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Use of software quality tools to analyse the problems of a large internet media company

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ABSTRACT

AOL (formerly a corporation referred to as AOL, originally referred to as America online, and conventionalized as AOL.) is a web portal and online service provider primarily based in NY. AOL was one of all the first pioneers of the internet within the mid-1990s, and also the most recognized on the online within the US. On June 23, 2015, AOL was obtained by Verizon Communications for \$4.4 billion. The following months, AOL additionally created with Microsoft and purchased many technology properties. AOL's products and Services square measure within AOL Mobile- permits you to require AOL websites and applications with you where you go and uses mobile-specific options to boost your expertise. Data Secure by AOL-Helps secure your devices from hackers, malware, viruses, spyware and many. System Mechanic- mechanically fix over 30,000 computer issues with system Mechanic, that wipes the useless junk from your disk drive and accelerates your disk drive and speeds up your pc in minutes. AOL Desktop for windows – The all-in-one expertise with mail, browsing, search, content, and dial-up connectivity. AOL Computer check-up- that includes twenty-four powerful pc optimization tools, AOL computer check-up cleans, secures, and accelerates your slow computer in minutes. AOL Mail- it's a free email service that provides sensible usernames, lovely style, and unlimited client support, alongside the standard mailbox features.

Keywords— AOL, 7QC Tools, Quality problems, AOL mail, Server issues, Dial-up internet, Reports, Ishikawa diagram, Control chart, Pareto chart, Scatter diagram, Run chart, Histogram, Check sheet/ Checklist, 5 WHYS, Poka Yoke, Takt time

1. OBJECTIVES

To begin with there are some common objectives:

- Describe the definition of quality and steps to control quality.
- Outline the improvement methodology and define the 7 Quality Tools.
- Utilize the 7 Tools effectively in the Company.
- To analyze and measure various issues and defects within the process in AOL.

- The degree to which each of these issues is present reflects the overall quality of the products or services delivered by the company.
- In order to eliminate these issues, the seven basic Quality Tools made statistical analysis less complicated for the average person.

2. INTRODUCTION

Quality can be broadly conceptualized as a prospective measure towards a certain object or even a procedure. In perspective, quality broadly exists in 3 or related parameters. They are, Comparative, Subjective and Quantitative. Quality has always been a core activity within an organization. Continuous quality improvement process assumes, and even demands that team of experts in the field as well as company leadership actively use quality tools in their improvement activities and decision-making process. Quality tools can be used in all phases of the software process, from the beginning of development up to marketing and customer support.

For solving quality problems, 7QC tools used are Control charts, Histogram, Scatter diagrams, Fishbone (Ishikawa) diagrams, Pareto charts, Run charts and Checksheets. All these tools are important tools used widely to monitor the overall operations and continuous process improvement. In this project, we are studying in detail the issues that are faced by AOL (America Online). The issues identified in their system such as the Server Issue which is caused when multiple servers and applications are malfunctioning. Another issue is the Dial-up Internet which is caused when there is a physical problem with the modem itself. As a result, these tools are used to find out the root causes and eliminates them, thus helps in improving the process.

3. METHODOLOGY

For solving quality problems, following Seven Quality Tools are required.

- Control Chart
- Histogram
- Scatter Diagram
- Fishbone Diagram

- Pareto Chart
- Run Chart
- Check sheet/Checklist

3.1 Control Chart

- Graphs used to study how process changes over time.
- Data are plotted in time order.
- A Control chart always has a central line for the average, an upper line for the upper control limit and a lower line for the lower control limit.
- These lines are determined from the historical data.

Table 1: Control chart data table

Sample	X-Bar	Range
Jan- 17	Jan- 17	120.00
Feb- 17	Feb- 17	135.00
Mar- 17	Mar- 17	150.00
Apr- 17	Apr- 17	140.00
May- 17	May- 17	90.00
Jun- 17	Jun- 17	30.00
Jul- 17	Jul- 17	110.00
Aug- 17	Aug- 17	185.00
Sept- 17	Sept- 17	110.00
Oct- 17	Oct- 17	50.00
Nov- 17	Nov- 17	35.00
Dec- 17	Dec- 17	40.00

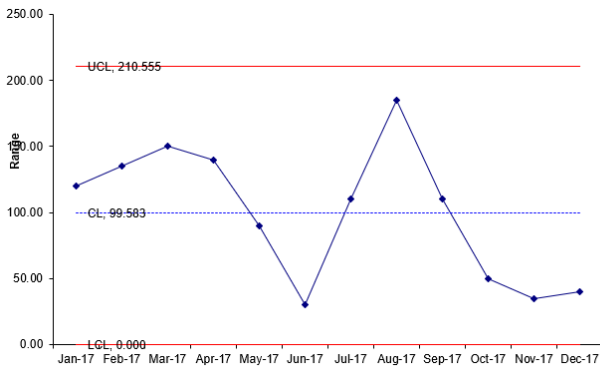


Fig. 1: Control chart graph

3.2 Histogram

- The histogram is one of the seven basic tools of quality control.
- A histogram is used for continuous data where the bins represent ranges of data.
- The most commonly used graph for showing frequency distributions, or how often each different value in a set of data occurs.

