Project Control & Management

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Lecture 7

Subjects

Project Management in Engineering Environments

1. Process breakdown for **Delivery**
2. Product **Integrity and Reliability**
3. **Cost** factors and management (Cost Control)

Recommended Reading

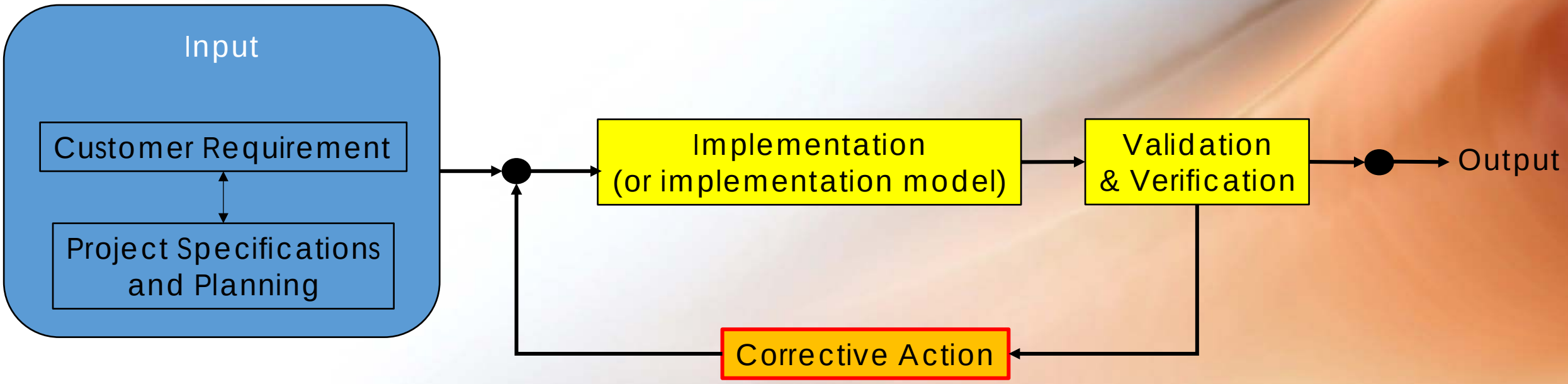
1. Komashie A. and **Mousavi, A.,** Clarkson, J., and Young T. (2014), An Integrated Model of Patient and Staff Satisfaction Using Queuing Theory, *IEEE Trans. Engineering in Health and Medicine,*
2. Mousavi, A ., Adl, P., Rakowski, R.T., and Gunasekaran, A. (2001) , " Customer Optimisation Route and Evaluation (CORE)", International Journal of Computer Integrated Manufacturing, Volume 14, Number 2, pp. 236 – 243.
3. Mousavi A. , Adl, P., Rakowski, R.T. and Gunasekaran, A. (2001), "Design of Production Planning System Using Customer Oriented Design And Resource Utilisation (CODARU)", International Journal of Advanced Manufacturing Technology, Volume 17, Issue 11, pp. 805-809.
4. www.satistica.com,

Cost Management Parameters

A. Earned Value Management (EVM):
   - Budget Controls
   - Cost Performance Index
   - Schedule Performance Index
   - Cost Variance
   - Schedule Variance
   - Estimate at Completion

B. Project Process Quality Assurance and Customer Satisfaction
   1. Process efficiency (energy, material, effort, waste, and yield)
   2. **Levels of customer satisfaction towards product attributes.**

Simple Closed-Loop Control Diagram



Product Conceptualisation

The purpose of product conceptualisation is to link product features to customer requirements

This link requires to be:

1. Be able to translate customer requirements to product specification
2. Measure the distance between customer **“ideal”** and the **“actual”** product attribute
3. Measure the level of **satisfaction** and highlight the sources of dissatisfaction
4. Be continuous and real-time

Product Breakdown into Key Attributes

Defining Key Attributes:

- Functionality
- Safety
- Longevity
- Levels of Customisation
- Meeting ever-changing tastes of the customers
- Competition
- Effects of customer dissatisfaction, both economical and reputational, leading to loss of business

