# Critical to Quality

# Let us map the Value Stream

# Making and attending a Dentist's appointment

**Monday 2nd November**

Phone call to dentist to make appointment. (10 mins waiting, 2min conversation.)

**Thursday 19th November**

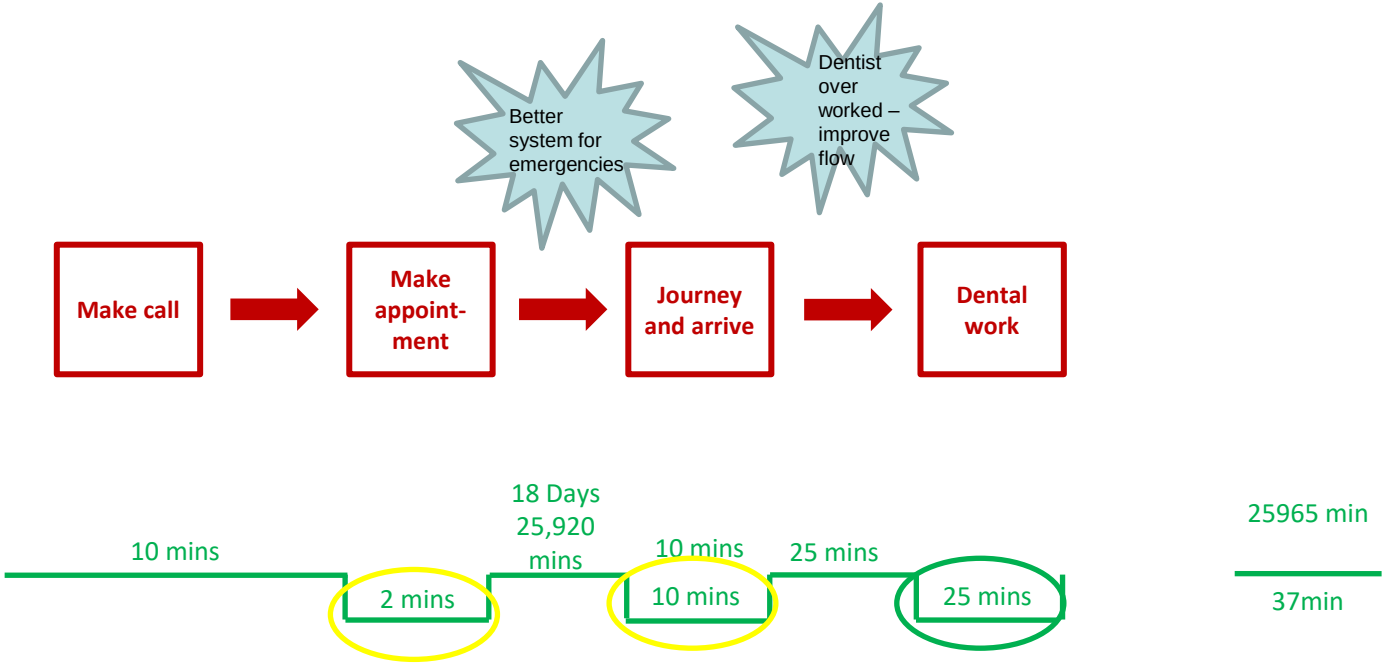
Arrive in Swansea at 13:40pm, 10 minutes searching for car parking space.

Arrive at Dentist surgery for 2pm appointment after walking from car park. Dentist running behind schedule so in Waiting Room for 25 minutes.

Sitting in the dreaded dentist chair by 2:25pm for drilling to start.

Back at Reception by 2:50pm to book follow-up appointment for additional work identified.

