues & costs adjusted to include actual information at some point

- <u>Actual:</u> Revenue & costs that have occurred, and for which amounts are known instead of estimated

- <u>Variance:</u> difference between the budget and actual revenues and costs

# Project Tracking

- Project tracking includes topic areas:
  - [Project Plan Elements](#)
    - *Set the objectives*
  - Work Breakdown Structure
    - *Detailed plan, expands project into list of activities*
  - [Planning Tools](#)
    - *Developing/analyzing time, resources, and costs*
  - Project Documentation
    - *Records created throughout project's life*

# Work Breakdown Structure

- Detailed plan which expands the project into a listing of activities

- During a project work breakdown structure, a number of planning activities occur such as the following:
  - The work is divided into smaller activities
  - Interrelationship between activities are defined
  - The project schedule is established

# Define Phase

Goal:

Define the project's purpose and scope and get background on the process and customer

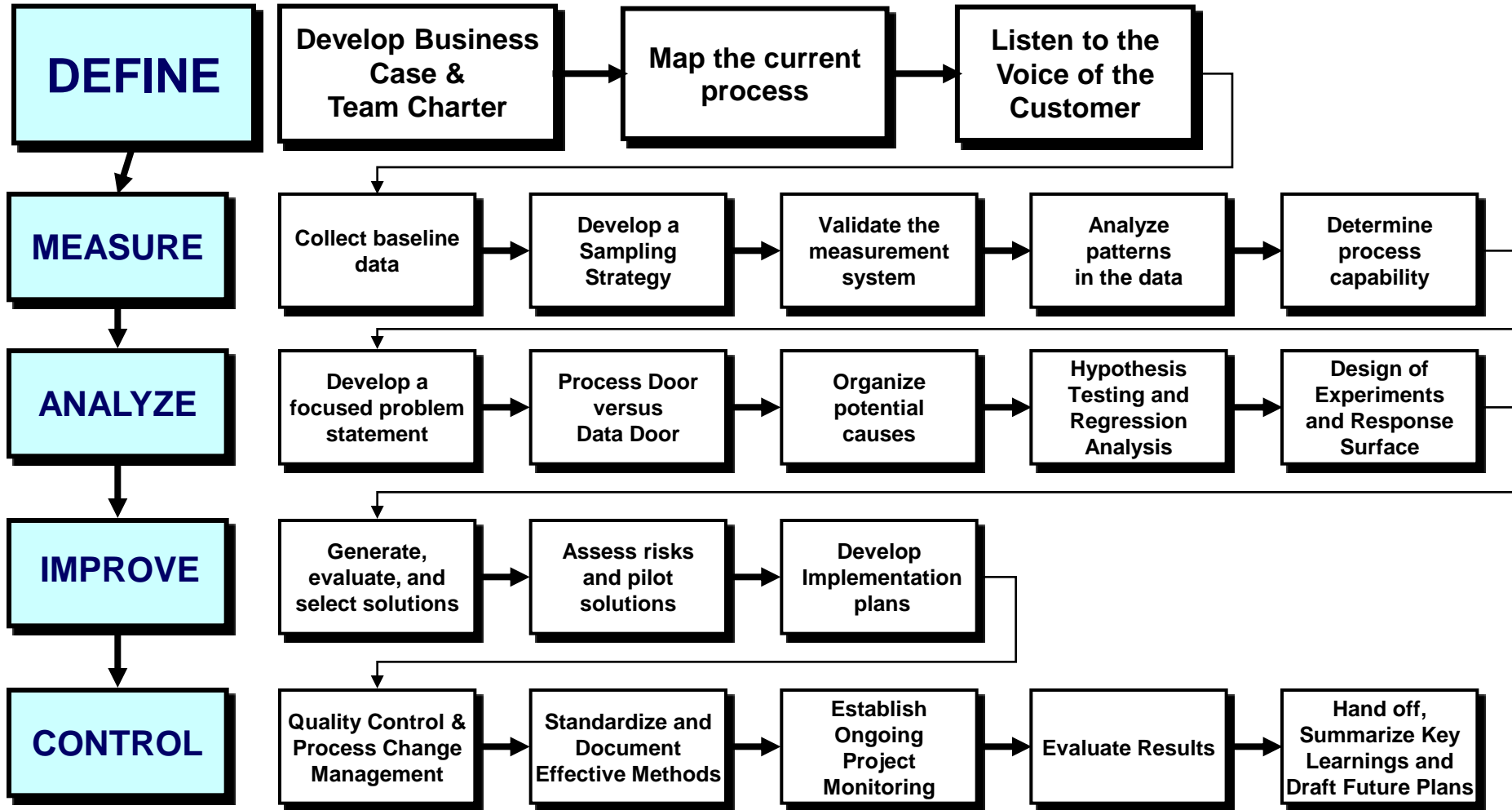| Develop Business Case & Team Charter | → | Map the current process | → | Listen to the Voice of the Customer |
|---|---|---|---|---|

