



Retain: Support

Voice of the Employee (VoE)

IS446 – Managing Customer Relations with Analytics



New

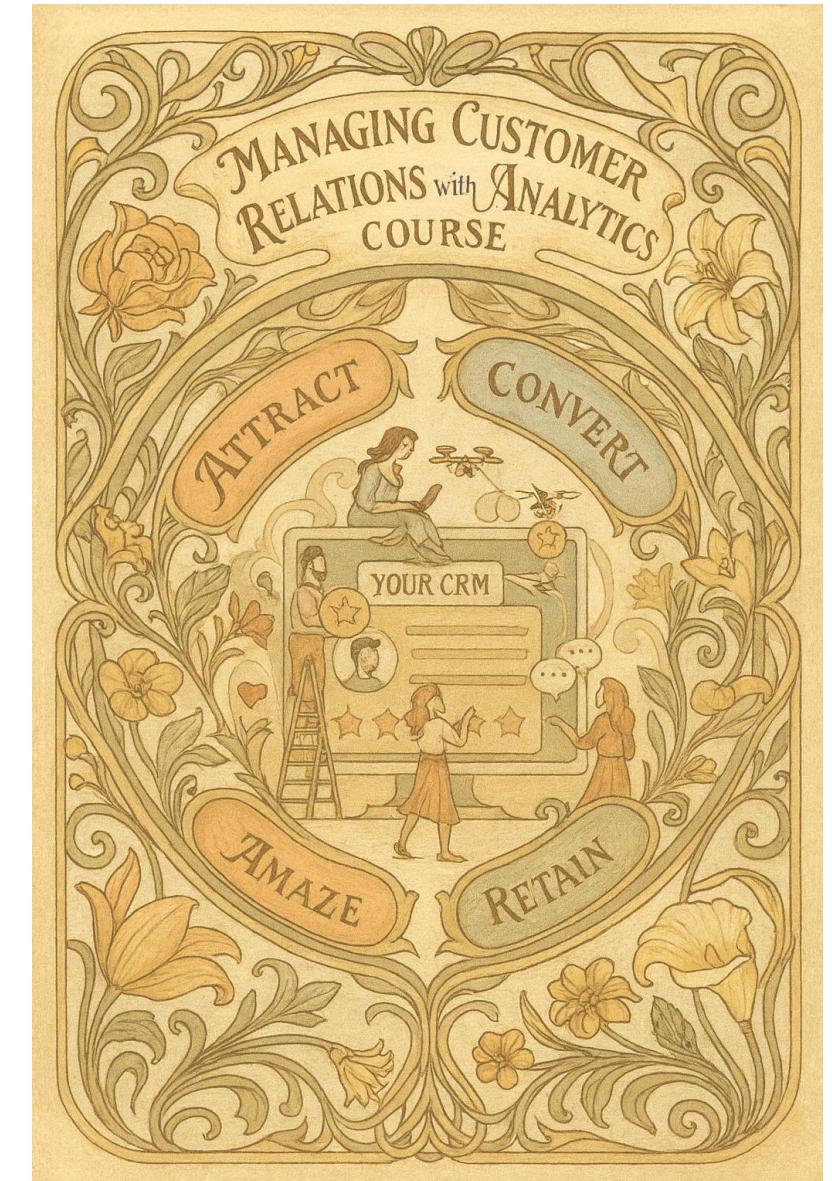
In-Progress

Escalated

Closed

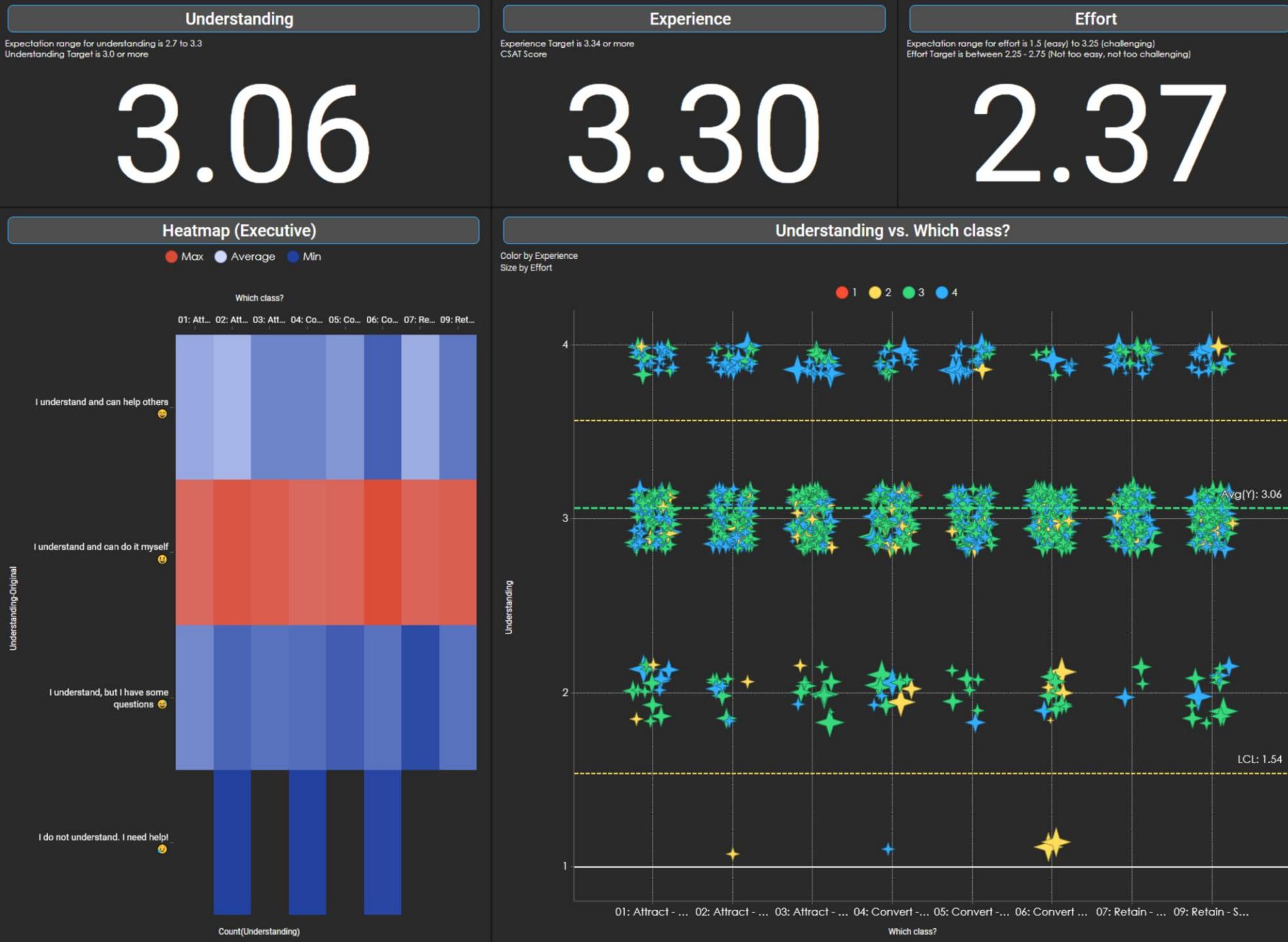
Agenda

-
- 01** Review / Wooclap 
-
- 02** High Quality Support
-
- 03** Support Models
-
- 04** Customer Experience
-
- 05** Measuring Retention



Reflections Dashboard

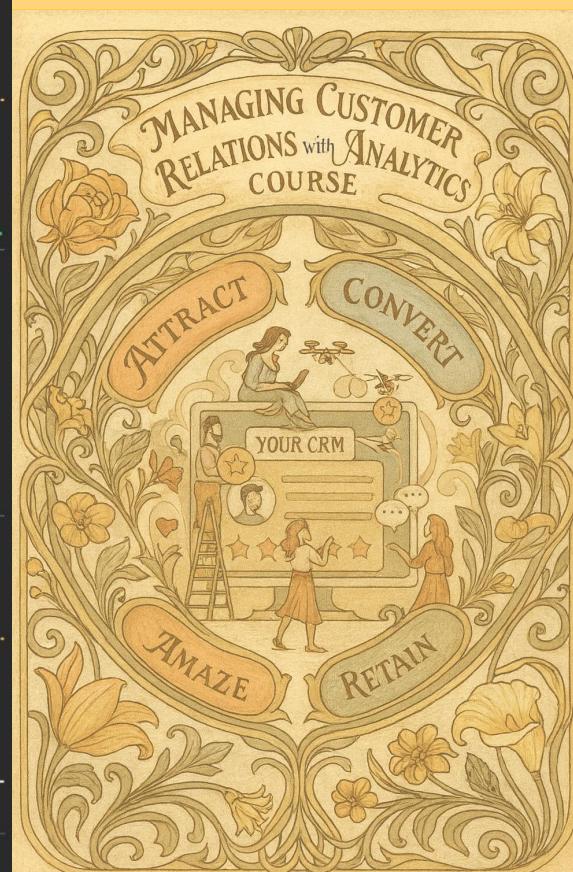




MCRA Operational Dashboard

Axis X – Class Topic
Axis Y – Understanding

Color by **Experience**, Size by **Effort**





Week 09 – Text Analytics

🔍 Key Insights and Learning Outcomes

- **SERVQUAL Model:** Widely cited as a framework for identifying and closing service quality gaps (Knowledge, Standards, Delivery, Communication, Service).
- **CARE Model:** Emphasised as a design tool for service experience, with students appreciating its breakdown into Commitment, Action, Results, and Empathy.
- **FLOW Model:** Understood as a way to optimise employee and customer experience by balancing challenge and skill.
- **Importance–Satisfaction Analysis & RFM Segmentation:** Recognised as practical tools for prioritising service improvements and identifying high-value customers.
- **Customer-Centric Thinking:** Many reflections linked empathy, attentiveness, and emotional intelligence to long-term loyalty and retention.

😊 Overall Experience and Sentiment

Predominantly positive. Students found the lesson engaging, relevant, and applicable to real-world service contexts.

Tone: Reflective and appreciative, with many expressing personal growth in understanding service quality beyond technical delivery.

🎯 Top Enjoyable Activities or Topics

Activity/Topic	Mentions
CARE Model & Empathy Discussions	High
SERVQUAL Gap Analysis	High
Wooclap Activities	Moderate
Tableau Labs (despite challenges)	Moderate
Group Sharing of Service Experiences	High

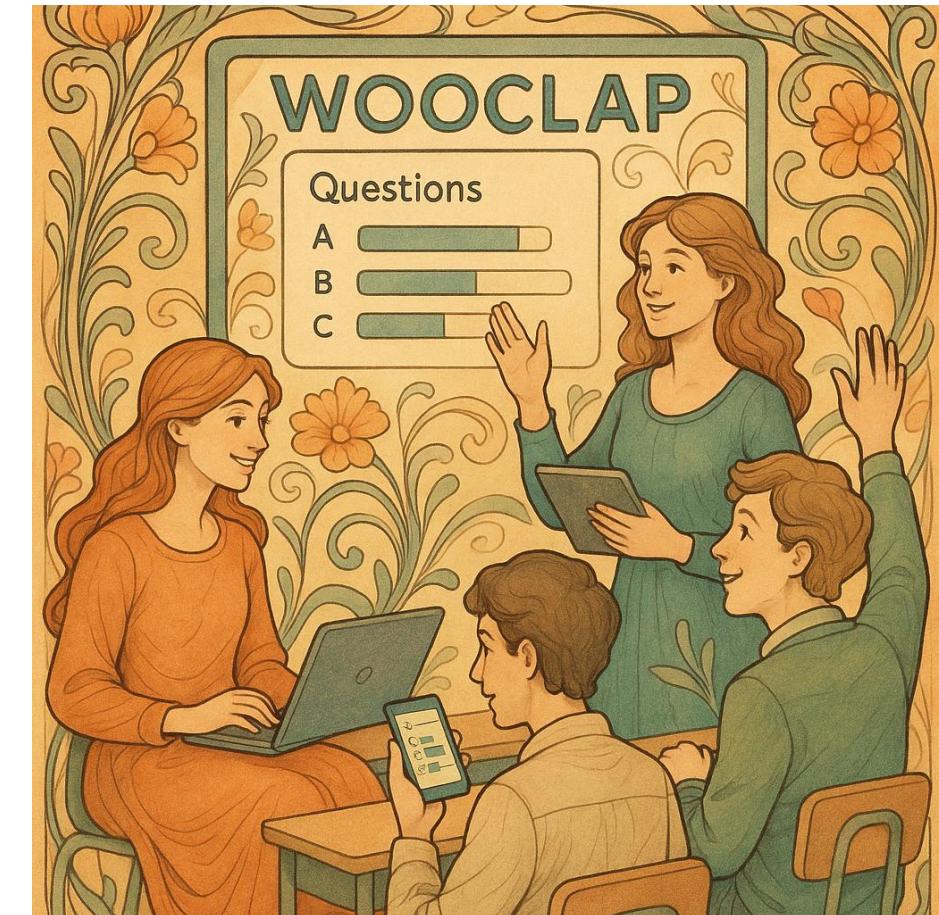
⚠️ Most Challenging Topics

Topic/Activity	Mentions
SERVQUAL Gap Differentiation	High
FLOW Model Interpretation	Moderate
CTQ Tree Creation	Moderate
Tableau Dashboard Design	Moderate
RFM Analysis Interpretation	Moderate



Let's Review...

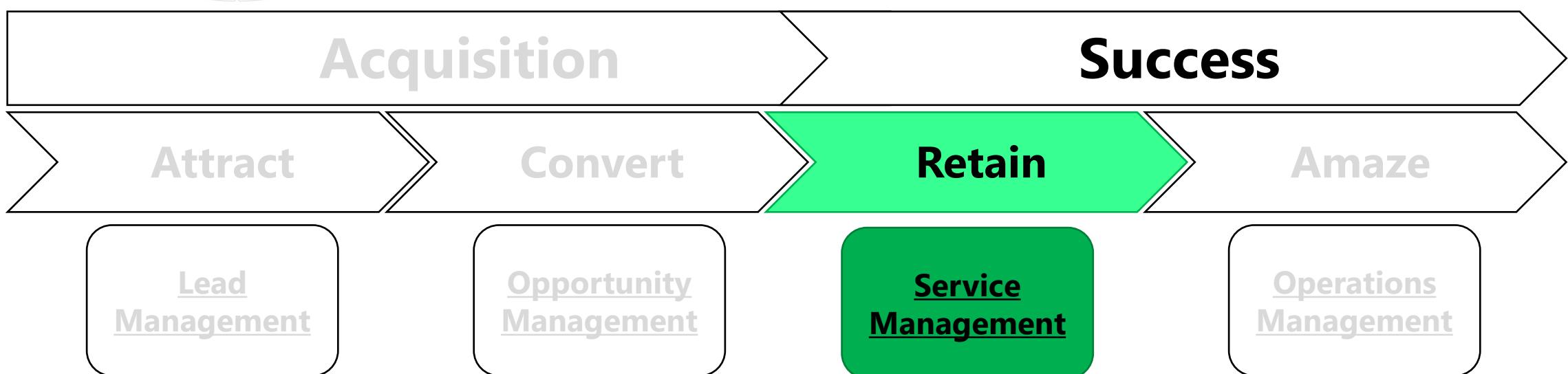
- Join the **Wooclap** event using the link or code.
- Sign in with your **SMU email** so your responses connect to your identity for attendance.
- For attendance, your presence is recorded when you join the event and submit at least one response. Stay in the event until class ends to ensure your attendance is captured.
- If you get disconnected, **rejoin using the same link/code and name**. Your participation will continue from where you left off.
- **Need help?** Let your TA / Instructor know right away if you can't access the event, log in, or submit answers so we can support you.