# Dentist Appointment



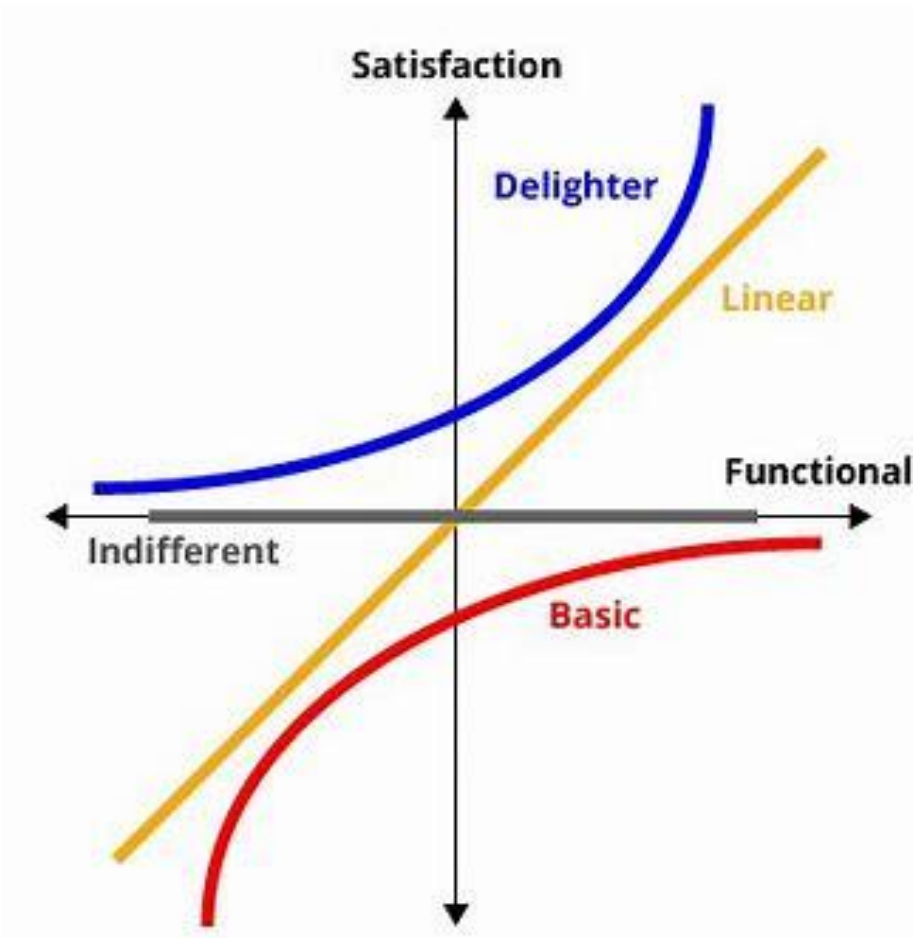

**25 / 25965 min = 0.96% VA**

**37 / 25955 min = 0.14% VA/NVA**

# Define 4 - Voice of the Customer (VoC) and Critical to Quality (CTQ)

# Voice of the Customer (VoC)

The Kano Model




Noriaki Kano b1940 Tokyo, writer, engineer and educator in the field of Quality Management

# Voice of the Customer (VoC)

The Kano Model

Is a model which helps to prioritise either products or service characteristics (or features) which effect customer satisfaction

Includes five categories which can effect customer satisfaction and dissatisfaction

# The Kano Model

Features to include:

Basic
Basic features customer expects – will dissatisfy them if absent

Excitement (Delight)
Will excite the customer disproportionally if present, might not notice if not there!