Cost of Customer Dissatisfaction on Products

- User requirements and perceptions will **vary widely** across the target market from customer to customer, they will vary with **time** and they will usually be influenced by **competitor's products**.
- This multi-dimensional dynamic tangle of information must be analysed as an on-going process in order for it to be of practical value.
- Market analysis is not confined to customer input and feedback. It should involve **gaining awareness** of all factors influencing the market in which a company operates such as: **competitors, suppliers, economic, technological, legal,** among others.
- Only **suitable data acquisition and analysis** platform will truly make the right impact

Embedding Voice of Customers(VOC) in the project

What do we mean by customer ?

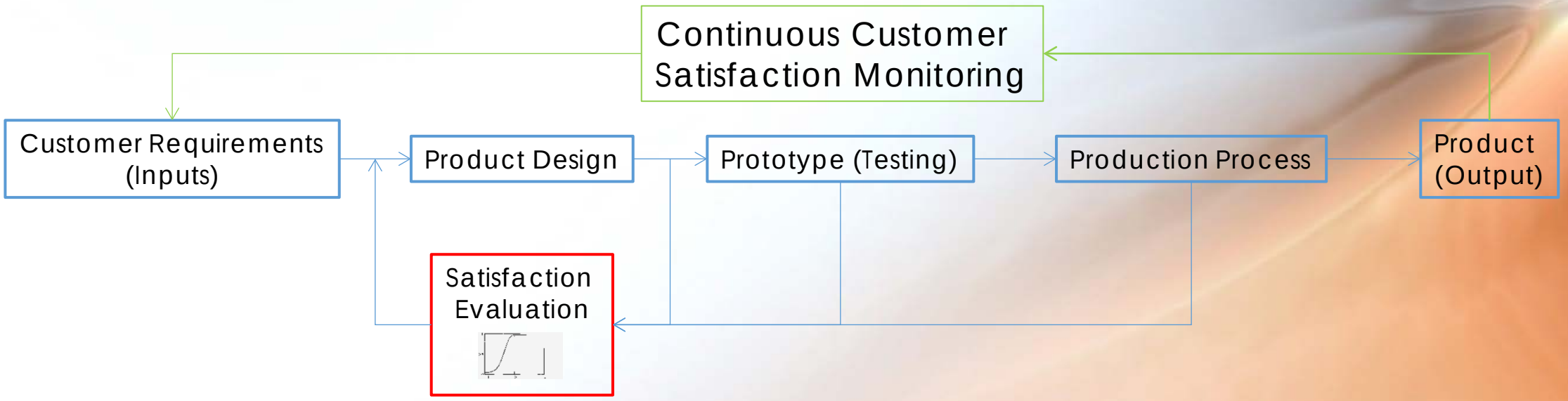
The purchaser – the decision maker – the influencer – or all of them ?

Reasonable way to tackle: if possible gather information from a wide spectrum.

Gather knowledge through listening to customers, to piece together an overall picture (VOC)

