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QUALITY MANAGEMENT 444

Lecture 15 (Week 8)

Chapter 4 & 17 – Quality planning & design for Six Sigma (DMADV)

Chapter 6 – Quality control

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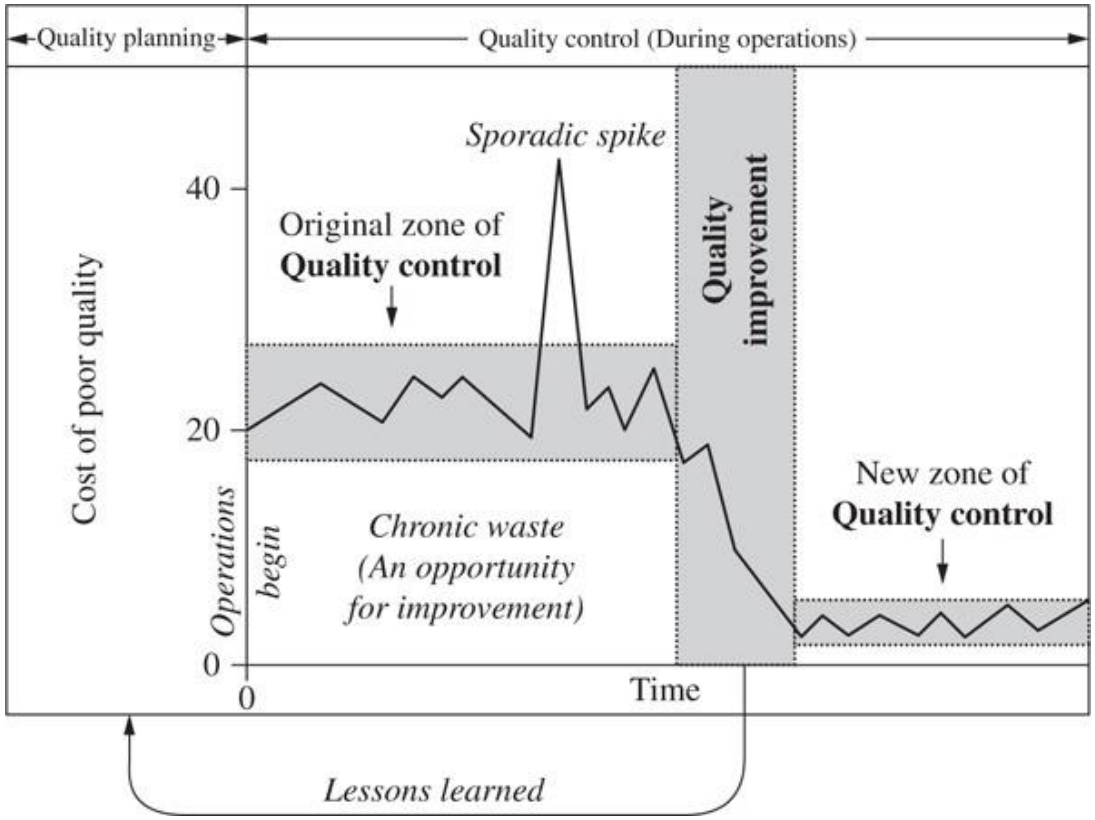
Lecture 15 (Week 8)

Chapter 4 - Quality planning and design of new goods and services
Chapter 17 – Continuous innovation using Design for Six Sigma (DMADV)

Universal principles for managing for quality: Juran's trilogy

Quality Planning	Quality Control	Quality Improvement
Establish goals	Determine the control subjects	Prove the need with a business case
Identify who are the customers	Measure actual performance	Establish a project infrastructure
Determine the needs of the customers	Compare actual performance to the targets and goals	Identify the improvement projects
Develop features which respond to customers' needs		Establish project teams
Develop processes able to produce the products	Take action on the difference	Provide the teams with resources, training, and motivation to: Diagnose the causes Stimulate remedies
Establish process controls transfer the plans to the operating forces	Continue to measure and maintain performance	Establish controls to hold the gains

Universal principles for managing for quality: Juran's trilogy



Why?

Why?

Deloitte.

Reinvent your business
Decoding the formula
for superior performance

September 2013

https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/strategy/be_en_reinvent-your-business_11092013.pdf

Why?

Prioritize increasing value over reducing prices

85% of surveyed corporate leaders believe that strategies aiming at increasing value have more potential to lead to long term success than strategies aiming at reducing prices

https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/strategy/be_en_reinvent-your-business_11092013.pdf

Why?

Prioritize increasing revenue over reducing costs

2/3 of the companies surveyed agree that strategies aiming at increasing revenue over reducing costs have more potential to lead to long term success

https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/strategy/be_en_reinvent-your-business_11092013.pdf

Why?

Prioritize experimenting new ideas rapidly over developing extensive business plans

100% of interviewed corporate leaders agree that experimenting new ideas rapidly has more potential to lead to long term success than developing lengthy, extensive business plans

https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/strategy/be_en_reinvent-your-business_11092013.pdf

Why?

Features That Meet Customer Needs	Freedom from Failures
Higher quality enables organizations to • Increase customer satisfaction • Make products salable • Meet competition • Increase market share • Provide sales income • Secure premium prices • Reduce risk	Higher quality enables organizations to • Reduce error rates • Reduce rework, waste • Reduce field failures, warranty charges • Reduce customer dissatisfaction • Reduce inspection, test • Shorten time to put new products on the market • Increase yields, capacity • Improve delivery performance
Major effect is on revenue.	Major effect is on costs.
Higher quality costs more.	Higher quality costs less.

All systems do what they are designed / developed to do

Mars Climate Orbiter

Remember the Mars Climate Orbiter incident from 1999?