Performance (linear)
Will excite customer proportionally, can be linear

Features to avoid:

Indifferent
Features customer may not care about

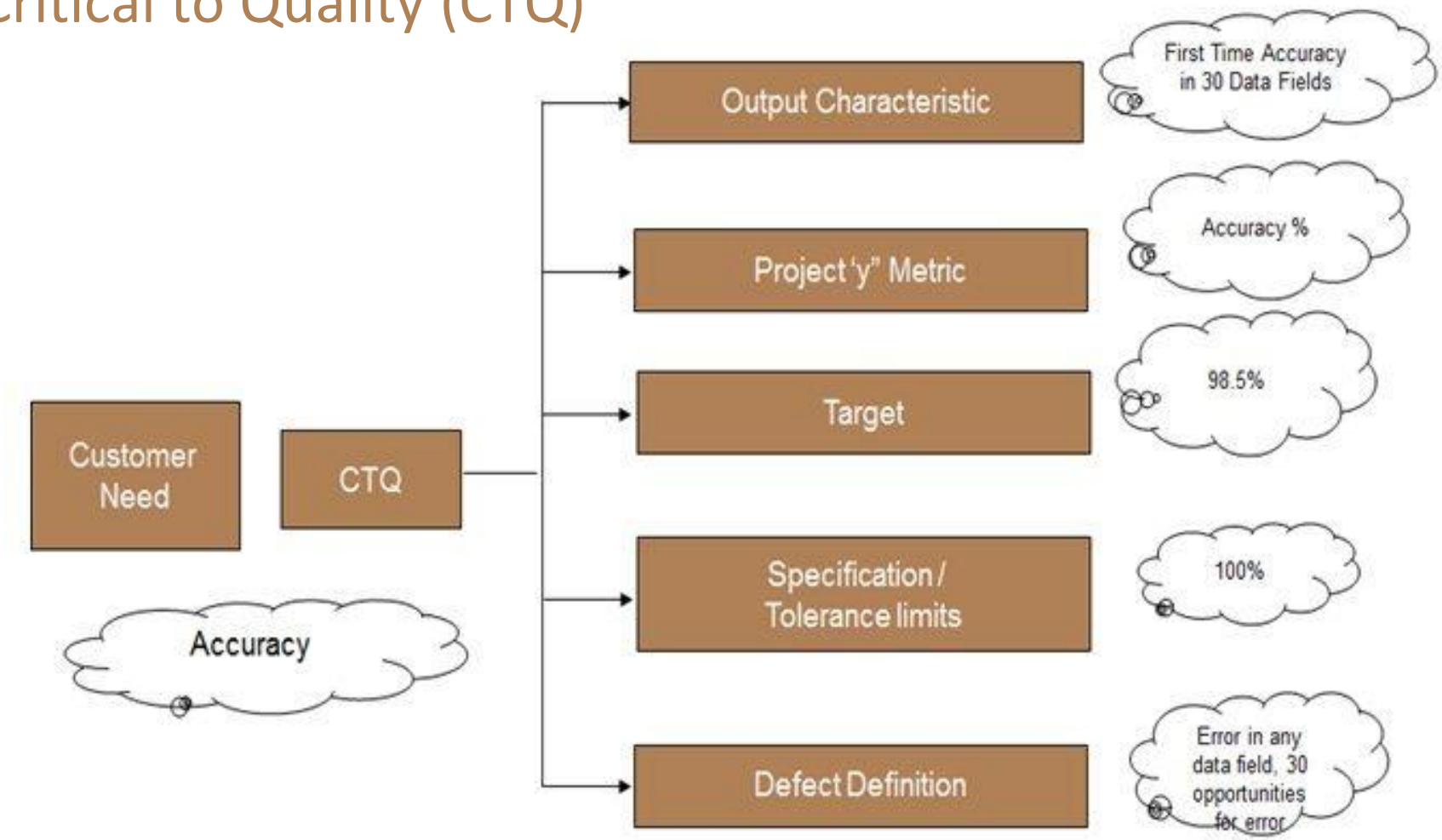
Dissatisfaction
Features which will upset the customer