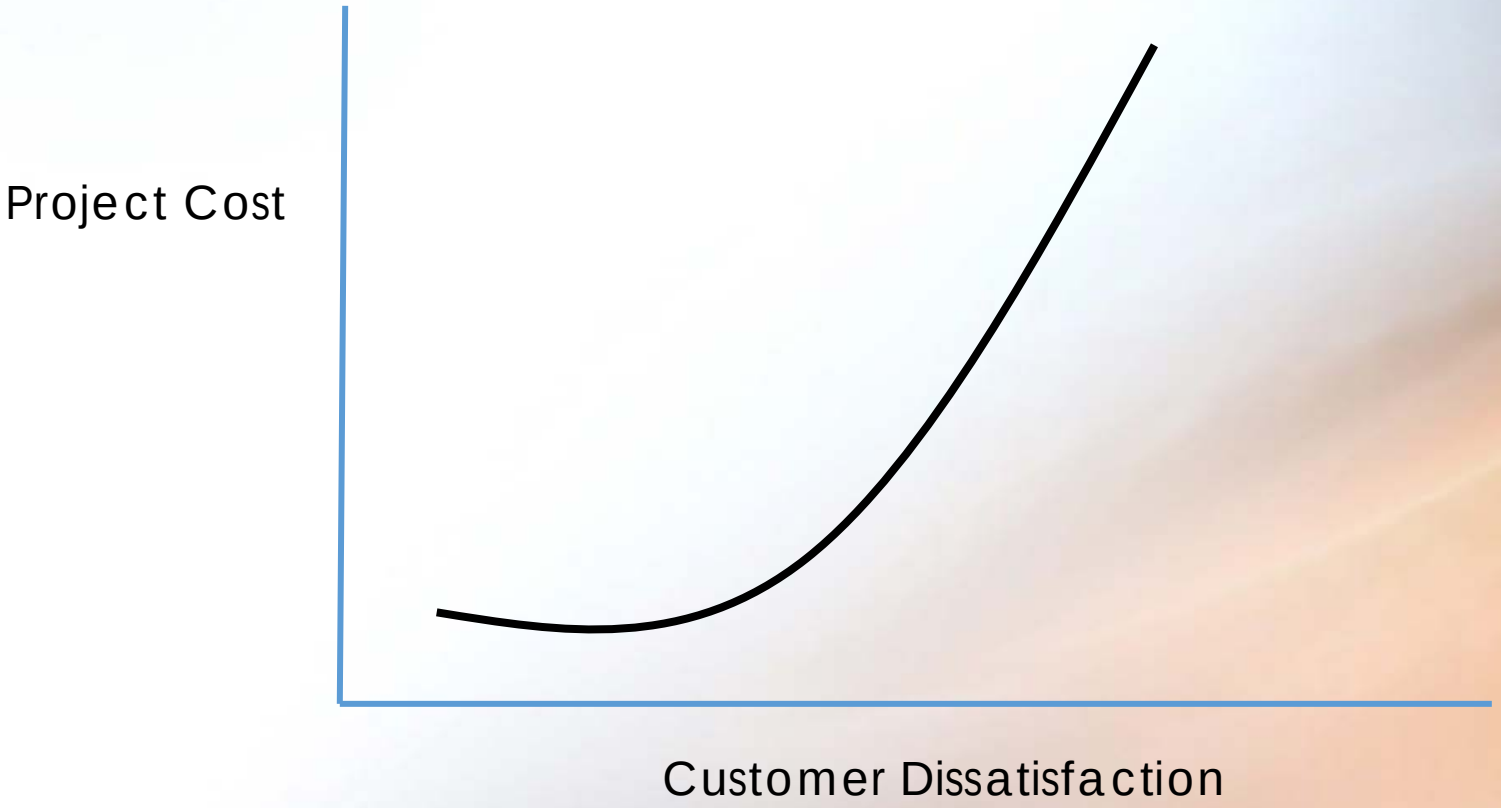
No matter it is single customer (i.e. make to order) or large number of customers (large volume)