Customer Success

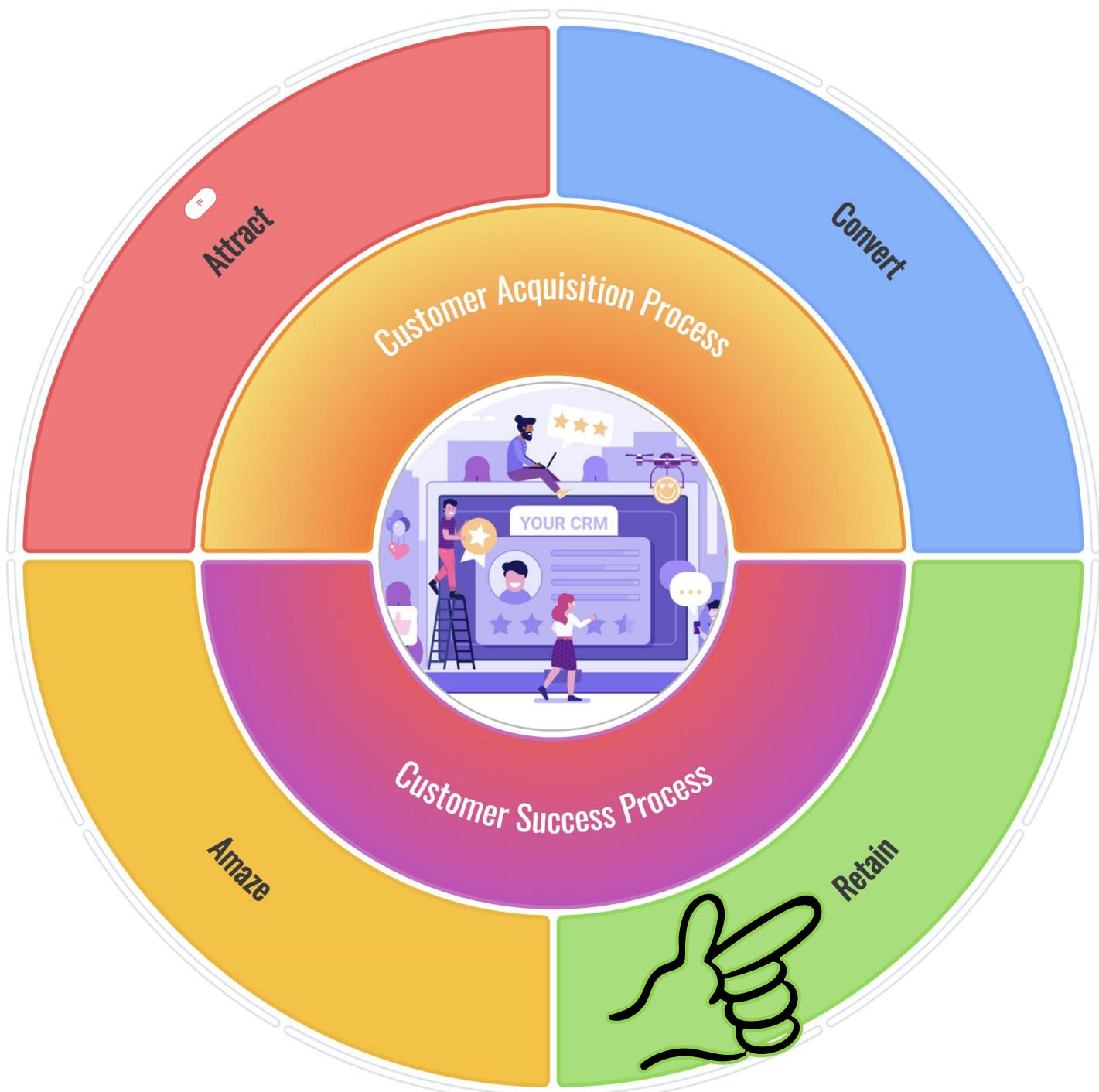


- **Part 1: Customer Acquisition Processes**
 - Attract new customers – **Marketing Organisation Unit**
 - Convert leads into accounts – **Sales Organisation Unit**
- **Part 2: Customer Success Processes**
 - Keep customers satisfied – **Service Organisation Unit**
 - Keep customers loyal – **Operations Organisation Unit**



Big Picture

- Customer Acquisition
 - Attract: Marketing
 - Convert: Sales
- Customer Success
 - **Retain: Service** 
 - Amaze: Operations



Agenda

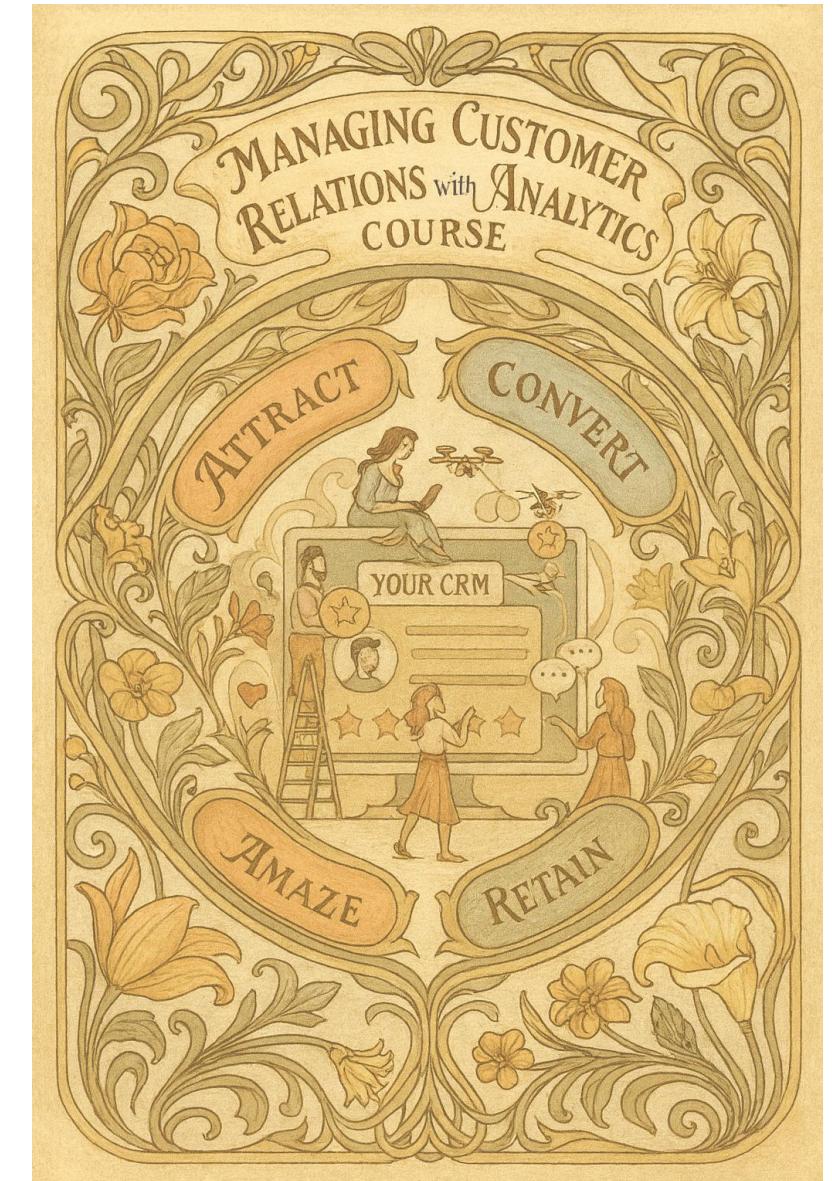
01 Review / Wooclap

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05 Measuring Service



Consistent High-Quality Product



Journey to
Satisfaction

High-
Quality
Product

Customers are satisfied whenever they consistently receive, in a **timely manner**, a **high-quality product**.



*Perfect as in thoroughly done,
Zero (0) defects.*

*Timely as at the right time,
this conflicts with perfect.*



Customers are satisfied whenever they consistently receive, in a timely manner, high-quality service



Commitment to Customer Satisfaction:

Ultimately, high-quality service is the commitment to ensure customer satisfaction **under reasonable conditions**. They take personal responsibility for the customer's experience and strive to **create positive outcomes**.



Student Perspective



Key Positive Themes:

- **Empathy Dominates:** This is by far the most frequently mentioned quality for amazing service.
- **Human Connection:** Words like "caring," "understanding," and "thoughtful" emphasize that genuine human interaction remains central to service excellence.
- **Personalization Matters:** "Personalized" appears nearly as often as empathy, indicating students highly value customized experiences tailored to individual needs.
- **Proactive Approach:** "proactive," "attentive," and "above-and-beyond" suggest exceptional service anticipates needs rather than merely responding to them.

Key Negative Themes:

Attitude Problems ("rude"), **emotional disconnection** ("Indifference," "apathy," and "unempathetic"), **neglect and inefficiency**: "being ignored or experiencing slow, inefficient service", **disappointment**.





Customers are satisfied whenever they consistently receive, in a **timely fashion**, **high-quality support**



Commitment to Customer Satisfaction:

When customers **consistently** experience an **effective problem resolution process**, they feel valued and supported. This leads to higher satisfaction because **customers know they can rely on the organisation** to address their concerns efficiently and effectively every time they encounter an issue.



The Journey to Satisfaction

With your project team, discuss about real life support experiences and complete the form at:

<https://forms.office.com/r/zMPhSWnXXW>

One submission per team...



10 minutes

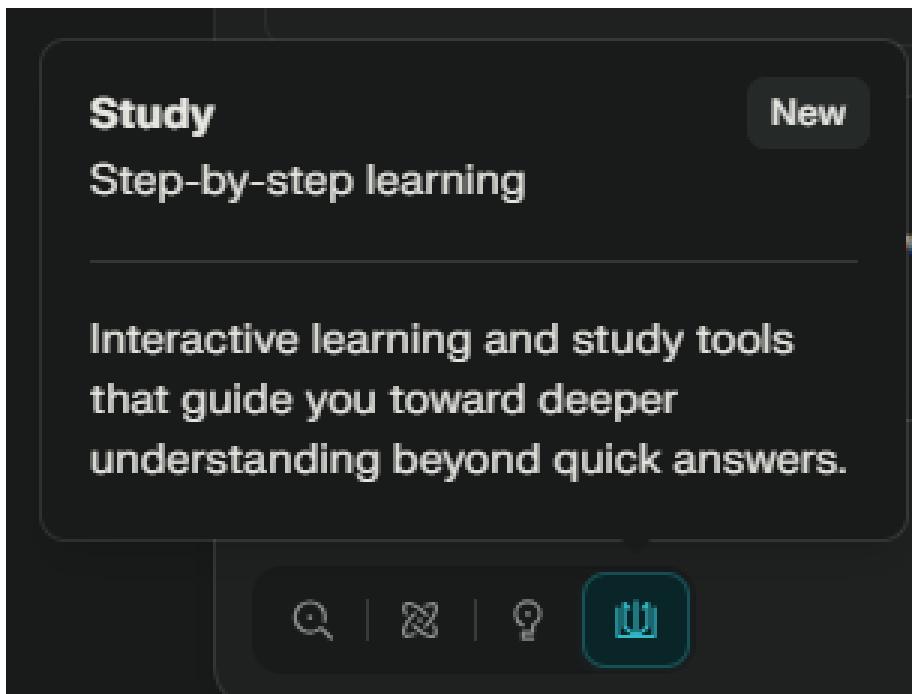


In-Class Activity



Use the Six Sigma Mentor

Tip use Study Mode: Post your CTQ proposal at your **team private channel**



10 minutes

CTQ Tree for **Consistent High-Quality Support**

Critical Need: Consistent high-quality support that provides an effective problem resolution process



Bad Support Example

PHILIPS Products Support What are you looking for? 2-year warranty 7-day returns Free delivery on orders over \$100 My Philips Welcome Rafael Barros Order history Address book My subscriptions All my products Register product Log out

All my products

DesignLine Ultra Slim Smart LED TV



55PDL8908S/12

[Write a review >](#)

DesignLine Edge Smart LED TV

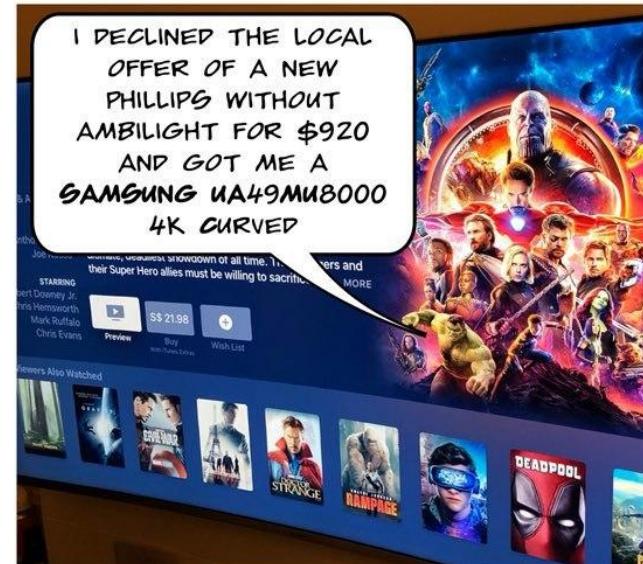
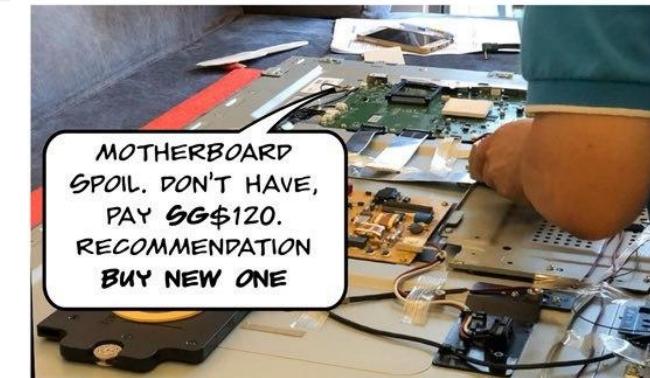
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[Write a review >](#)

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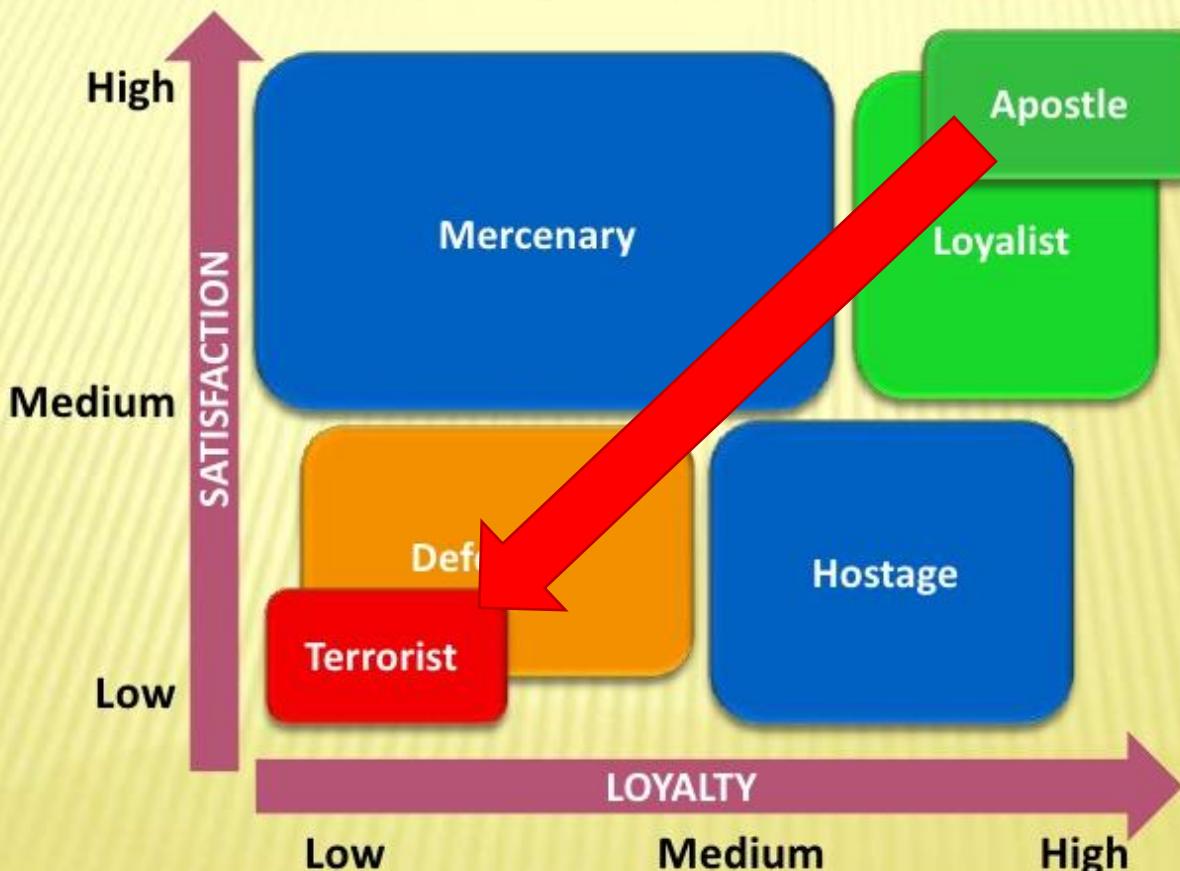
What are you looking for? Where can I find my model number? Or navigate to your product via below images



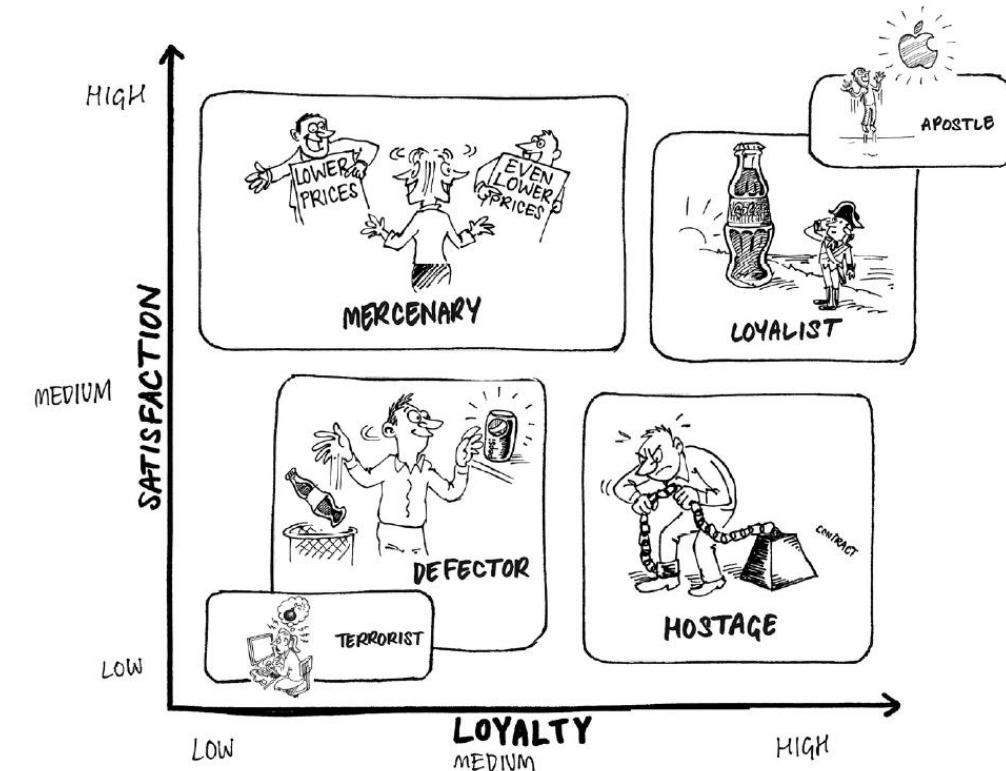
Recall: Apostle Model



CONSUMER BEHAVIOR DIVERSITY – CUSTOMER TYPES



MODEL 42: Customer Loyalty, Thomas Jones and Earl Sasser (1995)



PROBLEM STATEMENT

What is the relationship between customer satisfaction and customer loyalty?