# Voice of the Customer (VoC)

The Kano Model

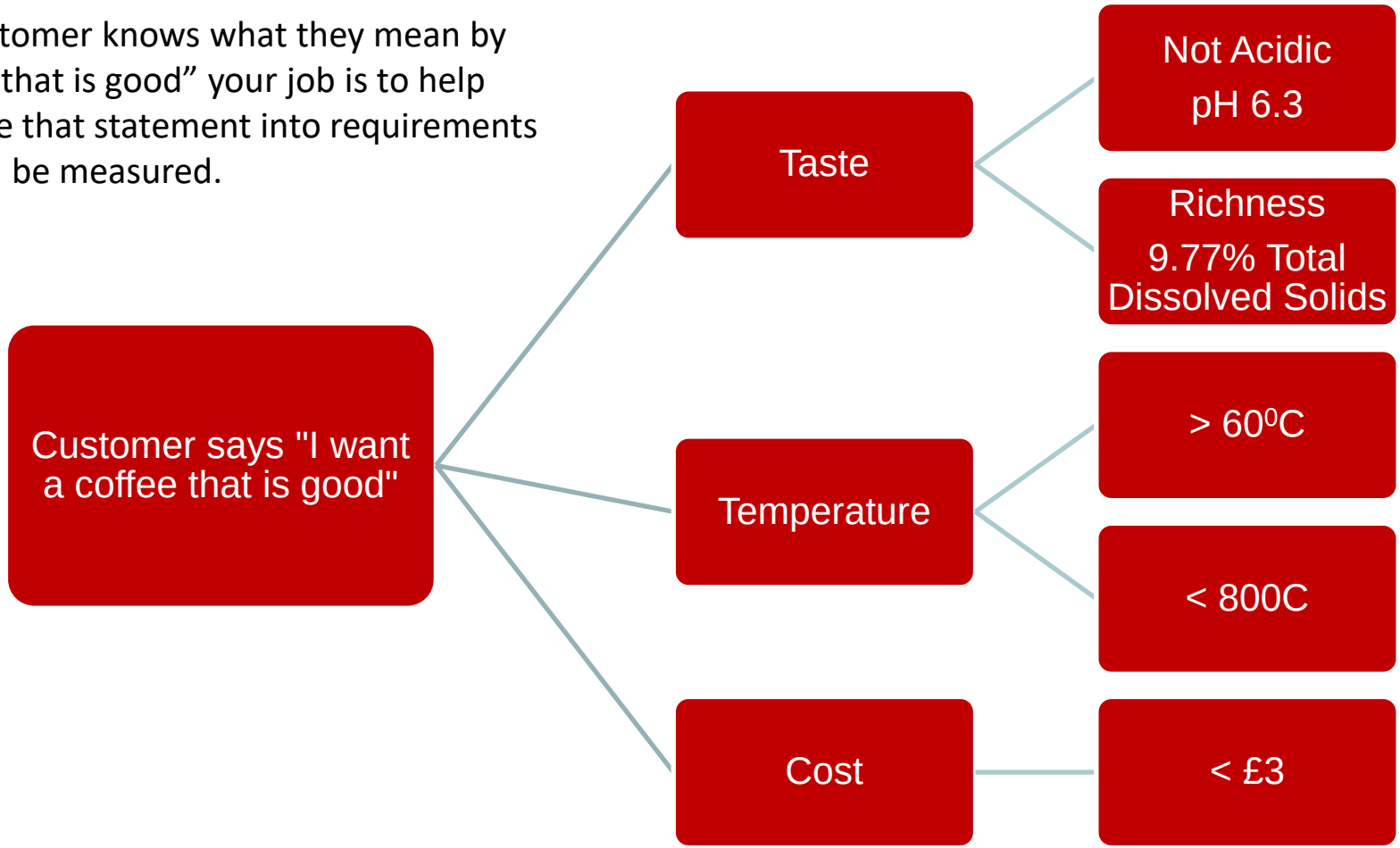
# Level 5 – Continuous Improvement with Industry 4.0

## Critical to Quality (CTQ)



# CTQ

The Customer knows what they mean by ”Coffee that is good” your job is to help translate that statement into requirements that can be measured.