What is the Method of data Acquisition



Customer Satisfaction Evaluation Control Loop

Cost



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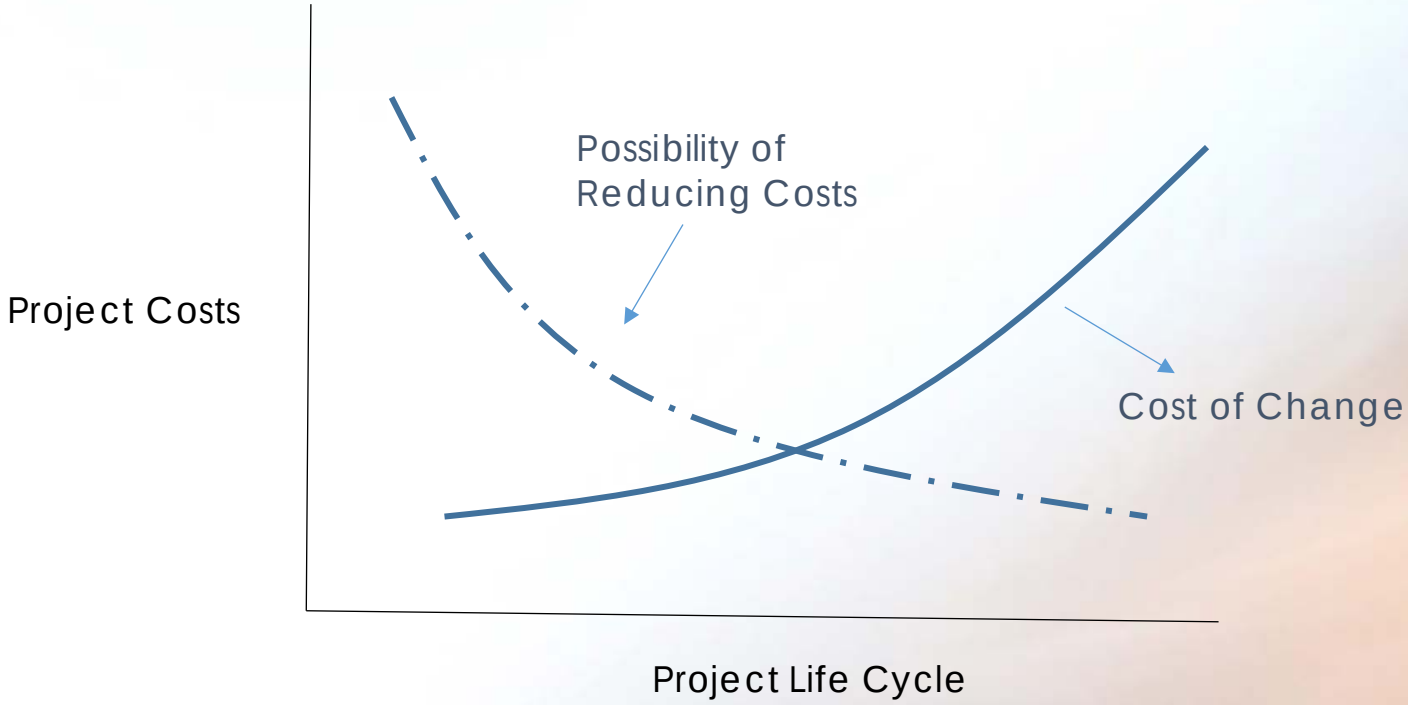

Project Costs
Possibility of
Reducing Costs
Cost of Change
Project Life Cycle

Project Control and VOC

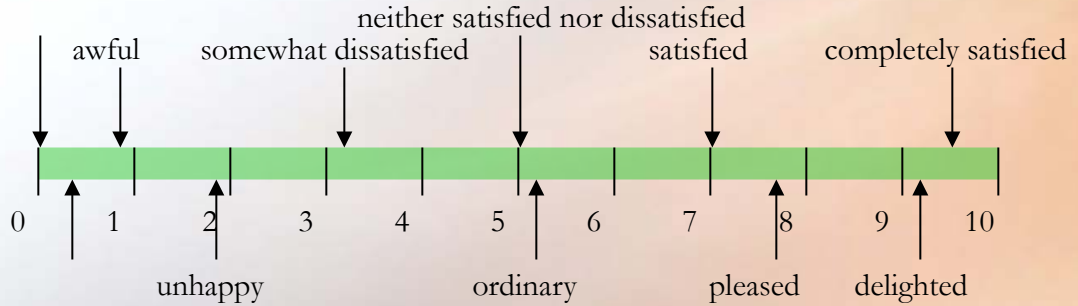
Seeking customer perception and feedback should form the basis for decision making.