Newspaper cartoon depicting the incongruence in the units used by NASA and Lockheed Martin scientists that led to the Mars Climate Orbiter disaster. (Source: Slideplayer.com)

Poor design

NASA uses the metric system while Lockheed Martin uses the English system when building a satellite

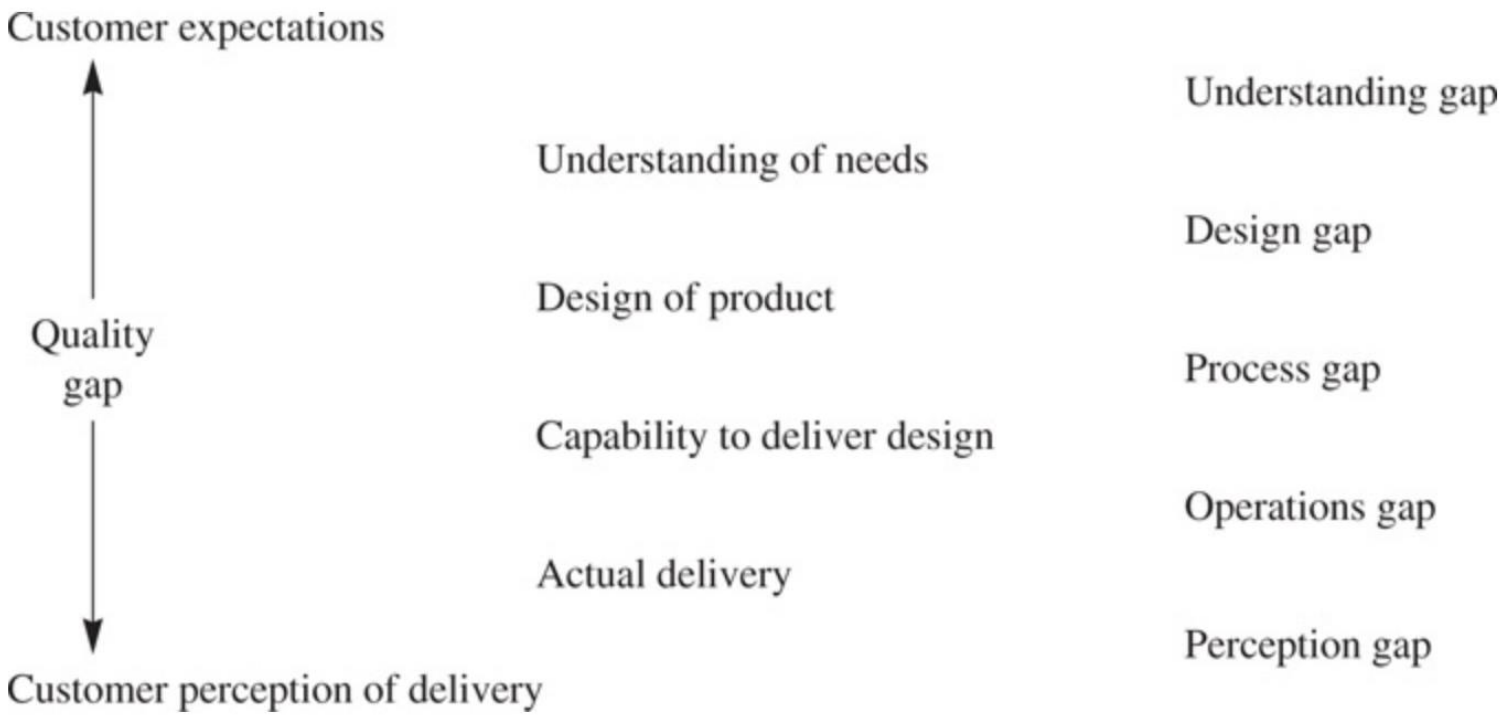
Cost of the lost orbiter: $125 million

Inflation-adjusted: $165.6 million

In 1999 a team of Lockheed Martin engineers used the English system of measurement, while the rest of the team used the metric system

Courtesy of NASA

Quality by Design Problem

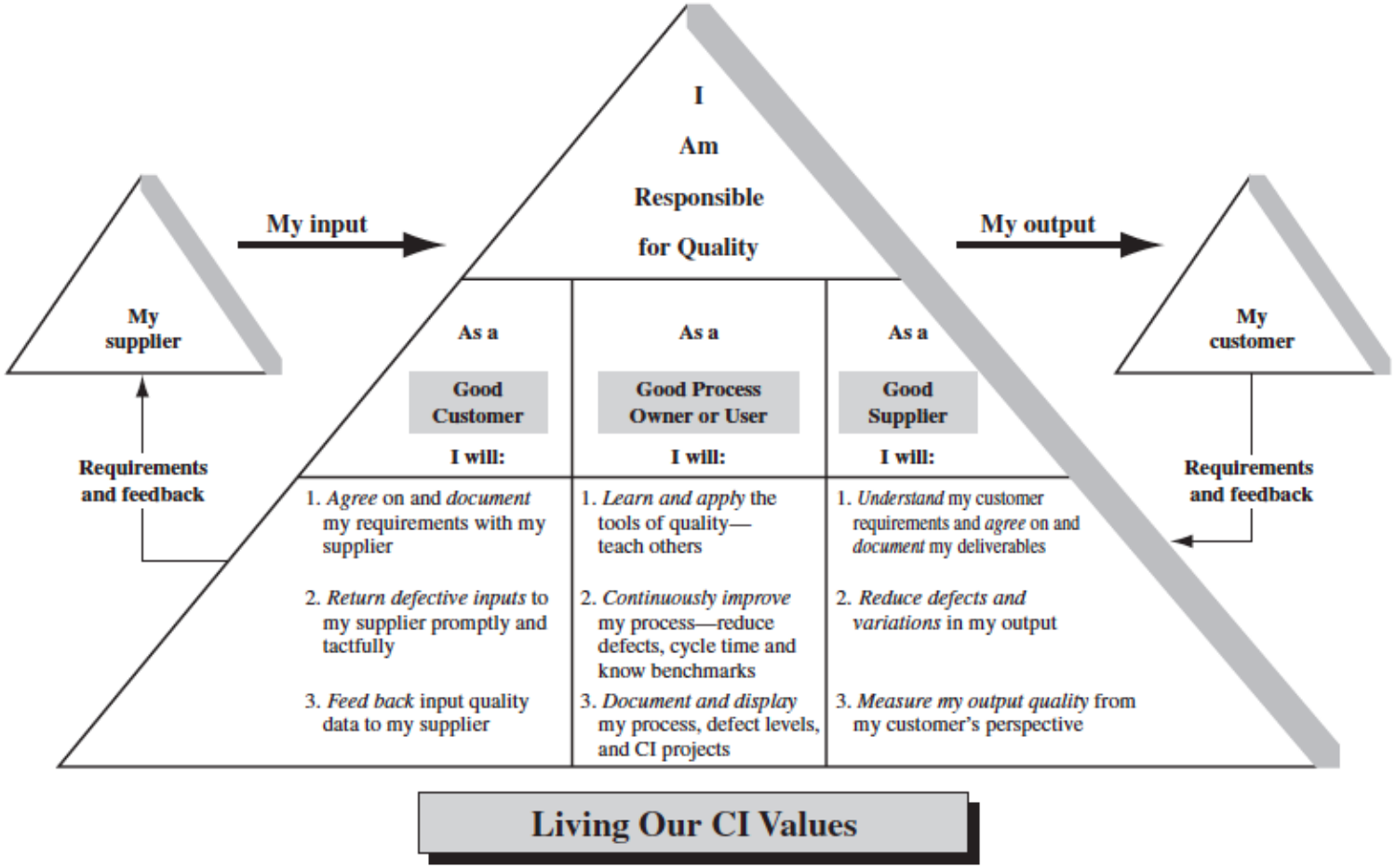


Quality planning

Quality Planning

1. Establish the project and design goals.
2. Identify the customers.
3. Discover the customer needs.
4. Develop the product or service features.
5. Develop the process features.
6. Develop the controls and transfer to operations.