**Need**
Harder to Measure

**Drivers**

**CTQ Requirements**
Easier to Measure

# Critical to Quality

Voice of the Customer

Critical Customer Requirements

Critical to Quality

| Requirement | Example |
| --- | --- |
| The 'Big' Y | Increase Sales |
| Voice of the Customer | Sales quotes takes too long. |
| Key Customer Issues | Get quotes in a timely manner. |
| Critical Customer Requirement (CCR) | Quote should be received by customer in 14 days or less. |
| Critical to Quality (CTQ) | Cycle time for quote. |
| Goal Statement from Project Charter | 95% of all quotes should be delivered to customer in 14 days from customer's request for quotation. |

# Critical to Quality

Some ways we can measure the process performance

- Defects Per Million Opportunities
- First-pass yield
- Defects Per Unit
- Throughput Yield

# Defects Per Million Opportunities (DPMO)

**DPMO = Units / (Critical Characteristics * Errors Detected)**

$= 74 / (4 * 600) * 10^6 = 30{,}833$

| Units | Process Step | Critical Characteristics | Errors Detected | Items with Error(s) | DPMO |
|---|---|---|---|---|---|
| 600 | 1 | 4 | 74 | 51 | 30,833 |
| 600 | 2 | 3 | 103 | 98 | 57,222 |
| 600 | 3 | 1 | 67 | 66 | 111,667 |
| 600 | 4 | 3 | 157 | 86 | 87,222 |
| 600 | 5 | 1 | 44 | 43 | 73,333 |

# First Pass Yield

**First-Pass Yield = 1– (Items with Error(s) / # Units)**

= 1 – (51 / 600) = 92%

| Units | Process Step | Critical Characteristics | Errors Detected | Items with Error(s) | DPMO | First-pass Yield |
|---|---|---|---|---|---|---|
| 600 | 1 | 4 | 74 | 51 | 30,833 | 92 |
| 600 | 2 | 3 | 103 | 98 | 57,222 | 84 |
| 600 | 3 | 1 | 67 | 66 | 111,667 | 89 |
| 600 | 4 | 3 | 157 | 86 | 87,222 | 86 |
| 600 | 5 | 1 | 44 | 43 | 73,333 | 93 |

# Defect Per Units

**DPU = # Errors Detected / # Units**

DPU = 74 / 600 = 0.12

| Units | Process Step | Critical Characteristics | Errors Detected | Items with Error(s) | DPMO | First-pass Yield | DPU |
|---|---|---|---|---|---|---|---|
| 600 | 1 | 4 | 74 | 51 | 30,833 | 92 | 0.12 |
| 600 | 2 | 3 | 103 | 98 | 57,222 | 84 | 0.17 |
| 600 | 3 | 1 | 67 | 66 | 111,667 | 89 | 0.11 |
| 600 | 4 | 3 | 157 | 86 | 87,222 | 86 | 0.26 |
| 600 | 5 | 1 | 44 | 43 | 73,333 | 93 | 0.07 |

# Throughput Yield

**Throughput Yield = 1- (Errors Detected / # Units)**

Throughput Yield = 1- (74 / 600) = 88%

| Units | Process Step | Critical Characteristics | Errors Detected | Items with Error(s) | DPMO | First-pass Yield | DPU | Throughput Yield (%) |
|---|---|---|---|---|---|---|---|---|
| 600 | 1 | 4 | 74 | 51 | 30,833 | 92 | 0.12 | 88 |
| 600 | 2 | 3 | 103 | 98 | 57,222 | 84 | 0.17 | 83 |
| 600 | 3 | 1 | 67 | 66 | 111,667 | 89 | 0.11 | 89 |
| 600 | 4 | 3 | 157 | 86 | 87,222 | 86 | 0.26 | 74 |
| 600 | 5 | 1 | 44 | 43 | 73,333 | 93 | 0.07 | 93 |