Questionnaires are popular source of information as they are:

- Easily distributed
- Like by like comparison
- Easy processing
- Economical exercise
- Web enabled

Existing Questionnaire and Survey

- Scales are prone to positive bias – particularly point systems (e.g. 1-10 rather than good-bad)
- Numbered scale is left more open to various interpretations than verbal (e.g. rating of 7 out of 10 is considered "satisfactory"
- Scales without midpoint is even more prone to positive bias
- For a verbal scale, answers may be rated as subjective (e.g. "satisfied") or objective (e.g. "good"). Empirical studies show that objective scales produce more realistic results.



Are the current Market/Customer Surveys Measuring Satisfaction?

Lord Kelvin : *"If you cannot measure it you cannot improve it."*

- Most are voting mechanisms
- You may know what percentage have voted to agree/disagree with a statement or expressed satisfaction/dissatisfaction
- Post analysis is difficult and open to interpretation
- Lack of systematic breakdown of product features – so major confusions on the type of data collected.
- Using only statistical inferences – normally requires reliable sample size and it reveals the correlations - **not measurements**

Customer Optimisation Route and Evaluation (CORE)

The consumer market is:

- evolving at an incredible rate,
- competition is getting fiercer,
- catalysed by technological developments improving business capability.

Where many consumer-centric initiatives fail is the integration of **real-time knowledge** of user requirements and adapting their daily business processes and project plans accordingly.

CORE 1

Customer Optimisation Route and Evaluation (CORE) is:

- a mathematical modelling tool designed to **bridge the divide between customers and product designers**
- in pursuit of **maximising potential customer satisfaction**.
- a translating tool for measuring customer's **qualitative** requirements into **technical design attributes**, satisfaction to the product as a whole and its constituent elements.
- Capable of **prioritise** areas for improvement.

CORE in Project Management

1. Customer Led
2. Quantifiable approach
3. Systematic method
4. Post & Pre Purchase feedback
5. Facilitates interaction with customers throughout the project lifecycle
6. Helps to bespoke product design to specified customer needs
7. Preliminary order analysis
8. Mass market product design
    - Proactive not reactive
    - More than just a reporting mechanism
    - Application specific
    - Integral part of business process
    - Quantifying satisfaction – Quality assessment

1. Customer Led

By using data gathered **directly from customers** as the input to a **decision making** tool, information integrity is ensured. As CORE provides a **common language** between **customers and designers**, there is no intermediary translation stage where facts can become blurred with management's interpretation or influence.

2. Quantification

Whereas other customer-focused methods rely largely on subjective opinions, translating this into **coherent numerical** form enables more **rapid analysis**, saving time in the development cycle. It also provides meaningful data on which to **rate current success**, but more importantly, make **future improvements**.

3. Systematic Method

- Core takes an orderly approach to the data retrieval process. By combining attributes of interest with appropriate weighting factors, all data may be captured and used in a manner consistent with its significance. It avoids the "insignificant many overshadowing the significant few" syndrome.

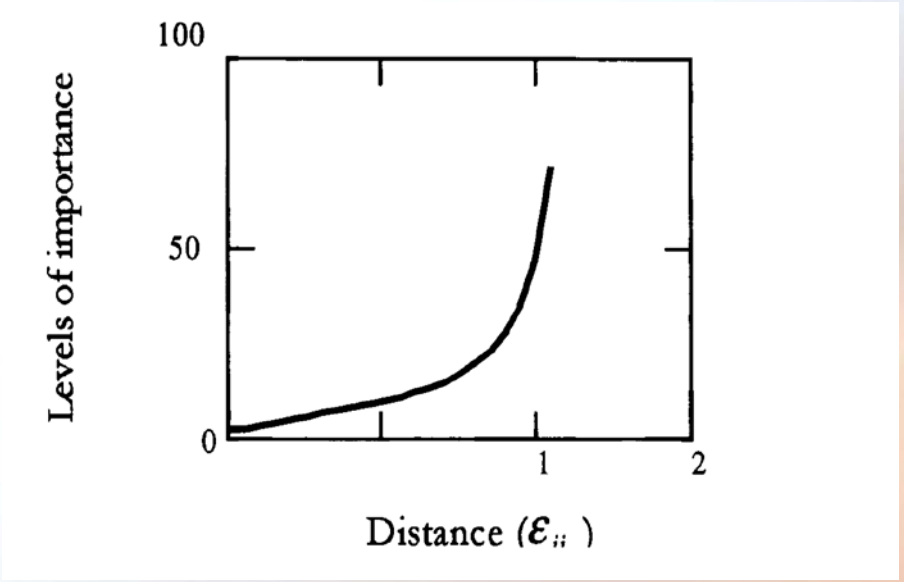
- Any product may be broken down into constituent attributes, be they tangible or intangible. These may be identified from the perspective of both designers and customers and a numerical variable assigned to each.