Triple role concept



Source: Gryna FM, et. al, Juran's Quality Planning and Analysis for Enterprise Quality, Sixth Edition, 2015

Quality planning

Quality Planning

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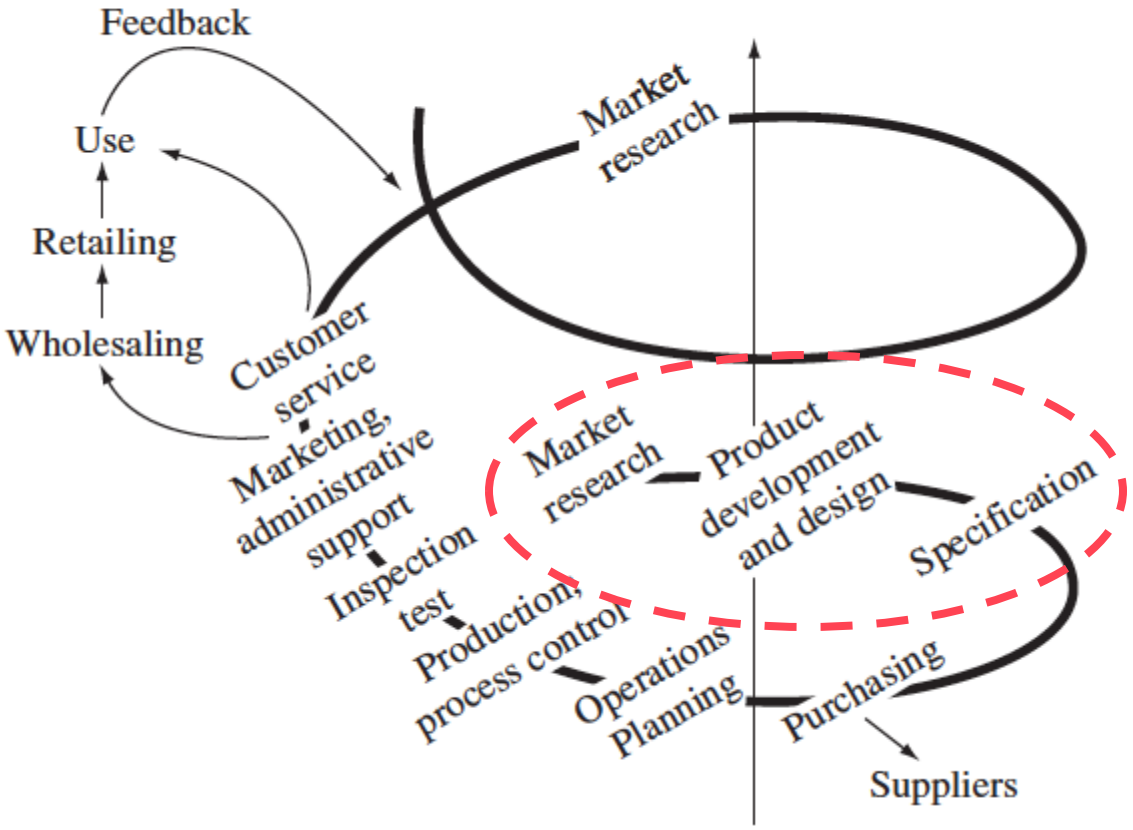
Designing for quality



Categories of customer emphasis related to quality

Emphasis	Features	Freedom from deficiencies
Initial economy	Willing to forego some features Like do-it-yourself features and add options later	Will tolerate some product deficiencies at delivery and during use
	Will tolerate a relatively short product life	Will tolerate some deficiencies in service before and after purchase
Value	Willing to make trade-offs between quality and price	Warranty provisions can be important
	Features must be justified by benefits and related price	Concerned about operating and repair costs
The "best"	Desire many convenience features	Greatly annoyed at deficiencies and associated inconveniences
	Emphasis on luxury, esthetics, brand image	Demand complete and timely response to all problems
	Desire high level of performance from product and from all personnel	