Journey to Satisfaction

Criteria	Service	Support
ITIL Definition	"A means of delivering value to customers by facilitating outcomes customers want to achieve, without the ownership of specific costs and risks".	"The process of resolving incidents and service requests and providing an interface for other activities such as change, problem, and configuration management".
Timing	Provided before, during and after the purchase	Usually provided after the purchase
Focus	Providing positive interactions delivered by a caring person	Providing effective assistance and problem-solving in a way that is customer-centric and responsive to customer needs
Expectations	Customers expect to be treated with respect, courtesy, and empathy , and they expect their needs to be understood and addressed effectively . The quality of interactions between the customer and the service or support provider is critical.	



Journey to Satisfaction

Service: range of designed interactions aimed to **enhance the experiences and improve the relations** with all stakeholders.
(Relational)



Support: range of designed interactions provided to assist stakeholders in **making cost effective and correct use of a product.**
(Technical)



Recall SERVQUAL



Customer

**Customer
Expectation (CE)****Customer
Perception (CP)****GAP 5**

Staff

Service Delivery**External
Communications****GAP 4**

Management

**Service Quality
Specification****GAP 1****GAP 3****GAP 1: Knowledge
GAP 2: Standards
GAP 3: Delivery
GAP 4: Communications
GAP 5: Service**Chief
Executives**Management
Perception (MP)****GAP 2**

GAP	Description
The Knowledge GAP GAP 1	Chief Executives are not aware or have not correctly interpreted the customer's expectation in relation to the company's value proposition.
The Policy GAP GAP 2	Managers incorrect translation of Chief Executive's expectations of the company's value proposition.
The Delivery GAP GAP 3	Staff incorrect interpretation of management expectation of the service specification. Lack of staff training or management sensors for service delivery quality.
The Communication GAP GAP 4	Marketing / Sales over-promising in advertising or pre-sales raising customer expectations that does not match the service delivery or product quality.

CSISG Structural Model



Perceived Product Quality
Perceived Product Customisation
Perceived Product Reliability

Perceived Product Quality*

Perceived Service Quality*

Perceived Service Quality
Perceived Service Customisation
Perceived Service Reliability

Perceived Overall Quality*
(After Recent Experience)

Price / Quality
Quality / Price

Customer Expectations
(Predicted Quality
Before Recent
Experience)

Predicted Overall Quality
Predicted Customisation
Predicted Reliability

Perceived Value

Customer Satisfaction

Overall Satisfaction
Ability to Meet Expectations
Similarity to Ideal

Complaint Behaviour

Customer Complaints

Satisfaction

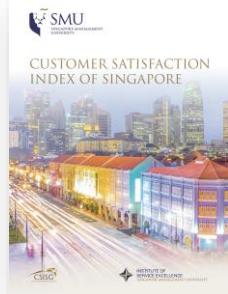
Customer Loyalty

Loyalty

*Note: For the Video Streaming Services sub-sector, attributes on Perceived Overall Quality are asked at the overall level and not broken down into Perceived Product and Service Quality.

COMPLETED PRACTICE AND OUTREACH PROGRAMMES

- Institute of Service Excellence
- DHL-SMU Analytics Lab
- DHL-SMU Green Transformation Lab



Consistency



The key role of Consistency



**“Consistency is the belt that fastens excellence in position.
If you don’t do it repeatedly, you’ll not excel in it.”**

The Great Handbook of Quotes

Israelmore Ayivor

Agenda

01 Review / Wooclap

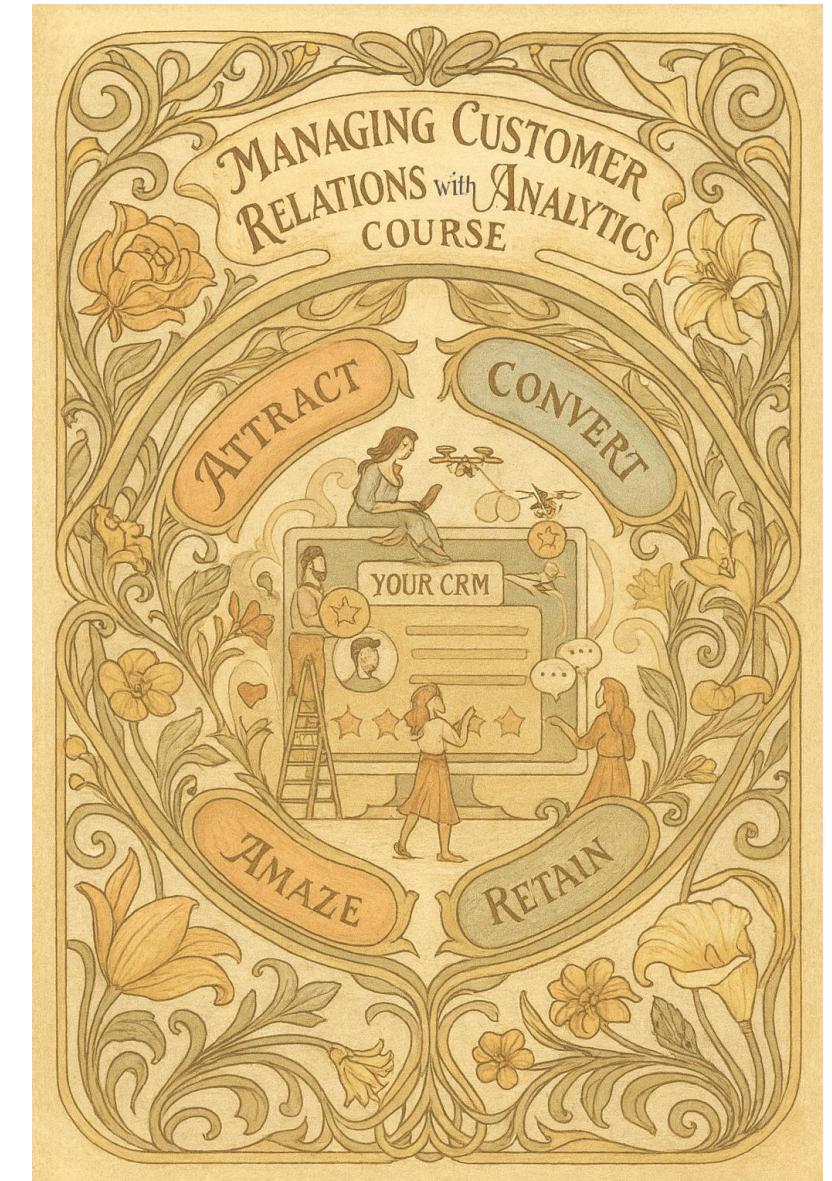
02 High Quality Support

03 Support Models



04 Customer Experience

05 Measuring Consistency



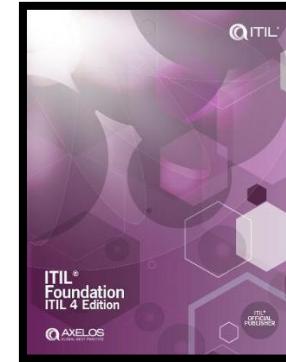


Enterprise Solution Frameworks Overview

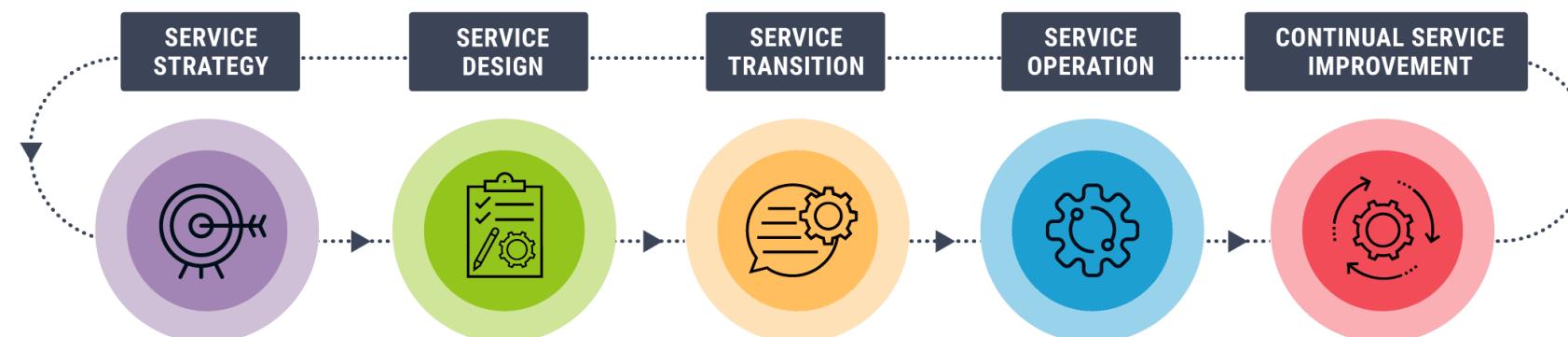


ITIL (Information Technology Infrastructure Library)

- Comprehensive framework for IT service management
- Focuses on aligning IT services with business objectives
- Key principles: value focus, continuous improvement, service lifecycle management
- Enables standardized service delivery and operational excellence



ITIL Processes



ITIL version 3.0



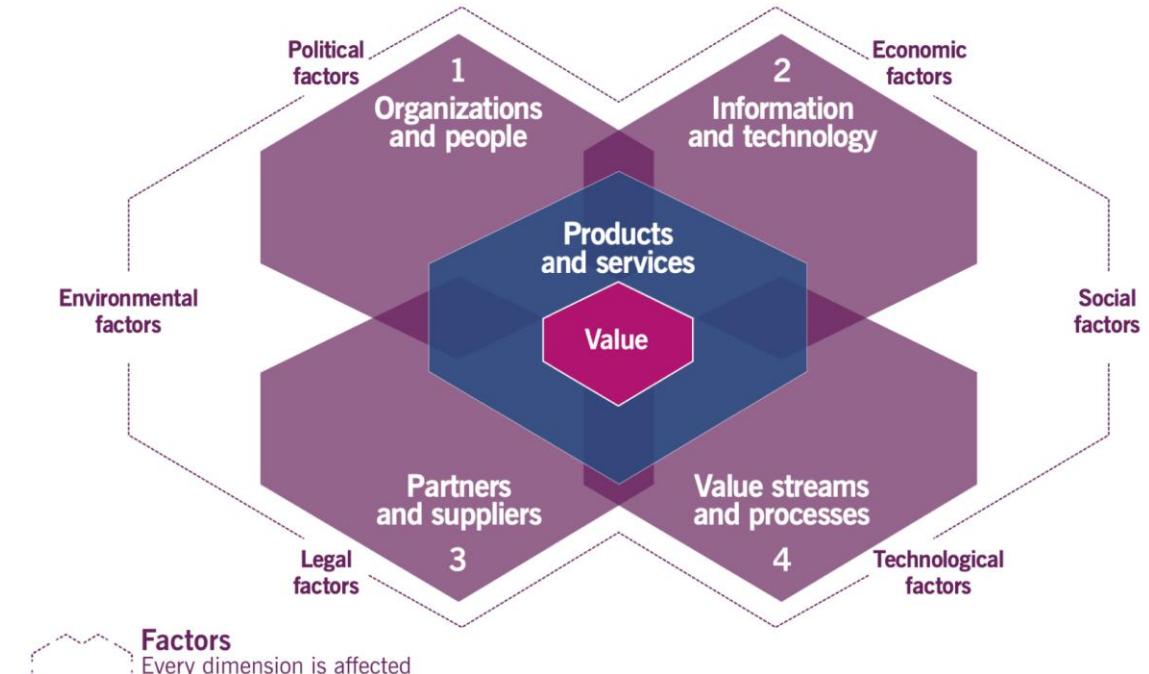
ITIL version 4.0 – IT Information Library

ITIL (Information Technology Infrastructure Library) is presented as a set of best practices for IT service management, aligning IT services with business needs.

Focus: Aligning IT services with the needs of the business

Ownership: Since 2021, ITIL has been owned by PeopleCert.

Compliance: Used to demonstrate compliance and measure improvements



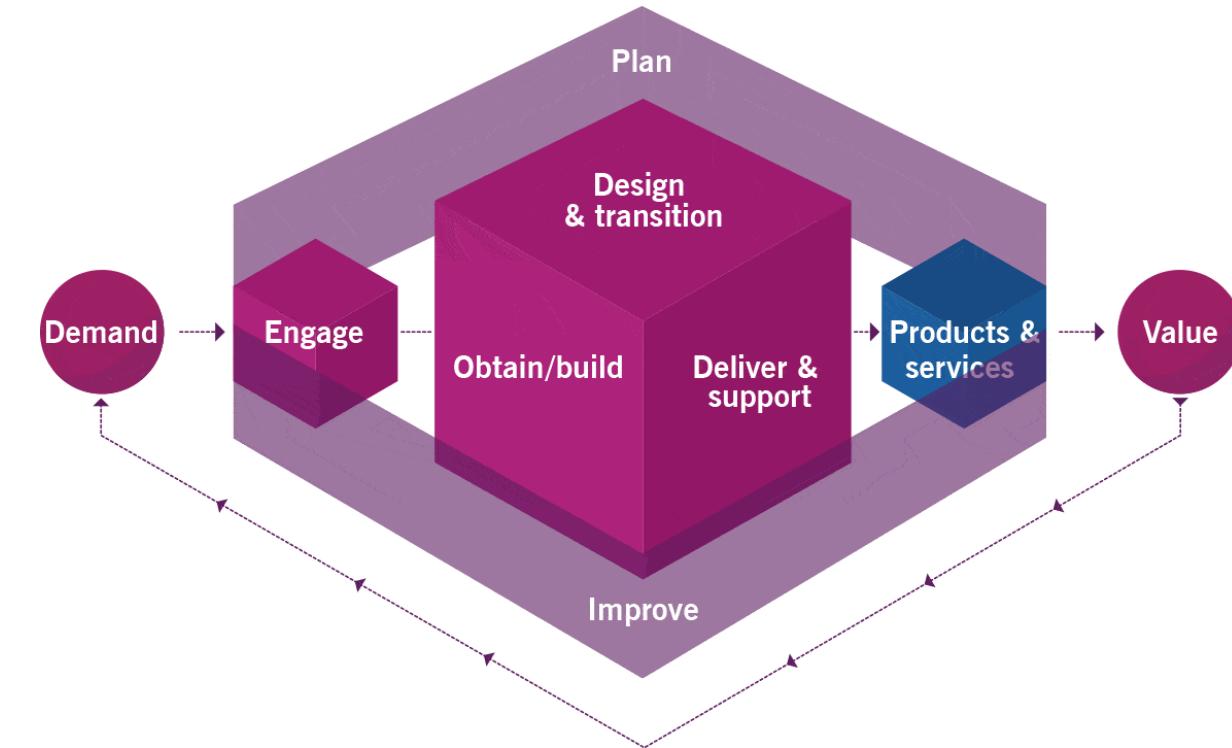
ITIL version 4.0



ITIL Service Value Chain Activities

Service Value Chain (SVC) - Six Key Activities:

- **Plan:** Defines policies and organizational direction
- **Improve:** Focuses on continual service enhancement
- **Engage:** Manages stakeholder relationships
- **Design & Transition:** Creates and modifies services
- **Obtain/Build:** Acquires and develops components
- **Deliver & Support:** Provides and maintains services