$$\varepsilon_{ij} = -abs\left(\frac{v_i - v_{ij}}{v_{ij}}\right)$$

i: product attribute
j: customer
v_i: actual design value for attribute i
v_{ij}: ideal design value for attribute i and customer j
ε_{ij}: distance between actual design value and ideal

3. Systemic Method – Dynamic Levels of Importance

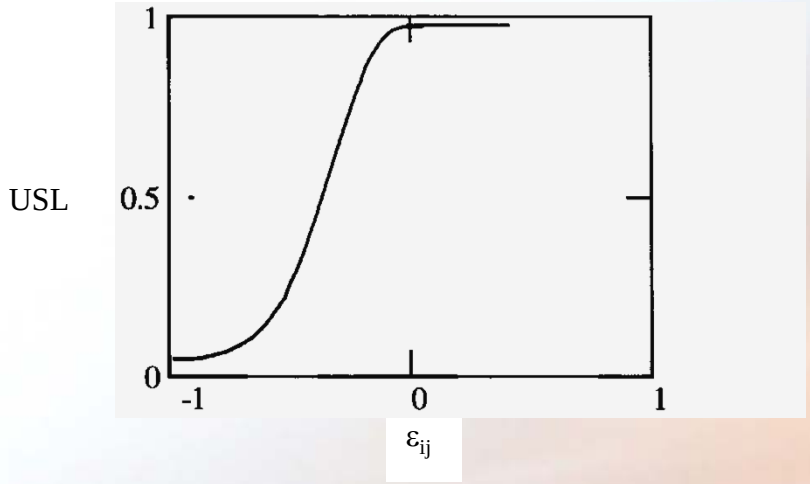
In addition to the value customers associate with a product attribute it is necessary to consider the importance they place on that attribute. The importance is a function of the ideal/actual deviation as previously calculated, $\alpha_{ij} = g(\varepsilon_{ij})$.



Relationship between levels of importance *i* for customer *j*, α_{ij}, and the absolute value of distance between actual design and expected value, ε_{ij}

3. Systemic Method – User Satisfaction Levels

Assessing the Users Satisfaction Level (USL) to the whole product is a function of both deviation of actual from ideal values and importance weighting



Users satisfaction level based on the deviation between actual and design values.

The Unique Features of the CORE Model

1. The unique mathematical model and algorithm used in satistica™ is called "*Customer Optimisation and Route Evaluation*" **(CORE)**.

2. **CORE** measures the level of satisfaction of an attribute based on the difference between the expected and the desired value of an attribute.

3. Regardless of the nature of product or service **CORE** needs three specific input to measure how a product or service attribute satisfies expectations.

Two Model Variables

1. The **Expected (Target** or **Ideal) Value**

2. The **Actual (Perceived)**

Satistica

Satisfaction calculation and Mountain Climbing

Product Conceptualisation

1. Breaking down the product into key functional and technical features
2. Interpreting the subjective requirements into technical metrics
3. Creating the communication platform to link the two
4. Measuring product performance based on the requirements.

The closer we are to the ideal the higher the satisfaction. Higher customer.

The Quick Response Reduces Project Costs

Adjustment to customer satisfaction throughout the project will reduce:

- Waste
- Rework
- Loss of business
- Lateness of delivery
- Customer Loyalty and Retention

Project Cost Parameters

Let’s go to satistica

www.satistica.com