UNDERSTANDING CUSTOMER NEEDS

Quality planning

Quality Planning

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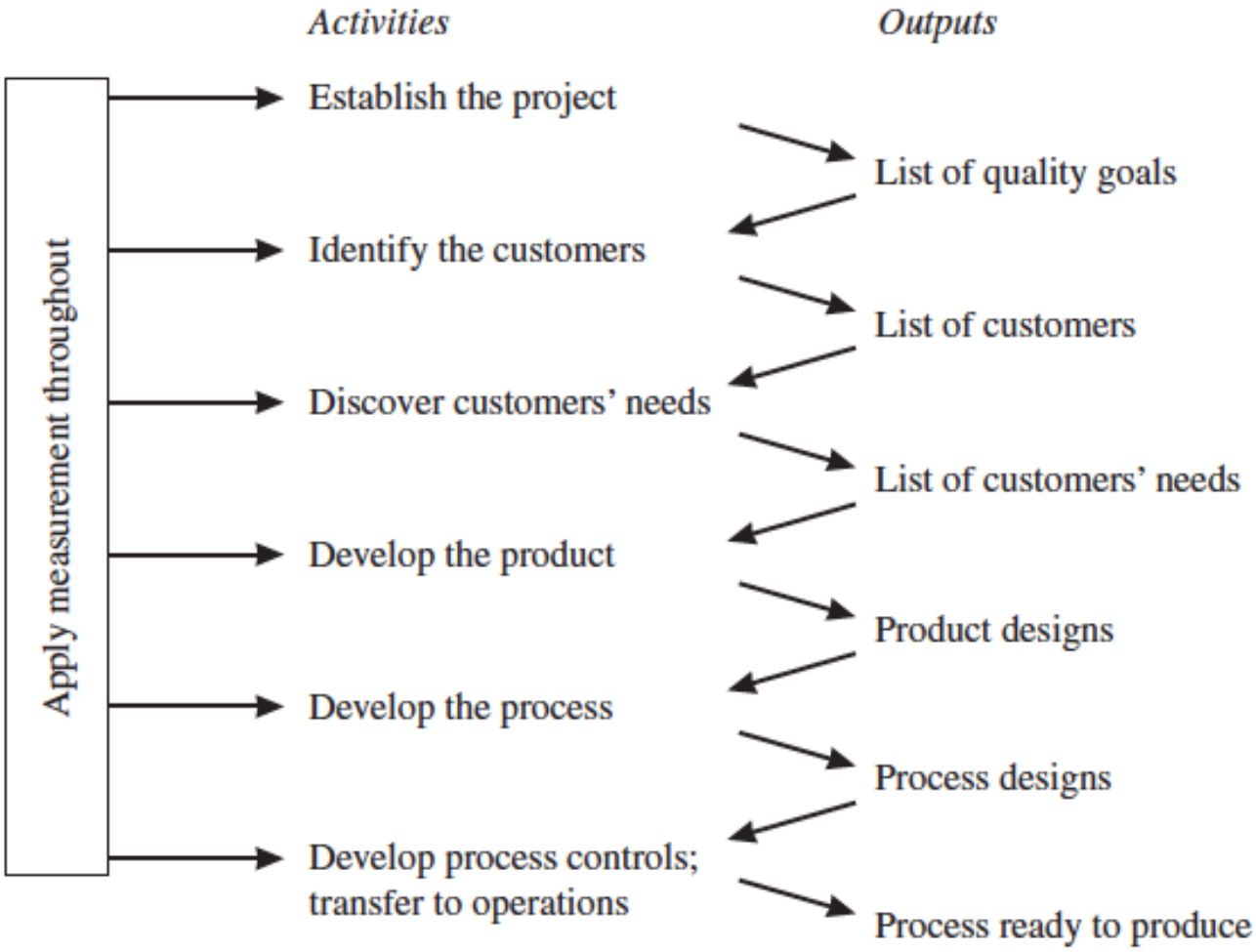
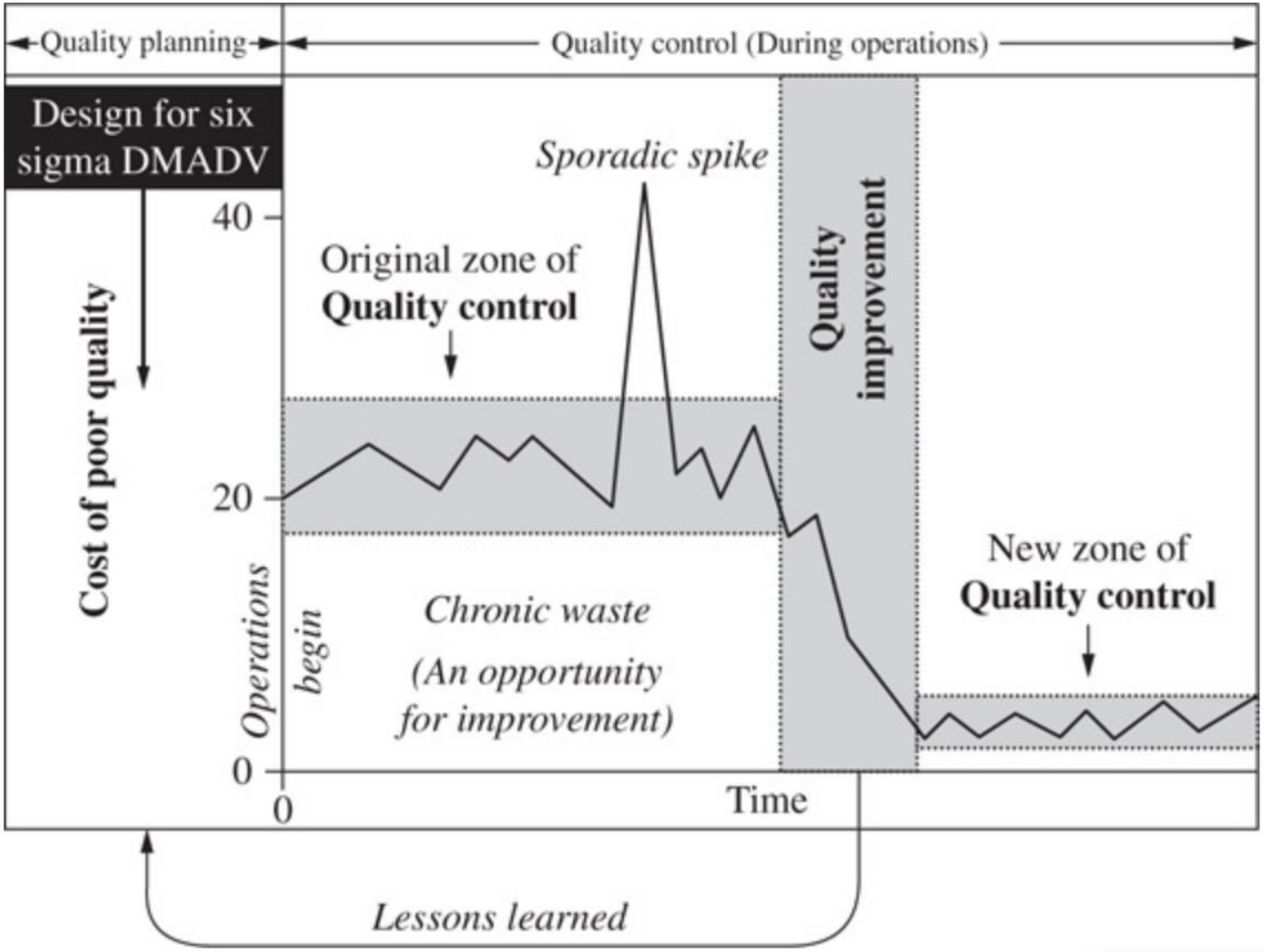
Quality by design roadmap



Quality planning – Continuous innovation



Quality planning – Continuous innovation

1. *Define* the goals and objectives for the new good, service, or process.
2. *Measure* and discover hidden customer needs.
3. *Analyze* the customer needs and determine the innovative features that will meet those needs.
4. *Design* by combining the features, thereby creating new products, services, or processes that incorporate the features.
5. *Verify* that the new innovation meets the customers' and organization's needs.