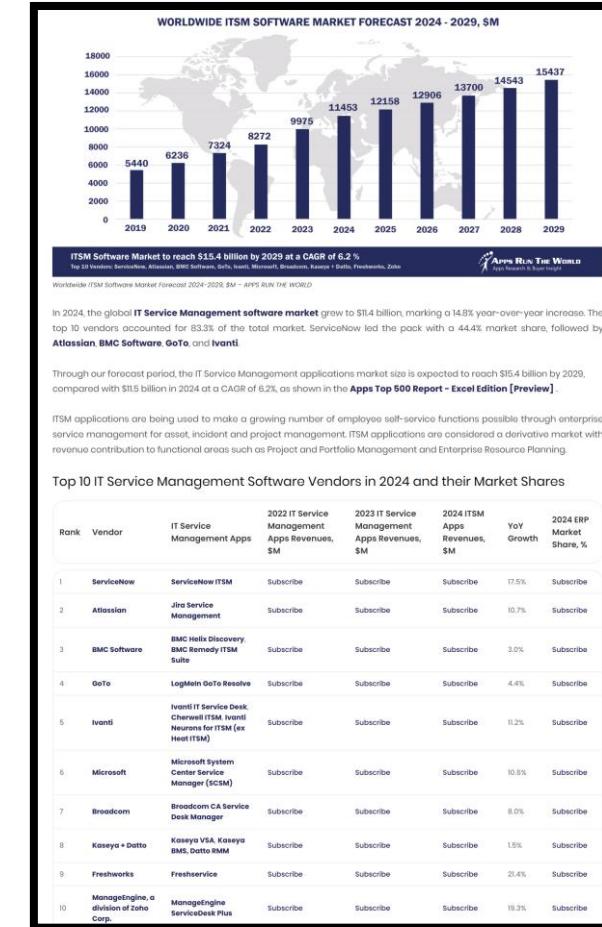


Apps that runs the world



Top 10 – ITSM Vendors

ITSM Platform	Provider	Enterprise Adoption (2024)
ServiceNow ITSM	ServiceNow, Inc.	Dominant in large enterprises (~44% market share); end-to-end platform for service requests, incidents, changes, etc., with extensive workflow automation.
Jira Service Management	Atlassian	Second largest ITSM user base; popular for companies leveraging agile practices. Integrates with development and DevOps tools for DevOps-centric support.
BMC Helix (Remedy)	BMC Software	Long-established ITSM suite (top 3 vendor) used in many global firms, often those with legacy on-premise needs. Evolving into Helix (cloud-based) for modern use.
Ivanti Service Desk	Ivanti (Cherwell)	Widely used in mid-to-large organizations, particularly those that adopted Cherwell or Ivanti's ITSM; among top 5 vendors. Focuses on unified endpoint and service management.
Freshservice	Freshworks	A growing cloud ITSM tool seeing rapid adoption (21% YoY growth in 2024), especially in mid-enterprise segments. Emphasizes ease of use and quick deployment.



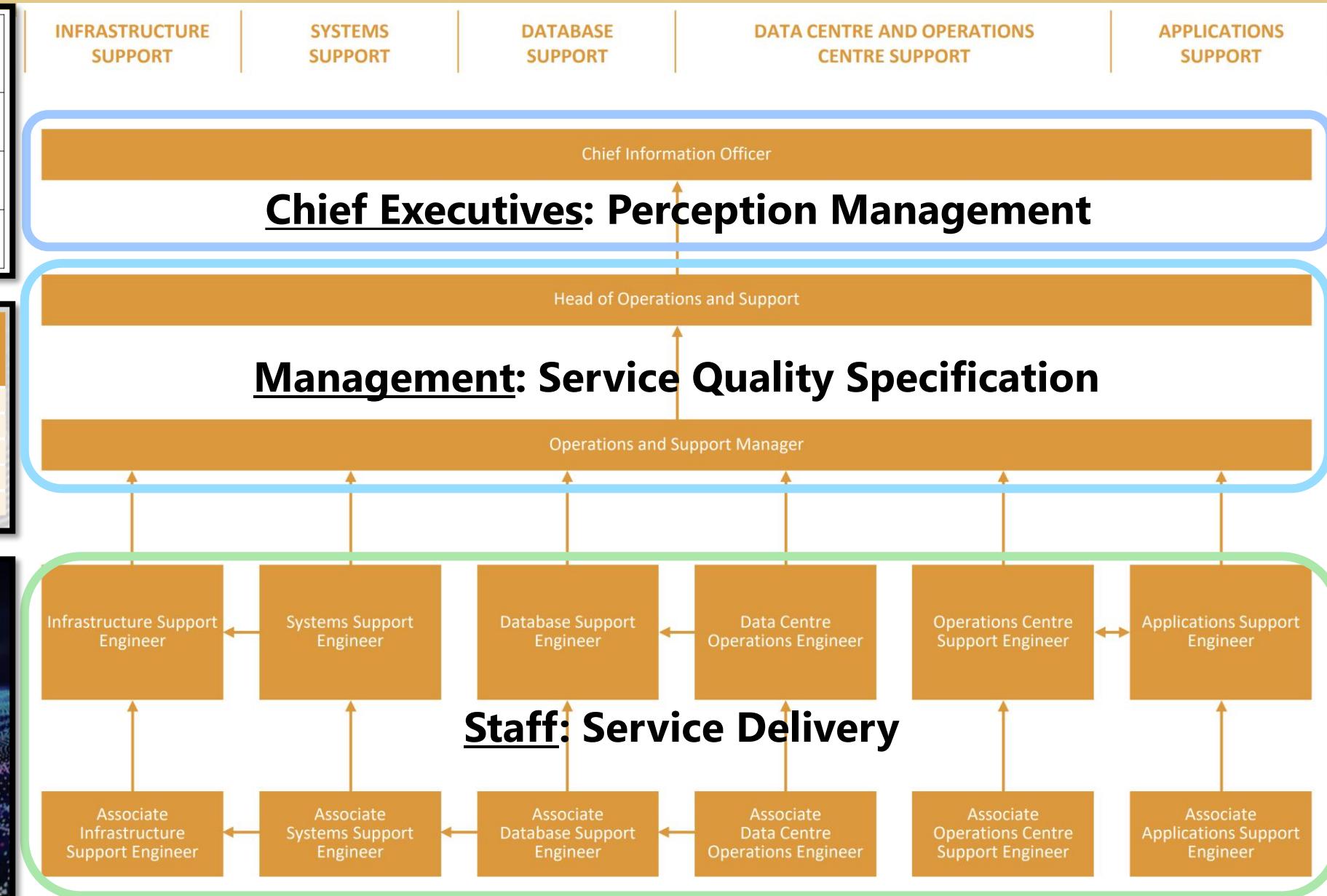
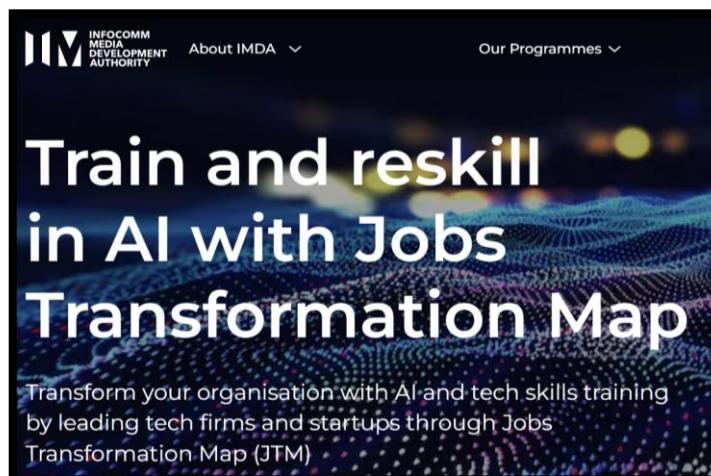
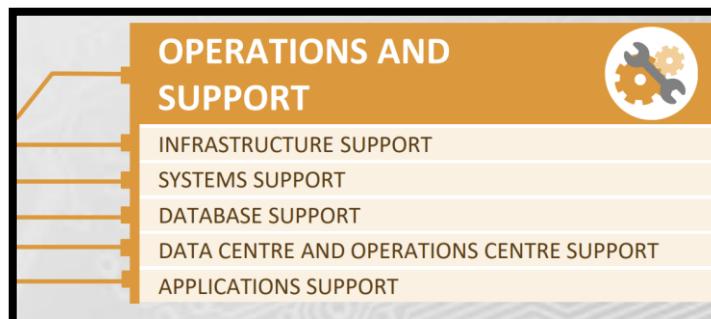
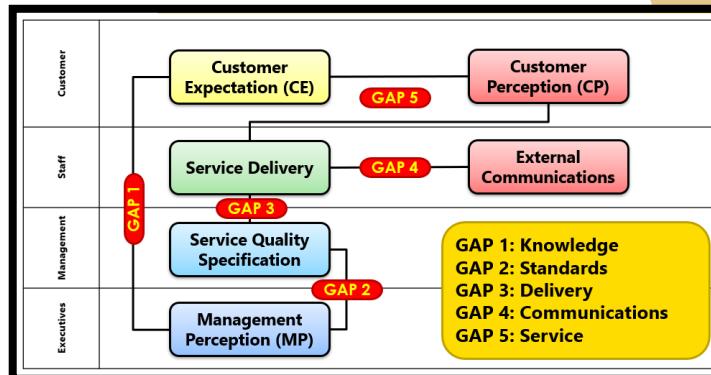
New

In-Progress

Escalated

Closed

Operations and Support (2023)



Service Units at SMU

Unit	Service description
Integrated Information Technology Services (IITS) – IT Help Centre	Central IT service desk for account/access, network/connectivity, email, collaboration tools, classroom/event tech, software and devices; requests via phone, email, and online portal
School Dean's Office	Accepts and triages students service requests, typically for academic governance, Programme administration, faculty/student matters, and school-level operations, routing specialized items to the relevant Programme.
Student Services Hub	One-stop counter for student administrative services such as enrolment letters, academic summaries, student card replacement, concession cards, locker rental, and payment guidance
Office of Campus Infrastructure and Services (OCIS) – Facilities Management & Services	Campus fault reporting and facilities maintenance requests via 24-hour hotline and helpdesk email; handles building operations and repairs
OCIS – Space Planning and Management	Requests related to space allocation, room/space usage planning, and space administration on campus
OCIS – Campus Development	Requests for campus development projects and infrastructure works coordination
OCIS – Leasing Business	Requests for conference bookings, retail space leasing, car park facilities, and hostel/faculty housing arrangements
Office of the Registrar	Academic administration requests including certification letters, academic summaries, registration and examination matters
Office of Finance	Student billing, payments, and loan-related service inquiries through finance support channels
Student Wellness Centre and Student Care	Requests for counselling, well-being support, and student care assistance across wellness services
Career Centre (Dato' Kho Hui Meng Career Centre)	Career advisory and placement service requests for students and graduates

SMU Support Units Survey



The Journey to Satisfaction

With **your project team**, discuss about the overall quality of the of the Support Units at SMU.

Individually, complete the [Support Units Evaluation Survey](#)



15 minutes

Support Units Evaluation Survey



Agenda

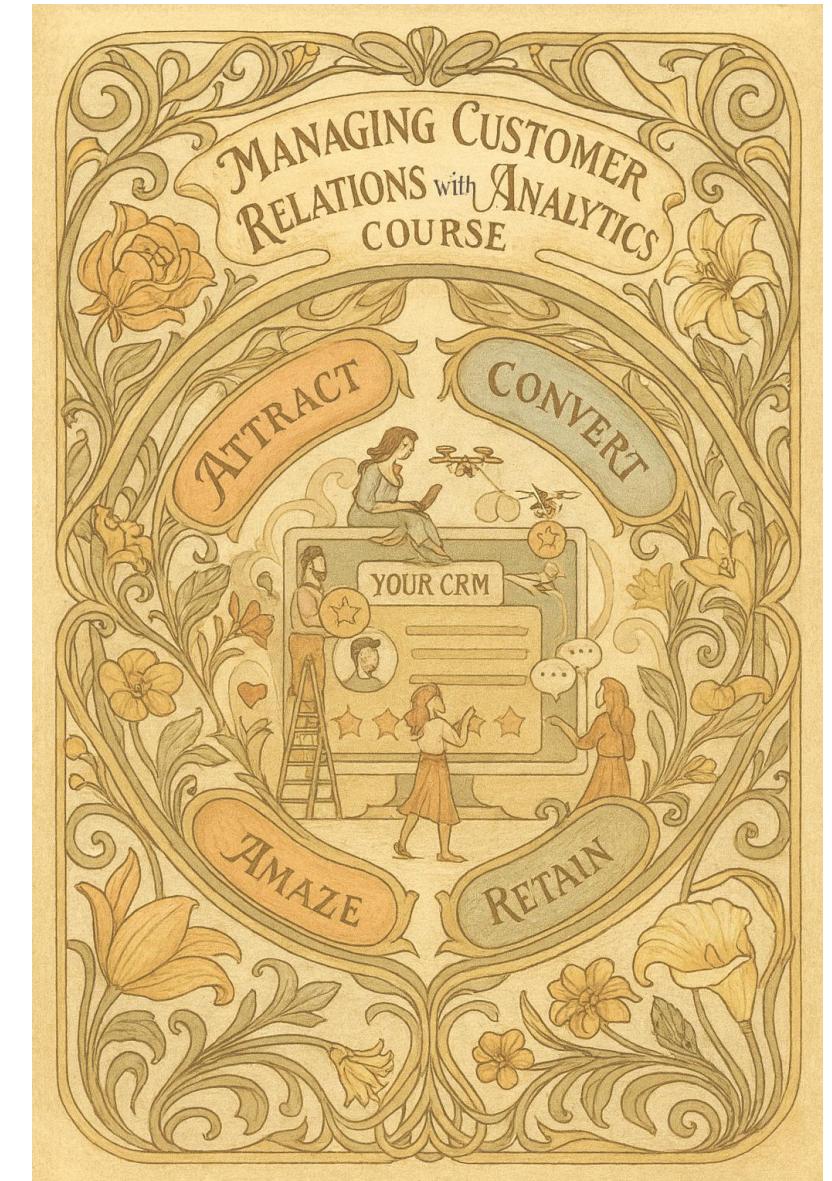
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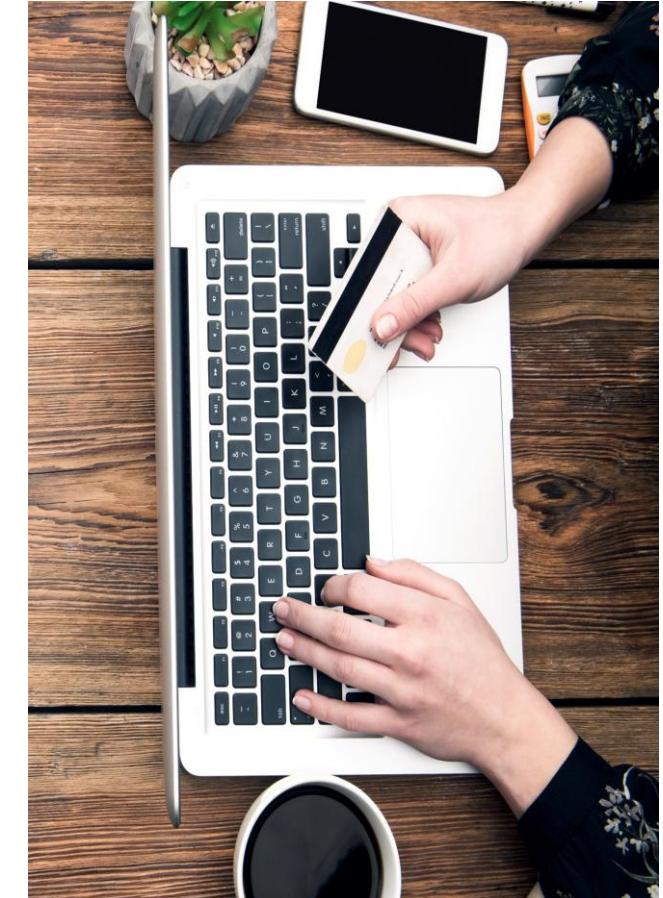
03 Support Models

04 Customer Experience 

05 Measuring Retention



Customer experience (CX) is about the customer's perceptions and related feelings caused by the one-off and cumulative effect of interactions.



OMNICHANNEL EXPERIENCE MANAGEMENT

Exceed customer expectations. Everywhere.

Transform complex customer data from various touchpoints into actionable insights, enabling businesses to deliver exceptional customer experiences across all channels. Drive loyalty, satisfaction, and overall business performance.