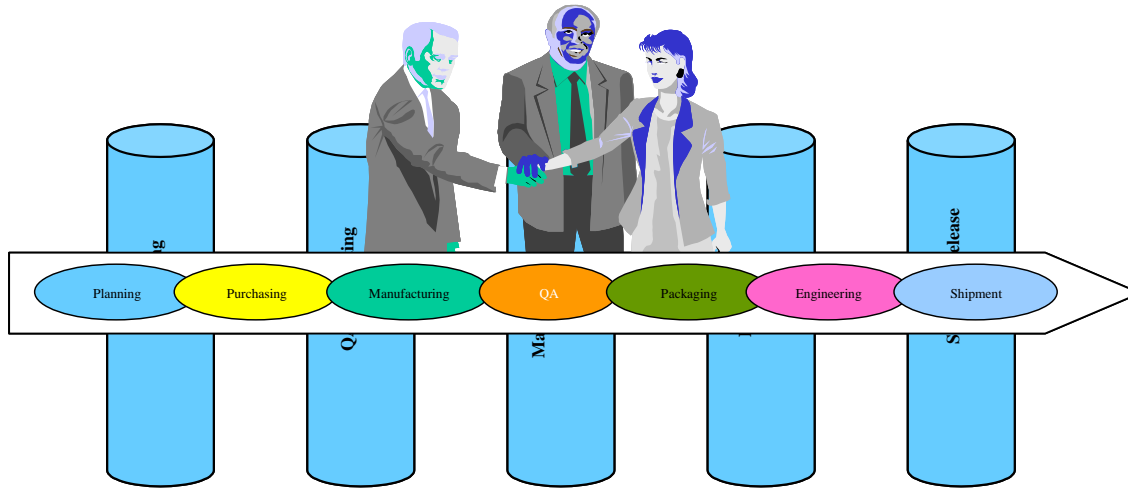Outputs:    Team Charter that summarizes the "what, why, who & when" of the project     High level process map ("SIPOC")     Measures that are critical to quality ("CTQs") for those customers

# The DMAIC Roadmap

| **DEFINE** | Develop Business Case & Team Charter | → | Map the current process | → | Listen to the Voice of the Customer |
|---|---|---|---|---|---|

| **MEASURE** | Collect baseline data | → | Develop a Sampling Strategy | → | Validate the measurement system | → | Analyze patterns in the data | → | Determine process capability |
|---|---|---|---|---|---|---|---|---|---|---|

| **ANALYZE** | Develop a focused problem statement | → | Process Door versus Data Door | → | Organize potential causes | → | Hypothesis Testing and Regression Analysis | → | Design of Experiments and Response Surface |
|---|---|---|---|---|---|---|---|---|---|---|

| **IMPROVE** | Generate, evaluate, and select solutions | → | Assess risks and pilot solutions | → | Develop Implementation plans |
|---|---|---|---|---|---|

| **CONTROL** | Quality Control & Process Change Management | → | Standardize and Document Effective Methods | → | Establish Ongoing Project Monitoring | → | Evaluate Results | → | Hand off, Summarize Key Learnings and Draft Future Plans |
|---|---|---|---|---|---|---|---|---|---|---|

# Sound Business Principles



**Process Management / High-Performance Environment**



**Continuous Assessment and Renewal**

Customer Wait Time

BEFORE    AFTER

Days

7
6
5
4
3
2
1
0



**Improvement & Innovation**

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