Quality Planning

1. Establish the project and design goals.
2. Identify the customers.
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Innovation

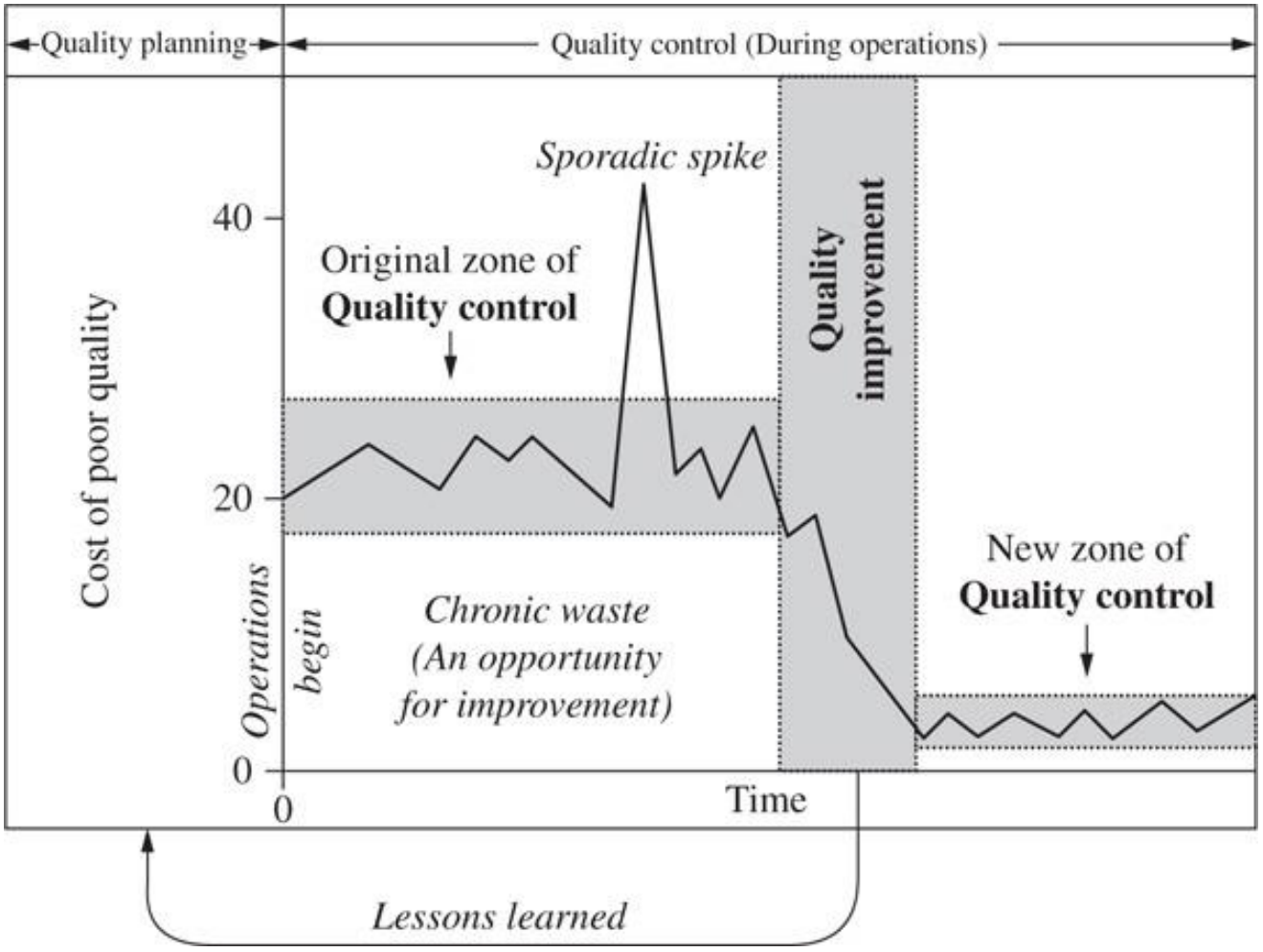
Use digital technology to enhance traditional business models	⊙ Use automated and digital services to compete with and extend existing manual services ⊙ Shift the core business model from selling products towards offering services ⊙ Transform hardware offerings into service offerings
Transform existing business models digitally	⊙ Offer entirely new services that cannot be provided manually ⊙ Offer existing services through new digital channels
Invent entirely new business models or different engagement models	⊙ Offer entirely new revenue generating products/services or different engagement models

QUALITY MANAGEMENT 444

Lecture 15 (Week 8)

Chapter 6 – Quality control to assure compliance to customer requirements

Quality control



Purpose of QC

SELF-CONTROL

THE ULTIMATE INSPECTOR: SELF-MANAGED PROCESSES

IMPROVEMENT AND SUSTAINMENT
Implementation of solution approach, monitoring, controlling and documenting

SOLUTION
Selection of solution alternatives and implementation of a strategy to reach goals

WHAT IS THE PROBLEM
Problem description and definition of project objective; initiation of project and planning of milestones

SEVERITY OF THE PROBLEM
Determination of causes for actual problems and cause variables, quality, data and facts

REASONS
Processing of the results and problem analysis

SELF MANAGED PROCESS (SELF-CONTROL)