- + Collect and unify data from multiple sources, including surveys, calls, chats, social media, and reviews, providing a 360 view of the customer experience
- + Leverage advanced AI and Natural Language Processing to analyze diverse data types, offering real-time insights that allow organizations to make data-driven decisions and proactively address customer needs



Member since
2022



**Customer
EXPERIENCE
MATTERS[®]**



CX Matters – 10 Years Shift

Thinking back to the 2015 CX video, *how do you think consumer expectations have changed in the past decade?*

Key Trends & Team Assignments:

- **Teams 1 & 2:** Decline in Loyalty
- **Teams 3 & 4:** Back to Basics
- **Teams 5:** Decline in Feedback
- **Team 6:** AI Skepticism
- **Team 7, 8:** Privacy vs. Personalization



With your Team:

- Why is this trend happening?
- What are the risks and opportunities for businesses?
- How should businesses respond to this trend?

Post a short summary (3-5 sentences) in your private team channel on Microsoft Teams.

- Trend Name
- Key Insight #1
- Key Insight #2
- Recommendation for Businesses

Which trend do you think will have the biggest impact in the next five years? Why?



10 minutes

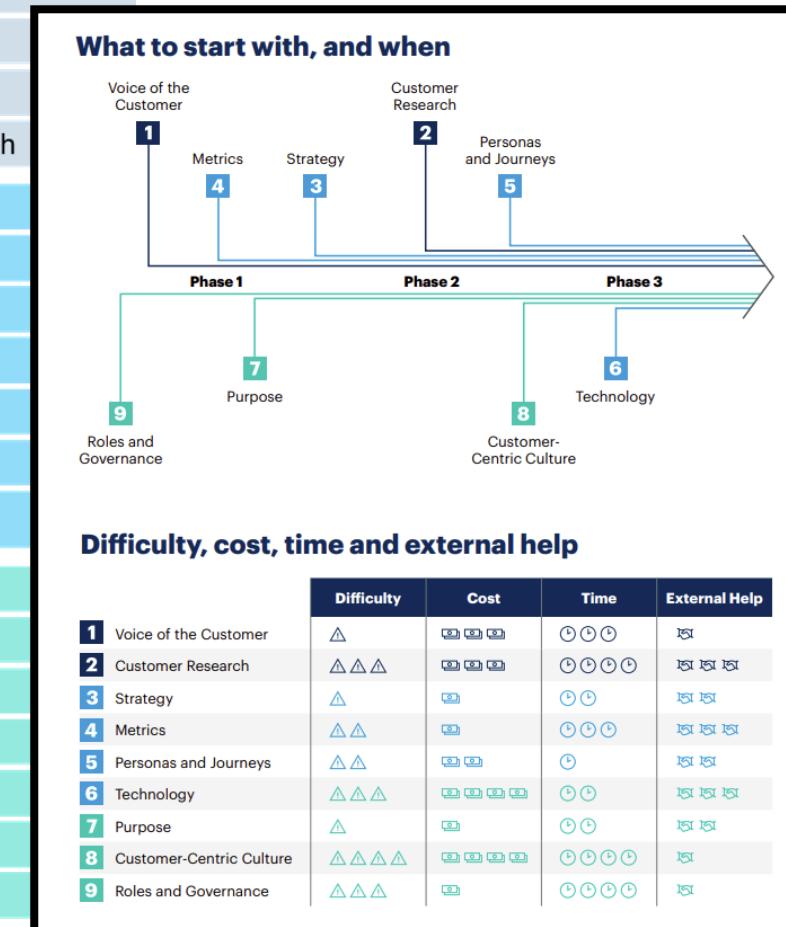
Gartner Customer Experience Capability Model

Pillars

Capabilities

Activities

Understand Customers 	1 Voice of the Customer	Build a quant and qual listening portfolio Leverage data to create customer insight
	2 Customer Research	Take action based on customer insight Build a customer research competency Inform CX projects through customer research
Set Customer Experience Strategy 	3 Strategy	Create a winning CX strategy Prioritize CX improvement opportunities
	4 Metrics	Measure customer experience Keep score in achieving strategic goals
	5 Personas and Journeys	Develop personas and journey maps Integrate UX into CX
	6 Technology	Align and prioritize tech investments
	7 Purpose	Inspire motivation Justify the investment
	8 Customer-Centric Culture	Foster a customer-centric mindset Enable customer-centric behaviors
Coordinate CX Across the Enterprise 	9 Roles and Governance	Manage CX team structure Build CX team capabilities Collaborate with business partners



GenAI Use-Case Comparison for Customer Experience

GenAI and CX

No.1**76%**

GenAI is the technology innovation priority for applications leaders for the next two years¹

Expect increased efficiencies and cost savings from GenAI for CX²

70%

Of organizations are still at early-stage levels of customer maturity³

Gartner

¹ Source: 2024 Gartner Enterprise Application Leaders Signature Survey² Source: 2024 Gartner "Does GenAI Improve CX?" Survey³ Source: The IT Score for Customer Experience

3 © 2024 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner is a registered trademark of Gartner, Inc. and its affiliates.



The Big Picture: Success Journey

Awareness

Intent

Own

Promote

Find

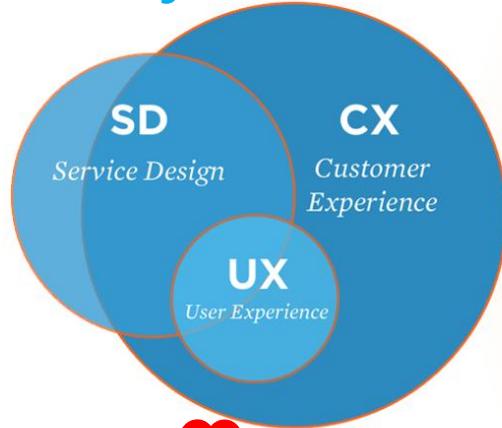
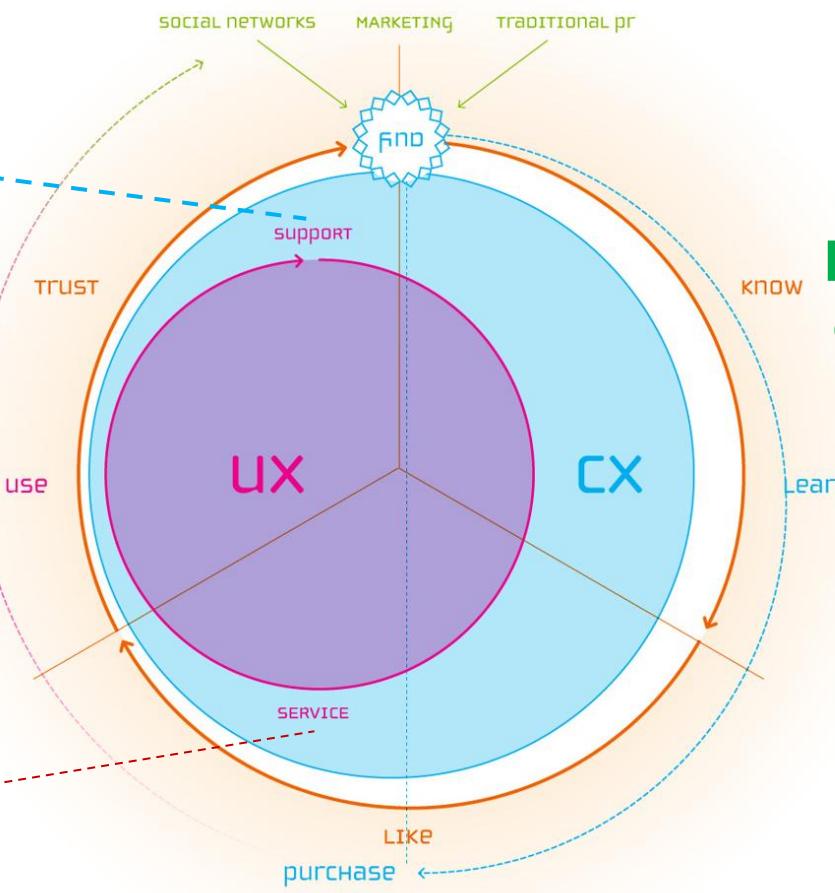
Learn

Purchase

Like

Use

Trust

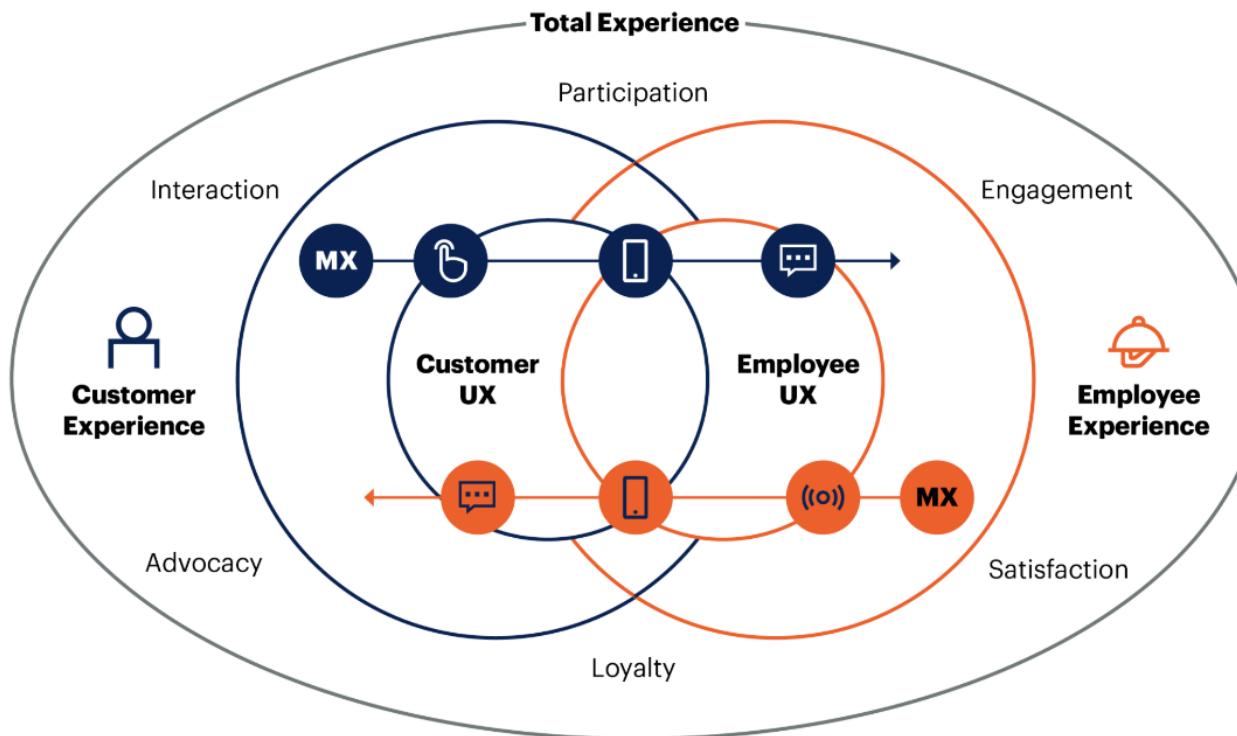
**Support
Quality****Service
Quality****Product
Quality**

The Big Picture



Total Experience

Total Experience Interlinks the CX, EX, UX and MX Disciplines



Source: Gartner
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Gartner®

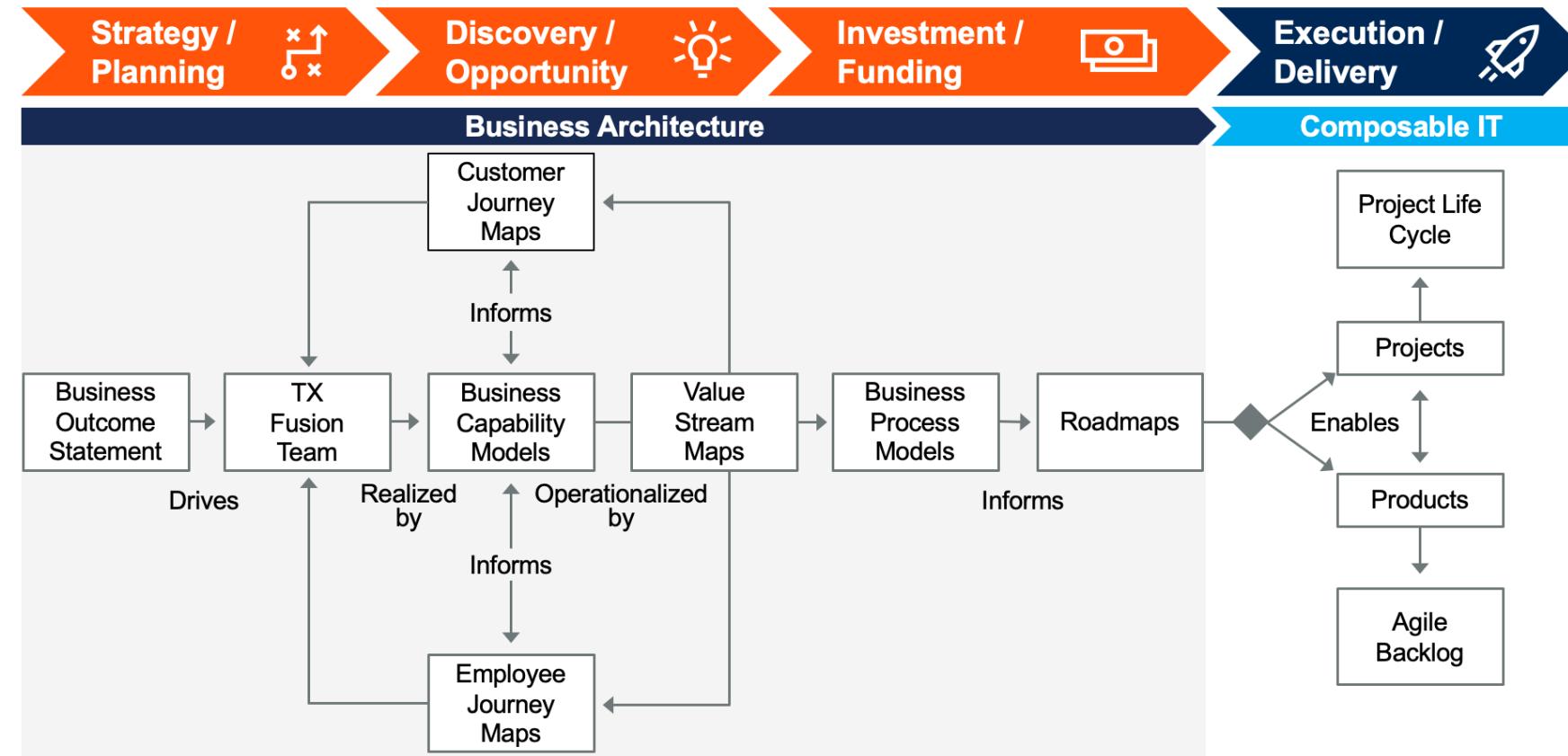
TX – Total Experience

CX – Customer Experience
EX – Employee Experience
UX – User Experience
MX – Multi Experience



Business Architecture

TX Starts With Business Architecture



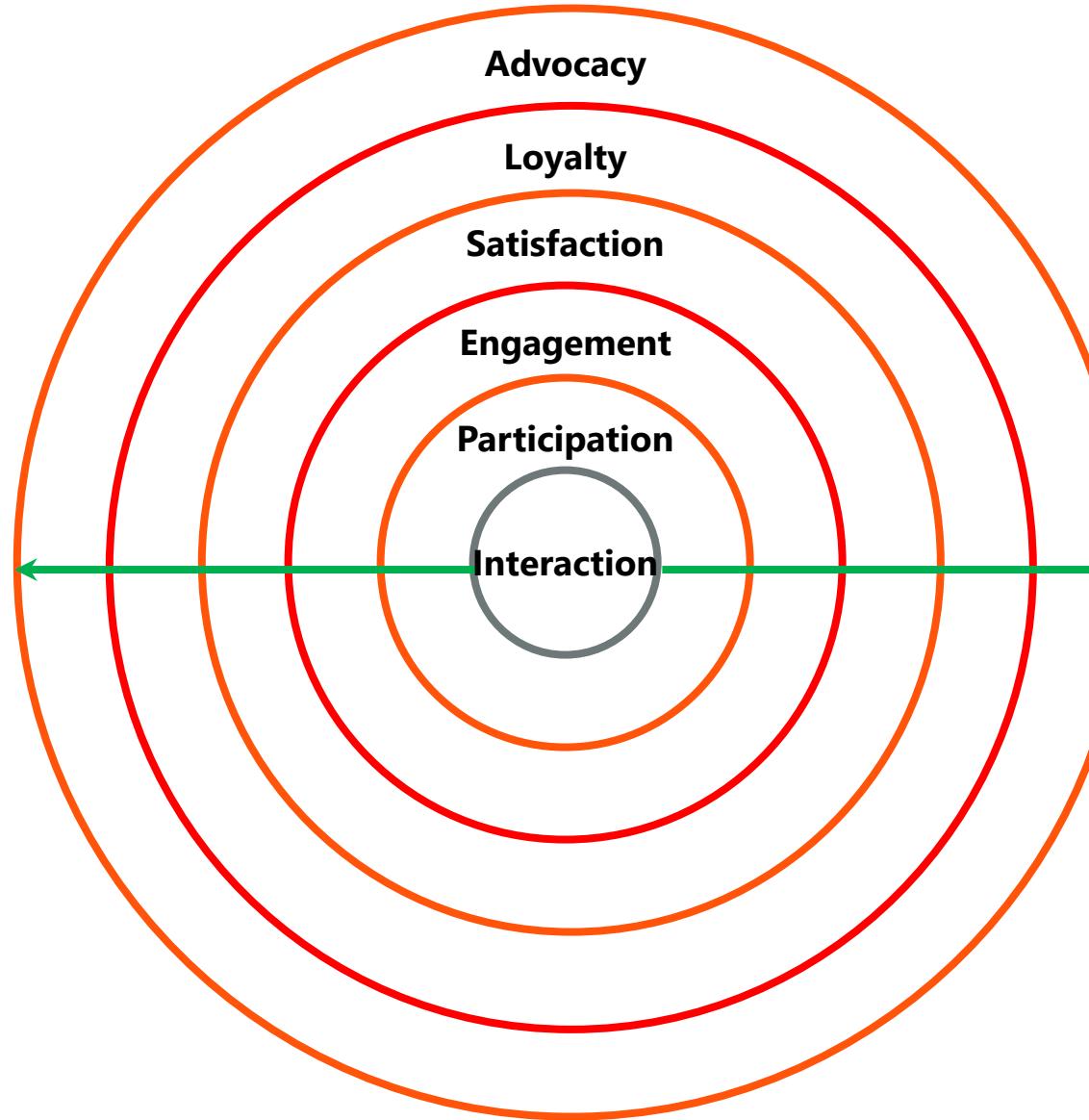
Source: Gartner

742226

87% of customer-facing employees sincerely want to create a superior experience for customers, however...