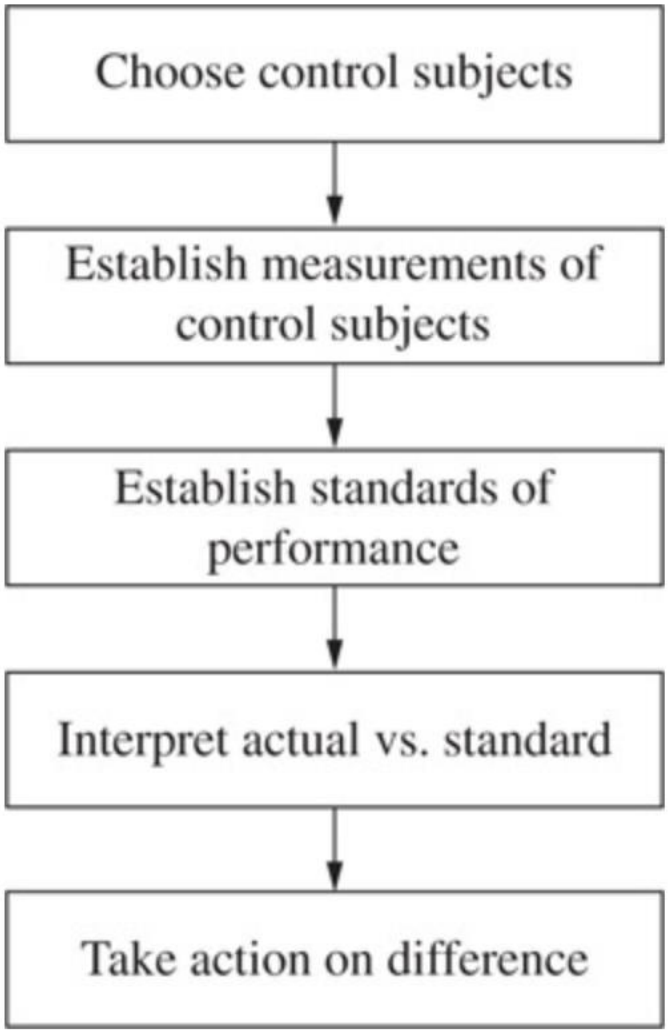
- **Work organised so that a person has full mastery over the attainment of planned results**
- **People must be provided with**
  - **Knowledge of what they are supposed to do**
    - **For example, the budgeted profit, the schedule and the specification**
    - **They must be supported by a process – not only numerical goals**
  - **Knowledge of their performance**
    - **For example, the actual profit, the delivery rate, the extent of conformance to specification**
    - **Get people to take ownership of their work**
  - **Means of regulating performance if they fail to meet the goals**
    - **These means must always include both the authority to regulate and the ability to regulate by varying either**
      - The process under the person's authority
      - The person's own conduct
  - **But heed the dangers of empowerment**

SELF MANAGED PROCESS (SELF-CONTROL)

Classical control and self-control

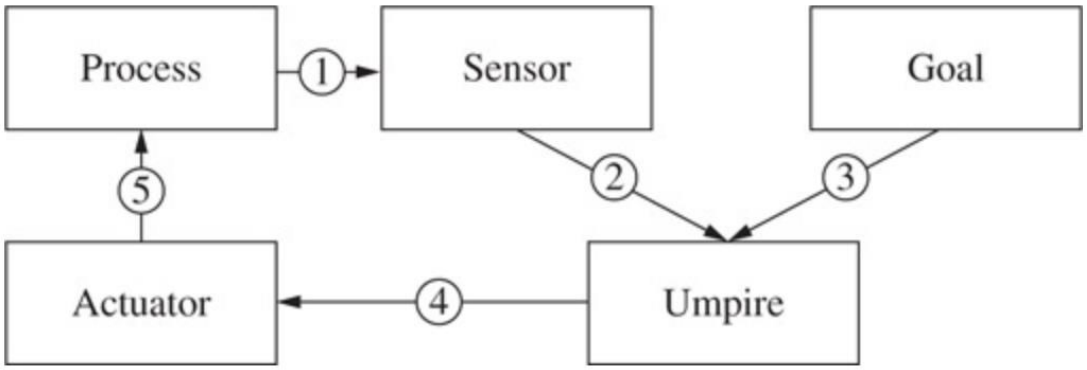
Classical control <<Complementary>>	Self-control
Standard or goal	Knowledge of what people are supposed to do
Measurement	Knowledge of performance
Action on the difference	Means of regulating a process
Primary emphasis during execution	Primary emphasis before execution

Quality control process



Quality control

- The process employed to meet standards consistently
- Actual performance vs. standard
- Sequence of steps:
  - Choose the control subject, i.e. choose what we intend to regulate
  - Establish measurement
  - Establish standards of performance: product goals and process goals
  - Measure actual performance
  - Compare actual measured performance to standards
  - Take action on the difference



Choose control subject

Establish measurement

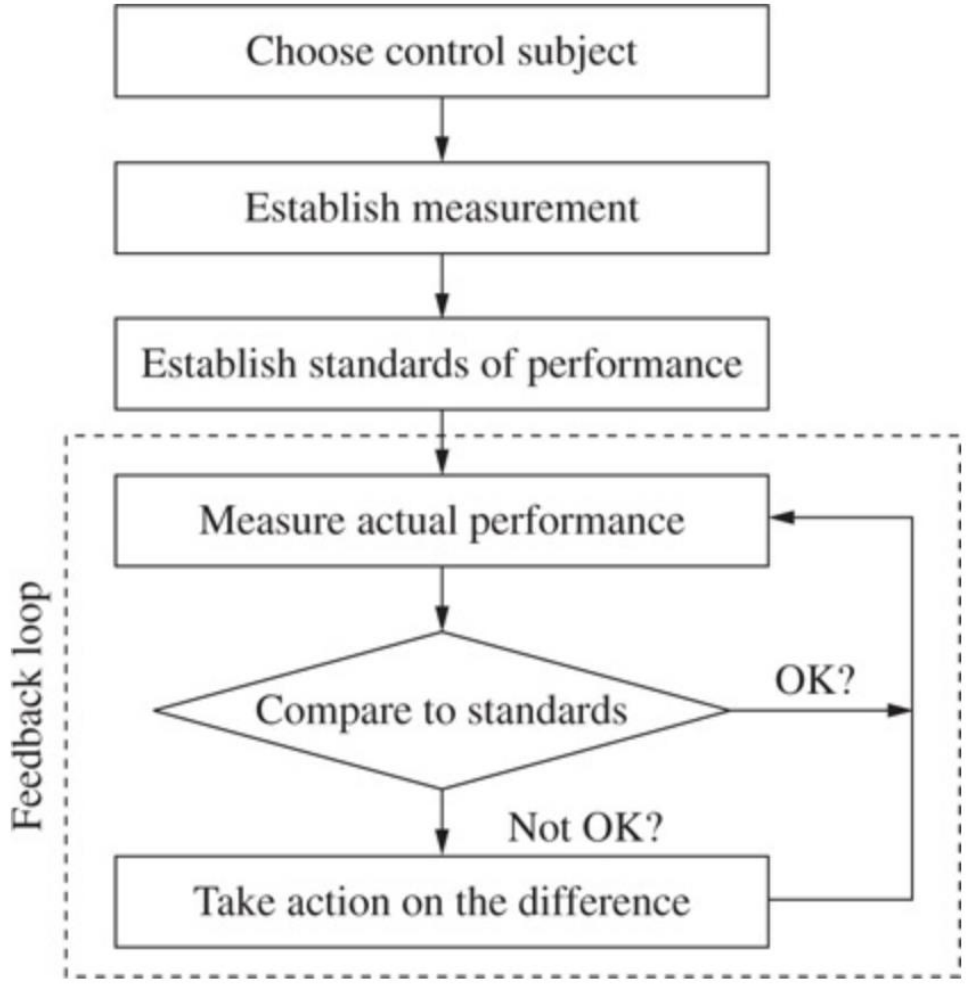
Establish standards of performance

Measure performance

Comparative analysis

Take Action

Quality control



What is critical to control?

- Quality control subjects should be **aligned and linked with customer parameters**
  - External customers are paramount, but also internal customers
- Start with defining work processes in terms of **objectives**, process steps, process customers, and customer needs
- Subjects should recognize **both components** of the definition **of quality**
  - Freedom from deficiencies and product features

Features That Meet Customer Needs	Freedom from Failures
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- Subjects should recognize **both components** of the definition **of quality**
  - Freedom from deficiencies and product features
- Subjects can be identified by **obtaining ideas** from both customers and employees
- Quality control subjects must be viewed by those who will be measured / measuring as **valid, appropriate, and easy to understand** when translated into numbers

What is critical to control for NETFLIX?

- **Choose control subject**
- Establish measurement
- Establish standards of performance
- Measure performance
- Comparative analysis
- Take Action

What is critical to control for NETFLIX?

Netflix identifies *what to measure for quality*:

- Content quality: video resolution, audio clarity, subtitles/dubbing accuracy.
- Platform performance: streaming speed, buffering time, recommendation accuracy.
- User experience: navigation, accessibility across devices, error-free playback.

Establish measurement

- A unit of measure: the unit used to report the value of a control subject
  - For example, kilograms, seconds, dollars
- A sensor: a method or instrument that can carry out the evaluation and state the findings in terms of the unit of measure
- Number of occurrences / Opportunity for occurrence

Measurement

If You Can't Measure It, **You Can't** Improve It. Management thinker Peter Drucker is often quoted as saying that "**you can't** manage what **you can't measure**." Drucker means that **you can't** know **whether** or not **you** are successful unless success is defined and tracked.

Measurement

Measuring quality…

⊙Quality control: measurement **provides feedback** and early warnings of problems

⊙Quality planning: measurement **quantifies customer needs** and product and process capabilities

⊙Quality improvement: measurement can **motivate** people, **prioritize** improvement opportunities and help in **diagnosing** causes

⊙Strategic quality management: measurement provides **input for setting goals** and later supplies the data for **performance review**

Measurement

Big Goals Need Measurement

Posted on July 27, 2016 by Susanna Mudge

President and CEO Susanna Mudge discusses the importance of measurement in achieving the Sustainable Development Goals.

Establishing measurement at NETFLIX

Netflix defines how to measure those elements:

- Video quality metrics (bitrate, frame rate, 4K consistency).
- Technical KPIs (startup delay, buffering ratio, crash frequency).
- Content checks (linguistic quality of translations, sync between subtitles and speech).
- Customer feedback (ratings, drop-off points, complaints).

Establish standards of performance (goals)

- **Each control subject must have a quality goal**
- **Criteria for operational goals:**
  - *Legitimate*: have official status.
  - *Measurable*: numbers.
  - *Attainable*: is it possible? Has it been done?
  - *Equitable*: fair for all individuals.

Control Subject	Goal
Vehicle mileage	Minimum of 25 mi/gal highway driving
Overnight delivery	99.5% delivered prior to 10:30 A.M. next morning
Reliability	Fewer than three failures in 25 years of service
Temperature	Minimum 505°F; maximum 515°F
Purchase-order error rate	No more than 3 errors/1000 purchase orders
Competitive performance	Equal or better than top three competitors on six factors
Customer satisfaction	90% or better rate, service outstanding or excellent
Customer retention	95% retention of key customers from year to year
Customer loyalty	100% of market share of over 80% of customers

Standards of performance: NETFLIX

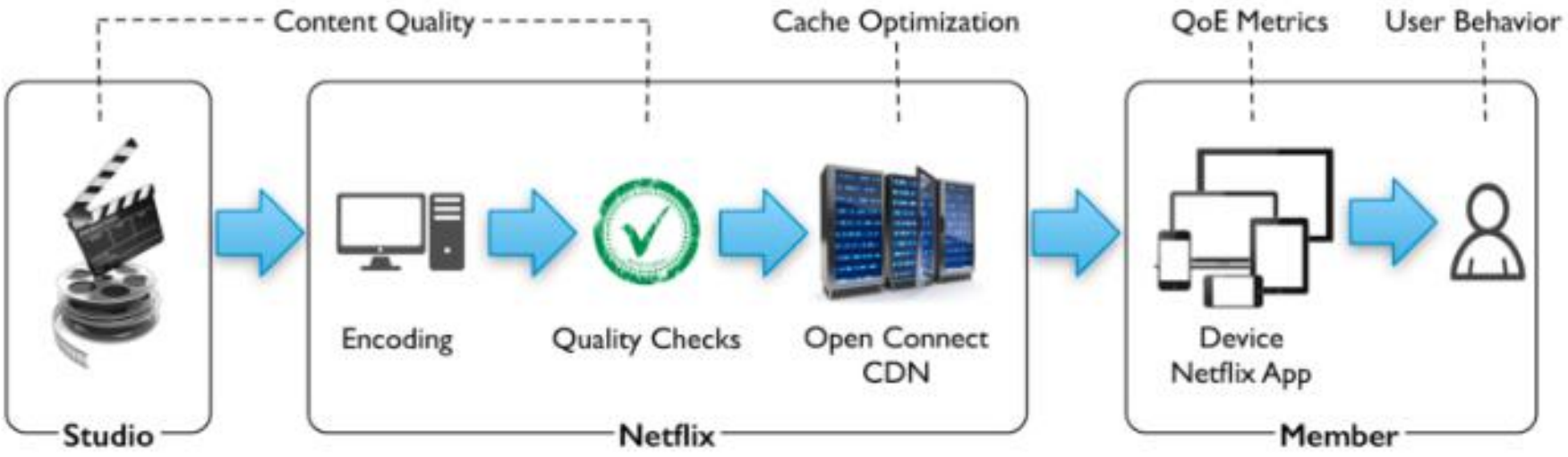
Netflix* sets internal quality benchmarks *:

- Max 1–2% of streams with buffering events.
- Subtitles must meet 98–100% accuracy standards (measured via human + AI QC).
- UX standards: app load < 2 seconds, smooth integration across devices.