Customers use a variety of channels to resolve issues and use multiple channels throughout a given journey (**avg 3-4**)



...57% of employees do not believe their company is enabling them to do so in the most effective way



Employees with a high-quality UX are **at least 1.5 times** more likely to have high levels of work effectiveness, productivity, intent to stay and discretionary effort

Agenda

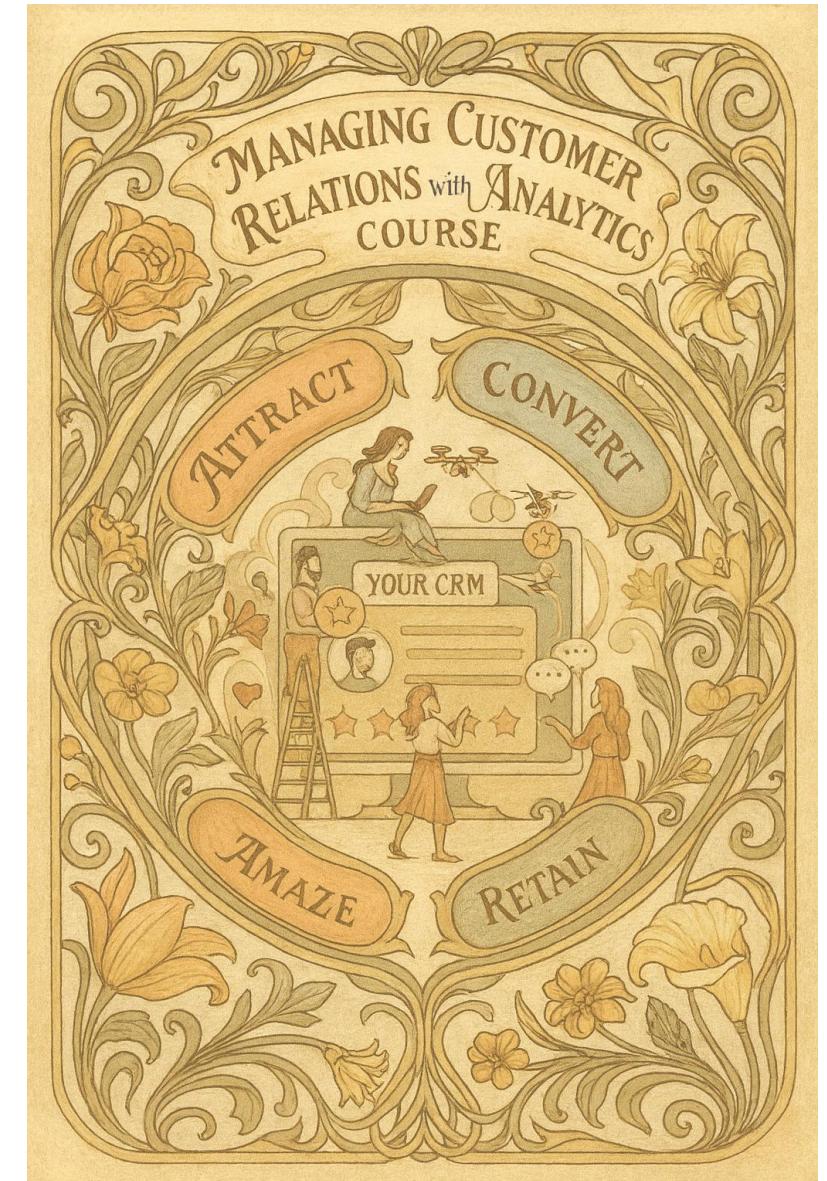
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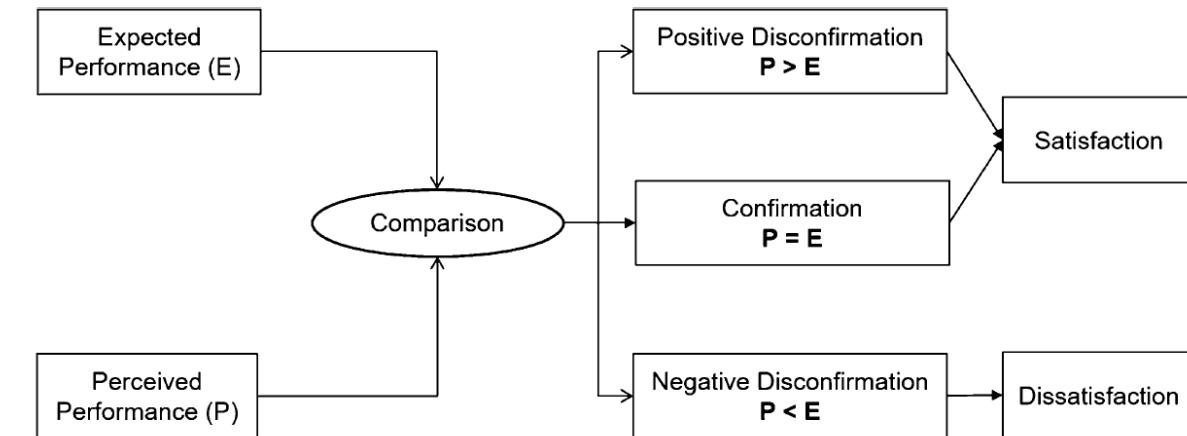


Intentions vs Actions

Intentions are based on surveys
(Expected Performance)

- Repurchase
- Cross-buying
- Positive Word-of-Mouth
- Price increase acceptance/tolerance

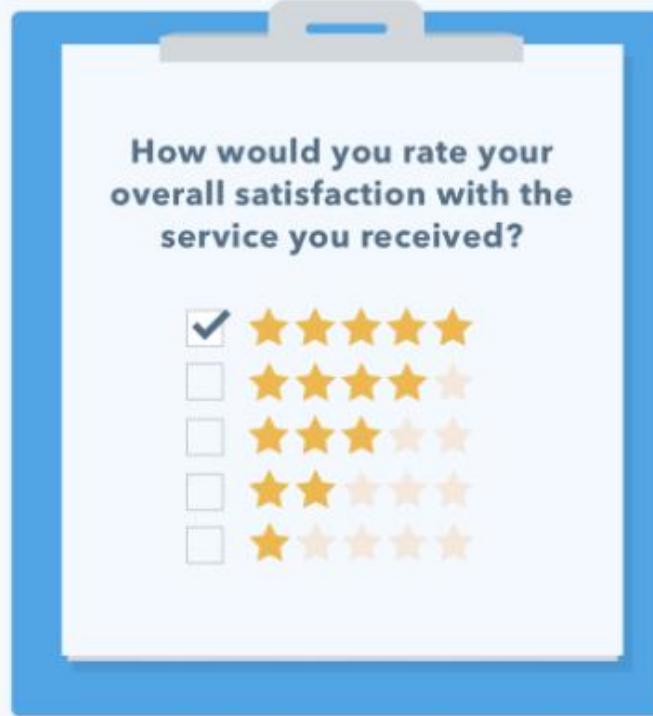
Actions are based on data
(Perceived Performance)



Customer Retention Metrics

Dimension	Expected Performance (surveys)	Perceived Performance (data)
Repurchase	<i>Are you planning to buy product x again?</i>	<ul style="list-style-type: none">Repurchase rateLarger cart
Cross-buying	<i>Are you planning to buy other products?</i>	<ul style="list-style-type: none">Range of product categories purchasedDollar amount spent on additional product categories
Positive Word-of-Mouth	<i>Will you recommend product x to your friends?</i>	<ul style="list-style-type: none">Number of referralsQuality of referrals
Price Increase Tolerance	<i>Would you tolerate a x% price increase?</i>	<ul style="list-style-type: none">Number of customers leaving/staying after x% price increase

CSAT: Customer Satisfaction



"How would you rate your overall satisfaction with the service you received?"

Changi Airport Group delivers a first class experience to every passenger

Singapore Changi Airport was crowned the World's Best Airport at the 2013 Skytrax World Airport Awards. It is also a 2012 winner of the National Infocomm Awards (NIA) for the Most Innovative Use of Infocomm Technology in the private sector. The centrepiece of its success is a self-named solution called OneChangi, which uses technology to transform business practices and orchestrate high standards of service. Salesforce.com plays a key role and gives Changi Airport Group (CAG) - the manager of Changi Airport - the tools to deliver a first class customer experience to every passenger.

NPS: Net Promoter Score



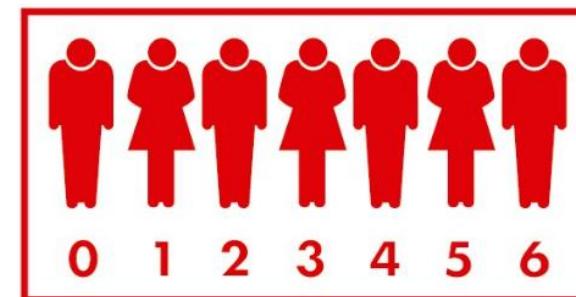
Net Promoter Score

The Net Promoter Score is an index ranging from **-100 to 100** that measures the willingness of customers to **recommend a company's products or services to others**.

Customers are asked one key question: "On a scale of 0-10, how likely are you to recommend our company/product/service to a friend or colleague?"

Based on their rating, customers are grouped into three categories:

- **Promoters** (score 9-10): Loyal enthusiasts who will keep buying and refer others
- **Passives** (score 7-8): Satisfied but unenthusiastic customers who may switch to competitors
- **Detractors** (score 0-6): Unhappy customers who can damage your brand through negative word-of-mouth



How to calculate NPS

The Net Promoter Score (**NPS**) is determined by subtracting the percentage of customers who are **detractors** from the percentage who are **promoters**

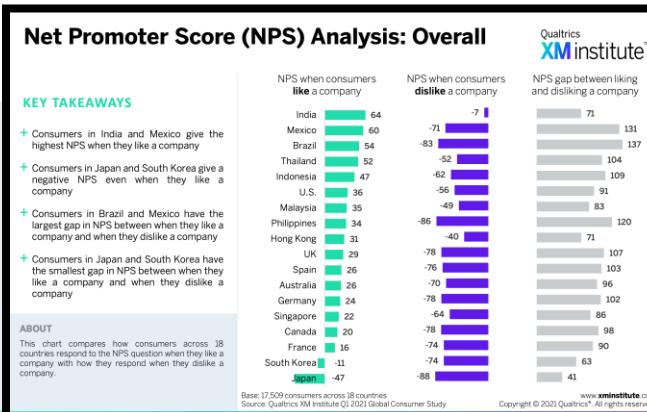


$$\text{NPS} = \% \text{ } ☺ - \% \text{ } ⌚$$

Net Promoter Score (NPS) Analysis: Singapore

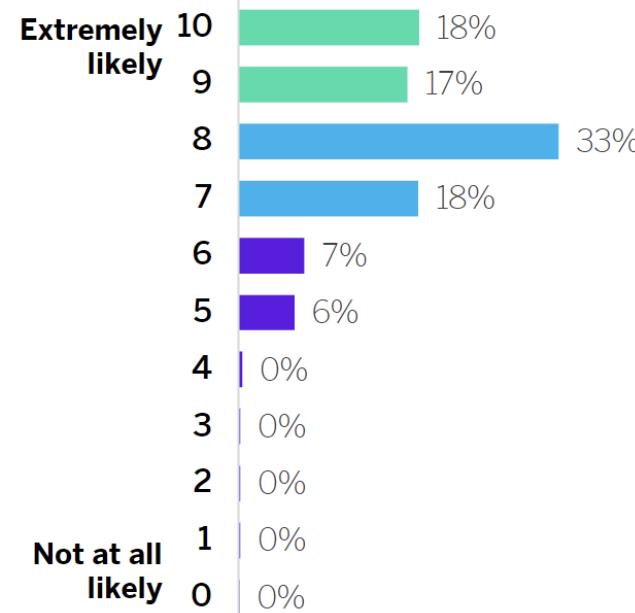
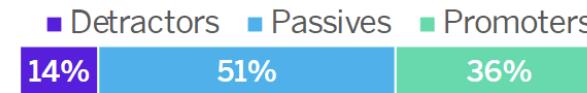
KEY TAKEAWAYS

- + There's an 86-point gap in NPS between when people like a company and when they dislike a company
- + When people like a company, they are 23 %-points more likely to be a promoter and 62 %-points less likely to be a detractor
- + The median response when someone likes a company is 8, while the median response when someone dislikes a company is 3.



Think about the companies that you **like**.
 How likely would you be to recommend them to your friends and relatives?

NPS = 22

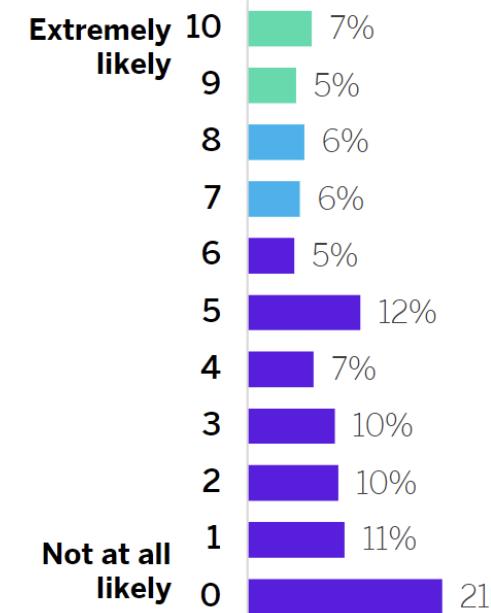
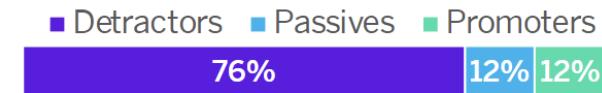


Base: 1,000 Singaporean consumers
 Source: Qualtrics XM Institute Q1 2021 Global Consumer Study



Think about the companies that you **dislike**.
 How likely would you be to recommend them to your friends and relatives?

NPS = -64



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CES: Customer Effort Score

How much effort did it take to solve your issue today?

1 2 3 4 5 6 7 8 9 10

CES Survey – 1 to 10 scale

- The **1-5 scale** – In this case, the answer options are as follows: Very Difficult – Difficult – Neither – Easy – Very Easy, and they are numbered from 1 to 5. The order can also be reversed.

How easy was it for you to solve your problem today?

Very Difficult Difficult Neither Easy Very Easy

CES Survey – 1 to 5 scale

- Emotions Faces** – While, this metric is pretty simple, it's useful if you run a lot of CES surveys for minor aspects of your product/service/website. Plus, it also makes it easy and intuitive for respondents to quickly answer. Basically, you use a Happy Face, Neutral Face, and Unhappy Face images as responses, with the Happy Face, usually meaning there was little effort required.

How easy was it for you to sign up for our trial?

RENTELY

Customer Effort Score (CES) is a metric used to measure how easy or difficult it was for a customer to complete a particular task, such as making a purchase or getting help with a problem.

The metric is usually determined by asking customers a single question, such as "How much effort did you have to put in to resolve your issue?" and asking them to rate their response on a scale, such as a 5-point scale ranging from "very easy" to "very difficult."

- Customer Success/Support Metrics

Customer Support Metrics

CSAT

Customer Satisfaction



Tracking support quality

CES

Customer Effort Score



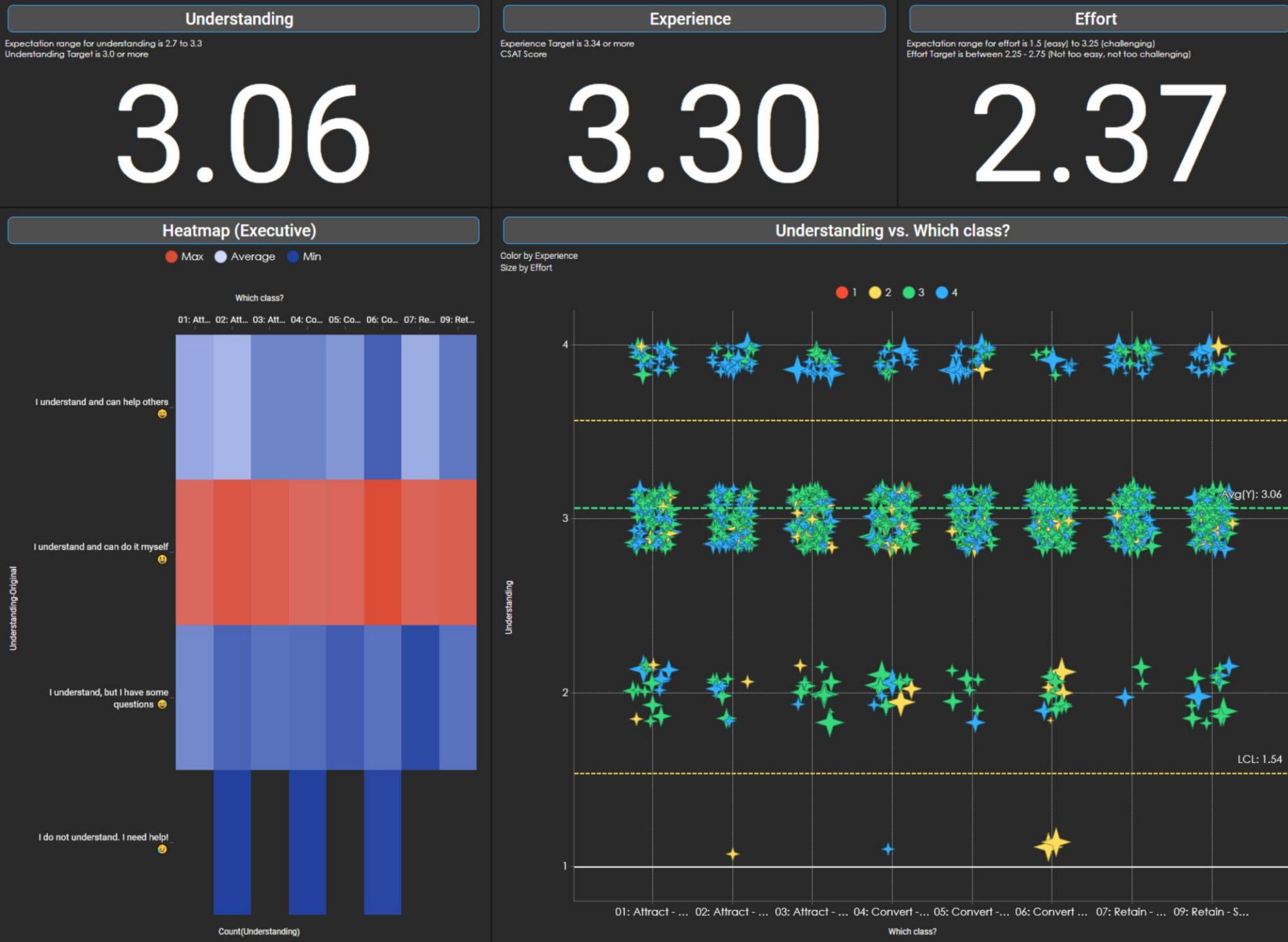
Making it easier to be a customer

NPS®

Net Promoter Score®



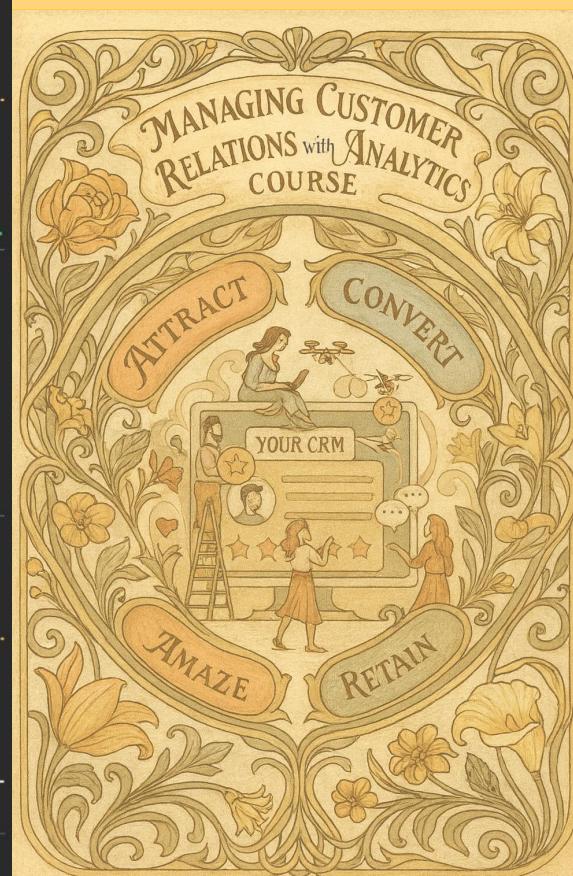
Building customer loyalty



MCRA Operational Dashboard

Axis X – Class Topic
Axis Y – Understanding

Color by **Experience**, Size by **Effort**





Guess Speaker

The 4th AUN-TEPL Symposium
AI for Personalised Learning

4. Action plan: What, Who, When

Using AI in the Continuous Improvement Loop

The Improvement Loop

1. Target and outcome
2. Root cause analysis
3. Prioritization
4. Action plan

The "improvement loop" from the book *Getting the Right Things Done* by Pascal Dennis

Technical Aids, 1984



Measuring Consistency

TECHNICAL AIDS

by
Lloyd S. Nelson

The Shewhart Control Chart—Tests for Special Causes

THREE years ago, for purposes of convenience and uniformity of application, I collected a set of tests for assignable causes (Figure 1) to be applied to Shewhart control charts for means of normally distributed data. Figure 2 is a set of comments on these tests. Deming (1982) refers to assignable causes as "special causes" in order to contrast them with what he calls "common causes". A common cause is one that affects all the points on the chart, as when a centerline is too high. A common cause is fixed by changing the system. A special cause is fixed by removing the perturbing influence that caused the out-of-control signal.

For my use, Figures 1 and 2 were printed back-to-back on 8.5" x 11" yellow card stock and issued to all areas where Shewhart charts are applied. One of the main objectives was to standardize on this schedule of tests so that discussion would be focused on the behavior of the process rather than on what test should be used. Further, control limits are

taken to be three sigma away from the mean unless specified otherwise. If it is desirable to use what otherwise might be called "two sigma control limits", test one is simply redefined to be "one point beyond Zone B."

Tests one, three, and four can be used with p , np , c , and u charts. If the distributions are close enough to being symmetrical, test two can also be used with these charts. Use binomial or Poisson tables to check specific situations.

Conditions that can cause each of these tests to give a signal are illustrated in the Western Electric *Statistical Quality Control Handbook* (1956). The serious user should consult this source. I am pleased to be able to say that the Society has given permission for readers to reproduce Figures 1 and 2 without copyright restriction.

References

- DEMING, W. E. (1982). *Quality, Productivity and Competitive Position*. Center for Advanced Engineering Study, Massachusetts Institute of Technology, Cambridge, MA, Chapter 7.
WESTERN ELECTRIC (1956). *Statistical Quality Control Handbook*. American Telephone and Telegraph Company, Chicago, IL.

KEY WORDS: Shewhart Control Charts, Tests for Assignable Causes, Tests for Special Causes, \bar{X} Control Charts

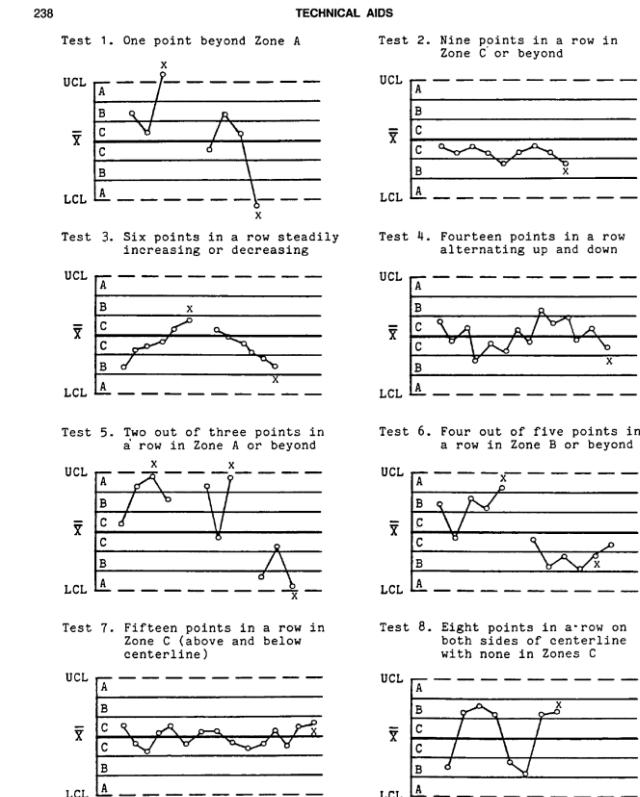


FIGURE 1. Illustrations of Tests for Special Causes Applied to Shewhart Control Charts

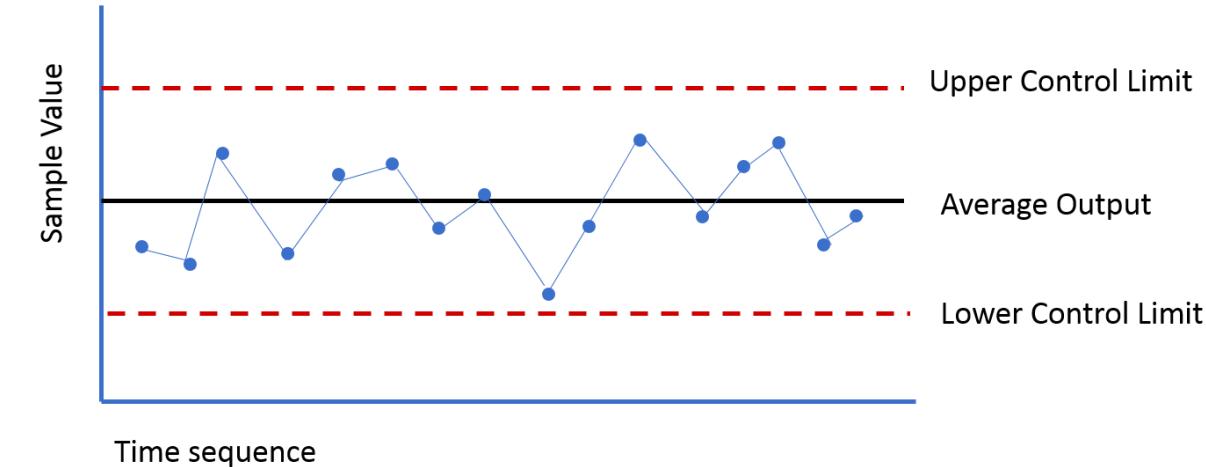


Control Chart

Control charts are visual tools used to monitor and analyze processes over time. They help determine if a process is stable and predictable or if it's being affected by special causes that need to be addressed.

Key components of a control chart:

- A center line representing **the average or mean of the data**
- **Upper and lower control limits**, typically set at 3 standard deviations above and below the center line
- **Data points** plotted chronologically



The UCL/LCL are usually set at three (3) standard deviations above the process mean.

This assumes that under normal conditions a process will fall within ± 3 standard deviations from the mean 99.73% of the time.

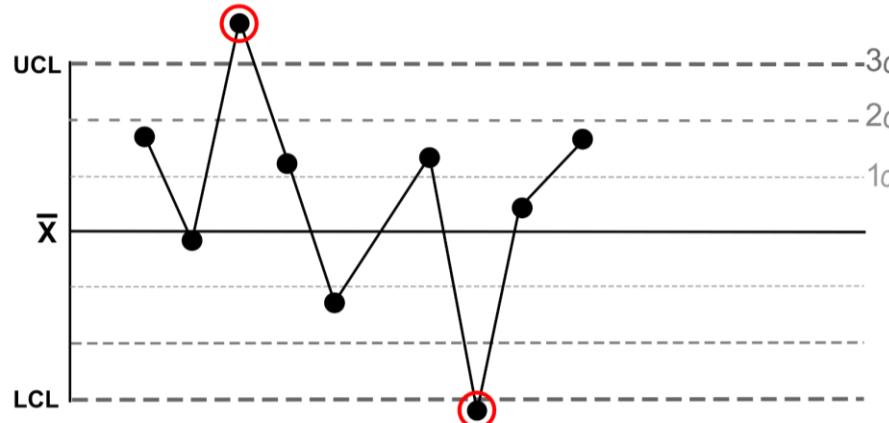
In theory, assuming a normal distribution, data within six standard deviations from the mean cover over 99.999998% of possible outcomes. 😲



Special Cases

- Nelson's Rule 1 focus on identifying when a single data point on a control chart is more than three standard deviations away from the mean. This is a strong indicator of something unusual happening in the process.
- Such an extreme value could be due to a variety of causes, including measurement errors, equipment malfunctions, or a real shift in the process. Identifying and addressing these causes quickly is crucial to maintaining process quality and reliability.

Rule 1: One point is more than 3 standard deviations from the mean



One sample (two shown in this chart) is **grossly out** of control.

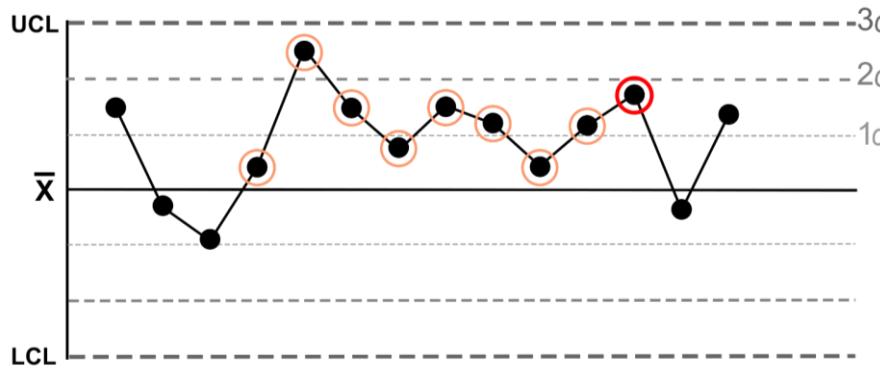
This is called a **special case**.



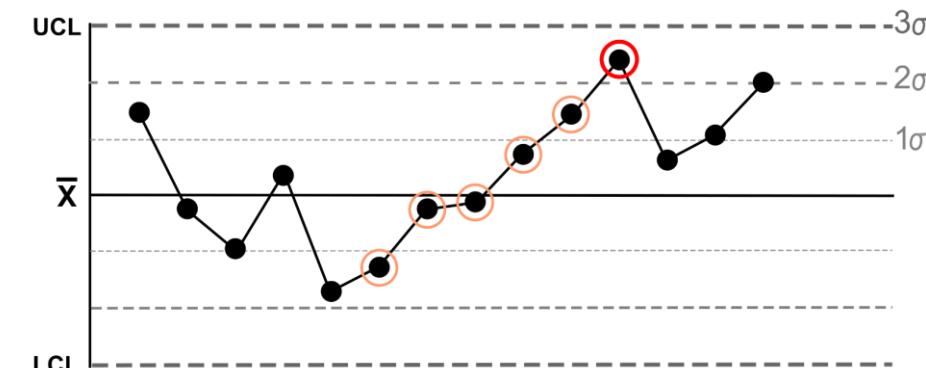
Detect bias and trends

- **Nelson's Rule 2 is used to detect a bias** in the process being monitored on a control chart. It identifies when nine consecutive points fall on the same side of the center line (which usually represents the average or target value of the process).
- **Nelson's Rule 3 identifies a trend in the process data.** It highlights when six consecutive points on a control chart all move in the same direction (either all increasing or all decreasing). This rule helps to detect when a process might be drifting away from its target or intended performance.