Measure actual performance

- Principle junctures to measure at:
  - At **changes** of jurisdiction
  - **Before** embarking on an **irreversible path**
  - After creation of a **critical quality**
  - At **dominant process variables**
  - At **natural windows** (A point in time where the quality of a future product can be measured / determined given the raw or unfinished product)

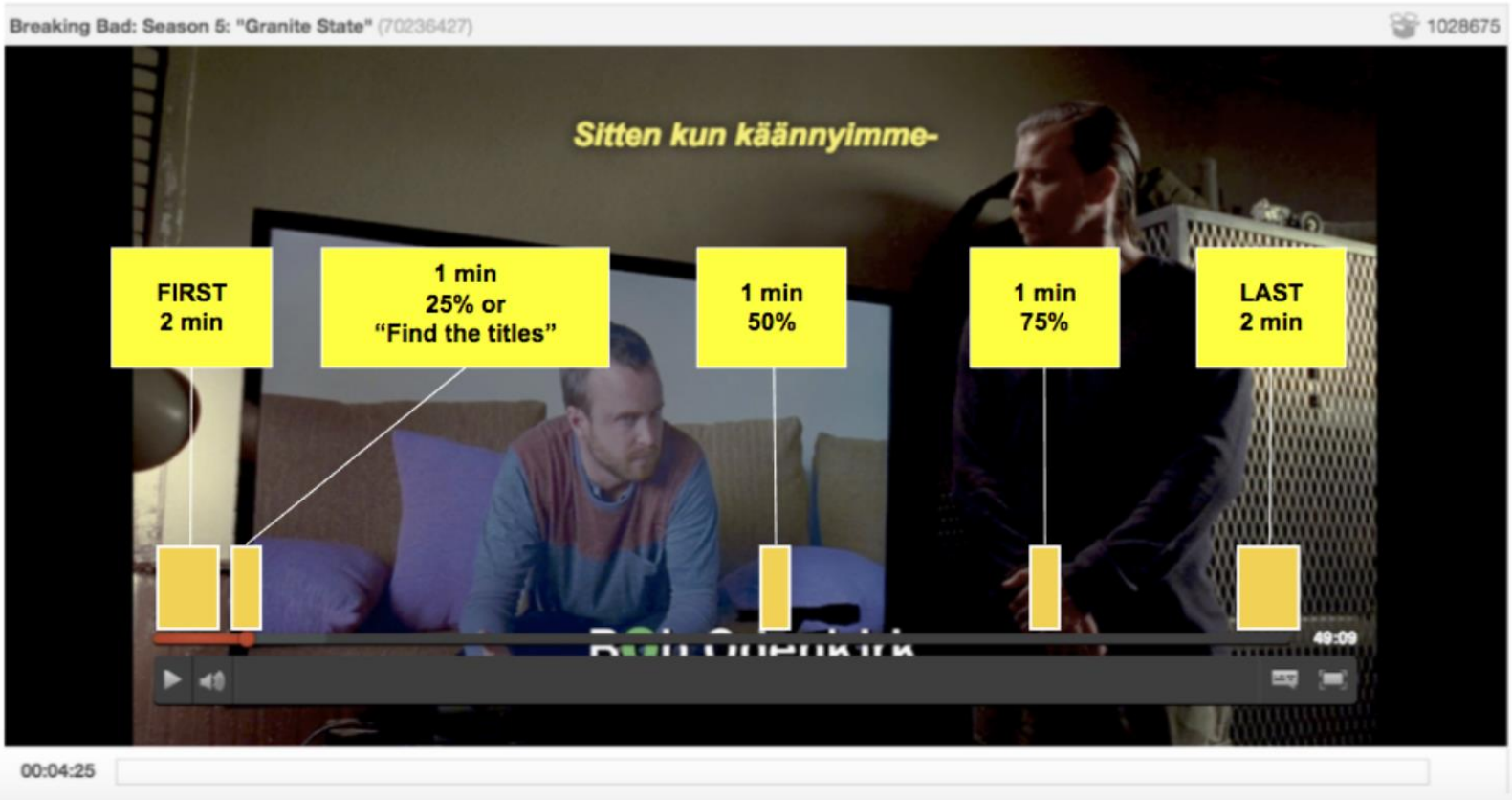
Measure actual performance: NETFLIX



The Netflix Streaming Supply Chain: opportunities to optimize the streaming experience exist at multiple points

Measuring performance

- Spot QC:
  - Consists of a Spot Check at:
    - First 2 minutes
    - 1min: Find the credits
    - 1min: 50%
    - 1min: 75%
    - Last 2 minutes



Measuring performance

- Full QC:
  - Entire asset is reviewed
  - Performed for Netflix Originals and high profile content (at Netflix's discretion)

Compare to standards

- The criteria for taking action (or not taking action) should be **(numerically) defined** before measurements are taken
- **Training** should be provided to ensure that the criteria are properly applied
- Understand the potential causes of variation:
  - Random – solely due to chance
  - Assignable – due to specific 'special' causes
  - Pattern / trend

Comparative analysis: NETFLIX

Netflix continuously monitor and compare performance against standards:

- AI-driven real-time monitoring systems flag deviations (e.g., buffering above threshold).
- QC teams and localization specialists review sample content against linguistic standards.
- Analytics dashboards show whether user satisfaction (measured by engagement & churn) matches expected levels.

Take action

- **Elimination of chronic sources of deficiency**
- **Continuous process regulation to minimize variation**
- **Elimination of sporadic sources of deficiency**
  - QC Feedback loop is well designed for this purpose

Quality control

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QUALITY CONTROL vs. QUALITY ASSURANCE

PREVENTION COSTS

The cost incurred in the process to reduce potential defects and errors (quality improvement costs, quality training, planning).

APPRAISAL COSTS

The cost of determining the current quality of the production process or service. (inspection costs).

Spending on appraisal & prevention vs cost of poor quality / failure costs

INTERNAL FAILURE COSTS

The cost incurred when defects and errors are found before delivery to the customer.

EXTERNAL FAILURE COSTS

The cost of trying to correct defects and errors after the product or service is delivered to the customer.

Universal principles for managing for quality: Juran's trilogy