Rule 2: Nine (or more) points in a row are on the same side of the mean



Rule 3: Six (or more) points in a row are continually increasing (or decreasing)

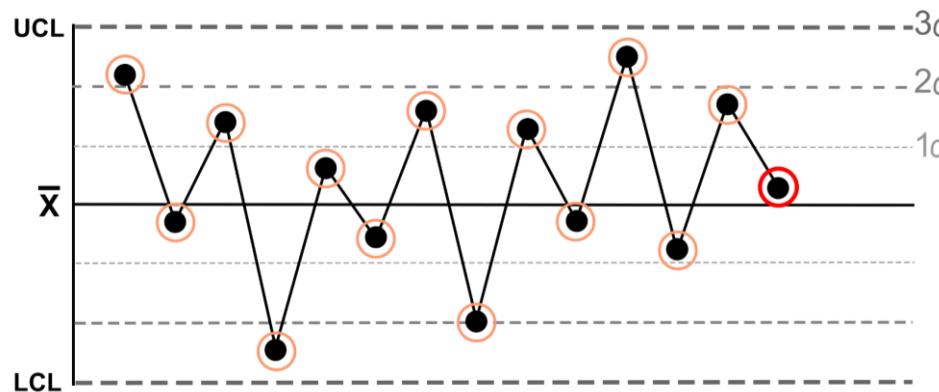




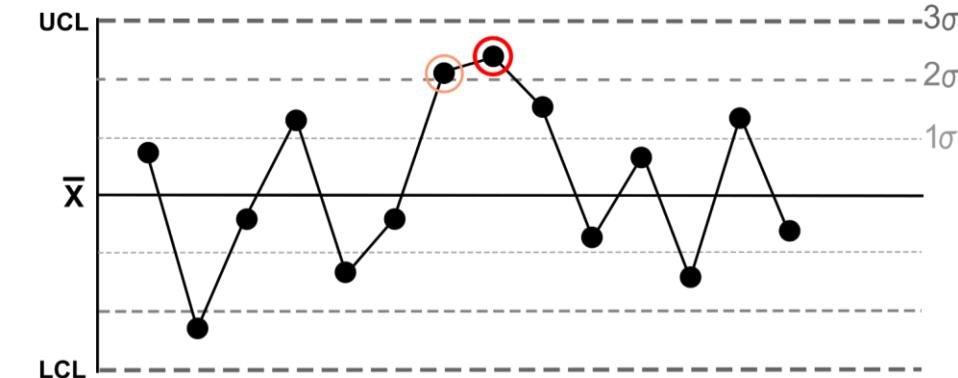
Detect oscillations and loosing control

- **Nelson's Rule 4 focuses on detecting unnatural patterns (oscillations)** in a process that could suggest instability. This rule triggers when there are fourteen consecutive points that alternate direction (up and down) on a control chart.
- **Nelson's Rule 5 helps identify subtle shifts from the mean** that might indicate a process moving towards being out of control.

Rule 4: Fourteen (or more) points in a row alternate in direction, increasing then decreasing



Rule 5: Two (or three) out of three points in a row are more than 2 standard deviations from the mean in the same direction

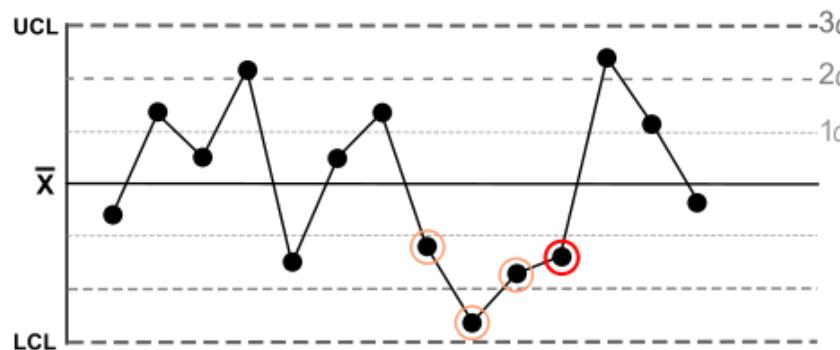




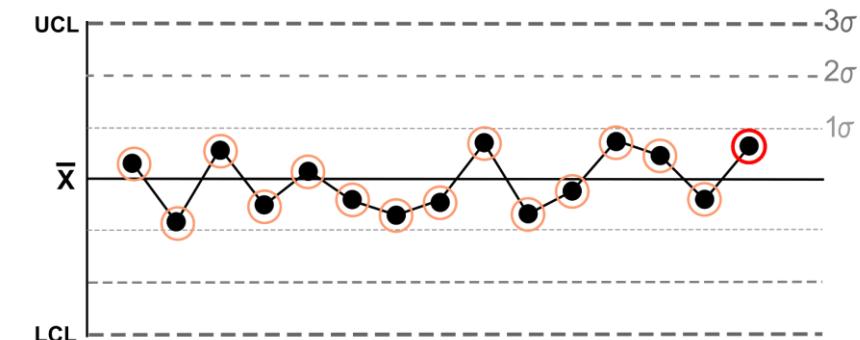
Consistent deviation and Lack of variability

- **Nelson's Rule 6 helps detect when a process is starting to show signs of consistent deviation** in one direction from the mean. This pattern could indicate that adjustments made to keep the process on target are not holding or are insufficient, leading to a drift that can impact product quality, efficiency, or safety.
- **Nelson's Rule 7 is used to identify a lack of variability in a process**, which can be just as problematic as too much variability. Processes generally have a natural amount of variation, and excessive control can artificially limit this.

Rule 6: Four (or five) out of five points in a row are more than 1 standard deviation from the mean in the same direction



Rule 7: Fifteen points in a row are all within 1 standard deviation of the mean on either side of the mean

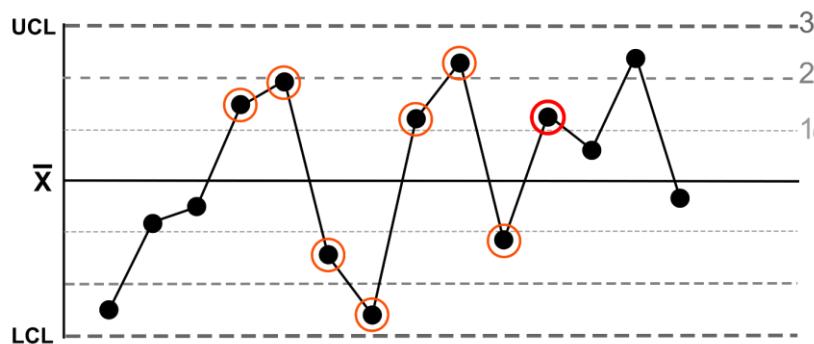




Unusual variability

- Nelson's Rule 8 identifies when a process displays unusual consistency in variability**, meaning the data points are consistently avoiding the area close to the mean (center line). This behavior can indicate issues such as a process that is too rigid, settings that are overly tight, or a problem with how measurements are being taken or recorded.

Rule 8: Eight points in a row exist with none within 1 standard deviation of the mean and the points are in both directions from the mean



Think about aiming darts to hit near the center of a target but avoiding the very middle. If you consistently hit around the middle but never close enough to touch the inner circle, it would seem like you're avoiding it on purpose.

Nelson Rules Applied

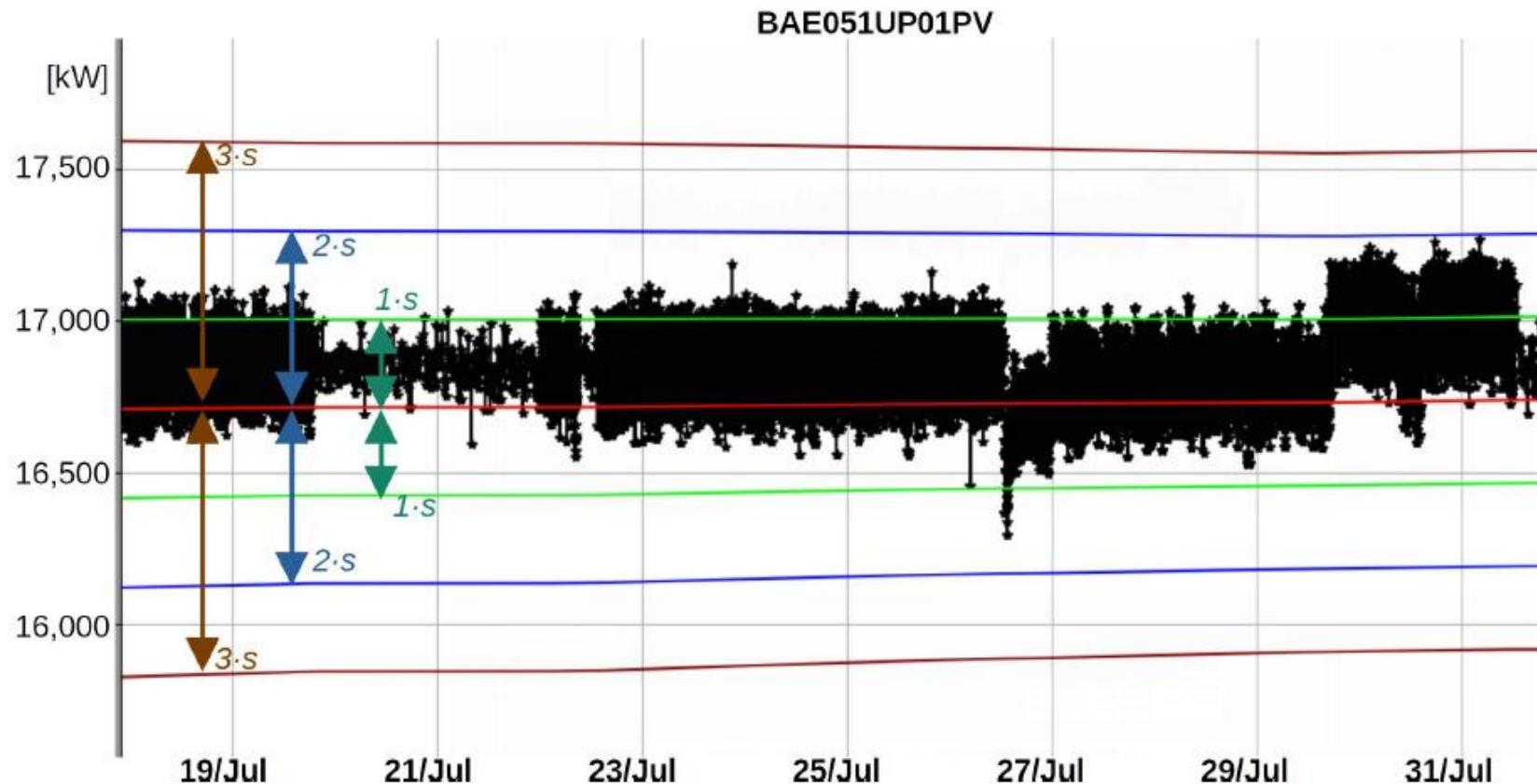


Figure 4. Control chart of active power of the generation unit 05 between 17 July 2019 and 31 July 2019.

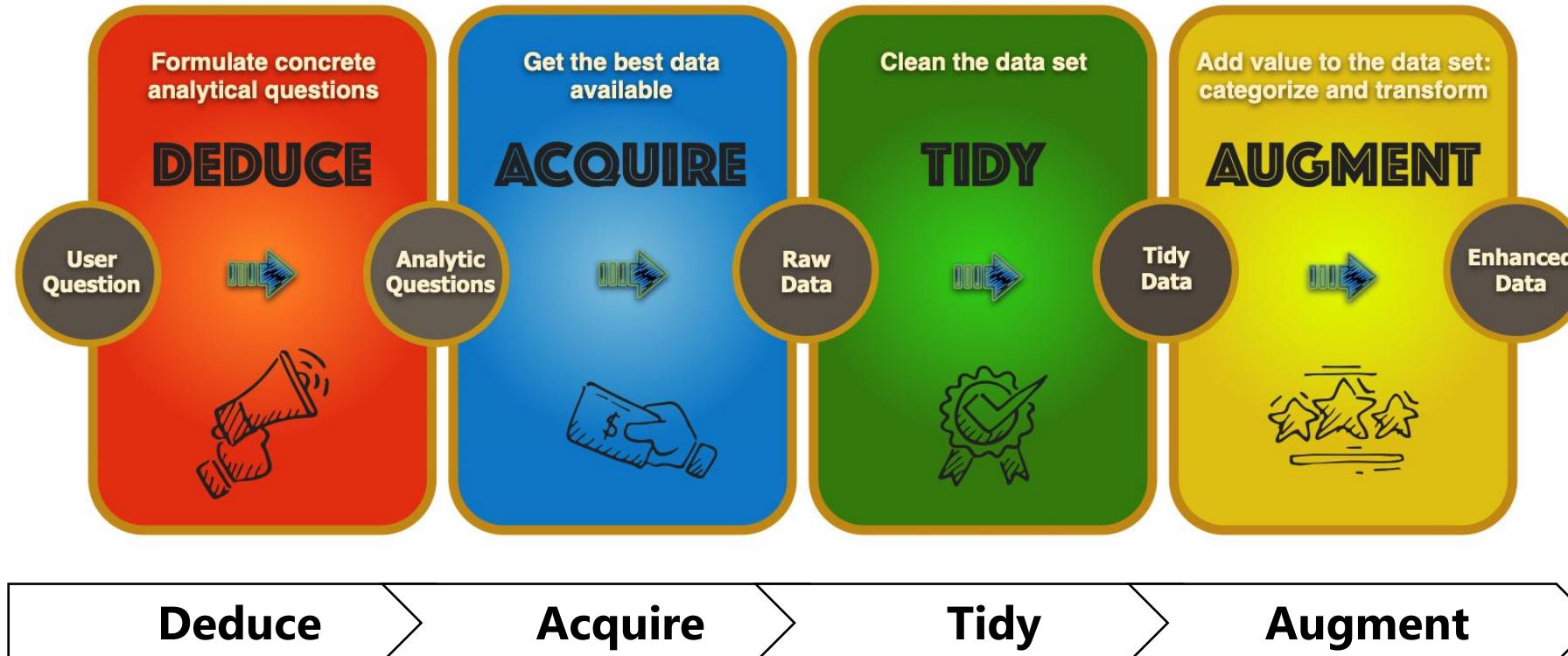
Available
on eLearn

[Nelson-ControlCharts-Case-Study-2021-energies-14-04924](#)

PDF document



Analytic Dashboard Development



Control Chart Guide 2024

PDF document

Errata: This should be <Value> not <value>. (**Uppercase matters**)

1. Change the Line to the Band
2. For **Band From**, change the **Value** to **Lower STD Reference** and change the Label to **Custom**. Set the custom label as "**Lower STD Reference: <value>**"
3. For **Band To**, change the **Value** to **Upper STD Reference** and change the Label to **Custom**. Set the custom label as "**Upper STD Reference: <value>**"
4. Set the format as you like

OrderData-Clean

CSV File



Available
content
on eLearn



CAPS

Customer Success Video CAPS

Context	You are a team of consultants specialized in Customer Success.
Audience	Senior Management Team at SCIS
Purpose	Deliver a persuasive pitch to convince senior management to adopt your proposed strategies aimed at enhancing undergraduate student satisfaction and loyalty.
Structure	Video Structure <ul style="list-style-type: none">Type: Proposal Pitch VideoDuration: 4 minutes (minimum: 3 minutes, maximum: 5 minutes) Submission Instructions <ul style="list-style-type: none">Upload your video to your team's private channel on Microsoft Teams.Deadline: Submit at least 24 hours before the scheduled class in Week 13.

Customer Success Technical Presentation

Context	You are a team of consultants specialized in Customer Success.
Audience	Faculty and fellow classmates.
Purpose	Conduct a live technical presentation demonstrating: <ul style="list-style-type: none">Your team's Customer Journey MapInteractive dashboardsCustomer Success management strategies
Structure	Live Presentation Structure <ul style="list-style-type: none">Type: Live demonstrationDuration: 10 minutes Presentation Instructions <ul style="list-style-type: none">All team members must actively participate.Provide a live demonstration of your Tableau Story to illustrate and support your strategies.Clearly present and explain your Customer Journey Map.

Kano Model (#39): Satisfaction



Desired Quality: Performance Attributes

Satisfiers (Requirements)

- Should be present
- Spoken expectations

- **A Success Video** – Check the **CAPS**
- **A Tableau Story** – To support your video
- **A High-Quality Customer Journey Map**
- **A Complete Value Proposition Canvas**
- **A Ten-Minute live presentation** of your Tableau Story and your Customer Journey Maps. Max 8 slides that matches your team branding

Delighters / Dissatisfiers

- Unspoken requirements



Last chapter: Journey to Loyalty!

- Quiz 3: 10 questions – 15 minutes on Week 11
- Quiz 4: 10 questions – 15 minutes on Week 13
- Quiz Grading - (We will take the best 3 out of 4)
- Presentations on Week 13 (Check CAPS)
- No final exam



Participation Points

- **We love to read your reflections on what we covered in our session today.** Taking a few moments to do this each week is a powerful learning tool.
- **It helps you grow:** Regularly reflecting helps sharpen your analytical skills, organize your thoughts, and spark new creative ideas.
- **It helps our class:** Your feedback is incredibly valuable and helps us improve the course for you in real-time.
- **It's part of your grade:** Timely submissions count toward your participation grade.
- **Short URL:** <https://forms.office.com/r/kRb8vniULD>

IS446 - MCRA Reflections
(AY202526-T1)