Histograms give a rough sense of the density of the underlying distribution of the data, and often for density estimation: estimating the probability density function of the underlying variable.

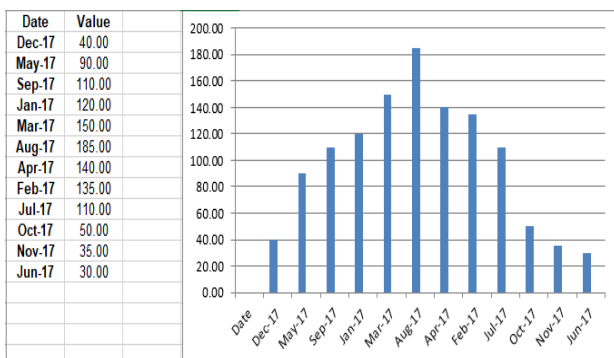


Fig. 2: Histogram

3.3 Scatter Diagram

- Scatter diagram is one of the seven basic tools of quality control.
- The Scatter diagram graphs pairs of numerical data, with one variable on each axis, to look for a relationship between them. If the variables are correlated, the points will fall along a line or a curve. The better the correlation, the tighter the points will meet the line.
- Scatter diagram is useful when your dependent variable may have multiple values for each value of your independent variable.

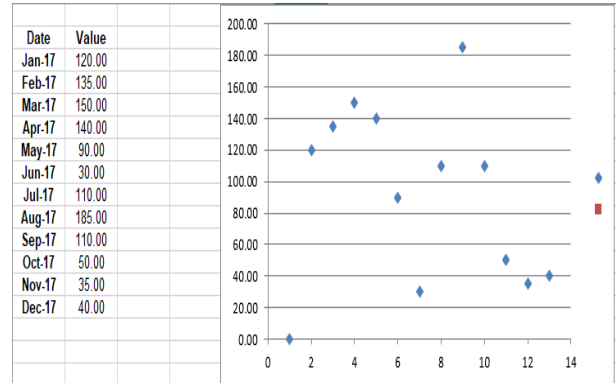


Fig. 3: Scatter Diagram

3.4 Fishbone Diagram

- Fishbone diagram is one of the seven basic tools of quality control.
- Fishbone diagram, is also called a cause and effect diagram or Ishikawa diagram, is a visualization tool for categorizing the potential causes of a problem in order to identify its root causes.
- The fishbone diagram identifies many possible causes for an effect or problem. It can be used to structure a brainstorming session. It immediately sorts ideas into useful categories.

Fishbone diagram is useful when identifying possible causes for a problem.

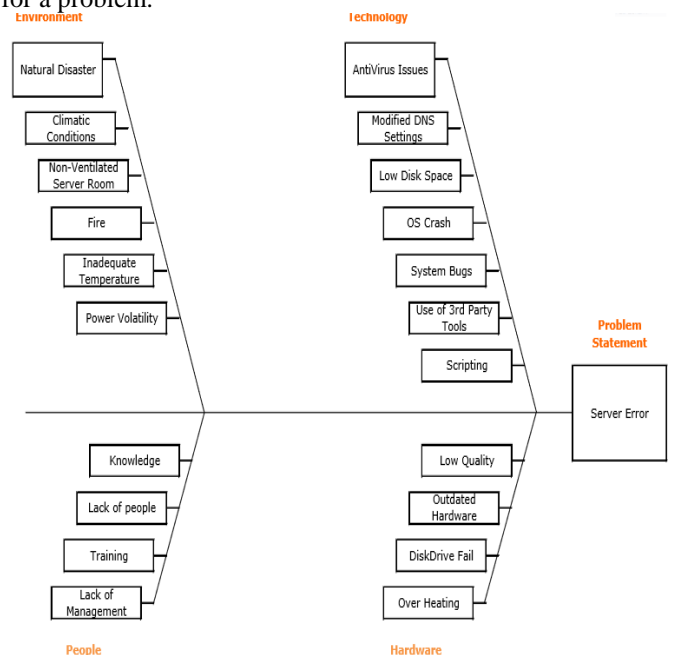


Fig. 4: Fishbone Diagram

3.5 Pareto Chart

- Pareto Chart is one of the seven basic tools of quality control.
- A Pareto chart, named after Wilfred Pareto, is a type of chart that contains both bars and a line graph, where individual

values are represented in descending order by bars, and the cumulative total is represented by the line.

- The purpose of the Pareto chart is to highlight the most important among a (typically large) set of factors.
- In quality control, it often represents the most common sources of defects, the highest occurring type of defect, or the most frequent reasons for customer complaints, and so on.

		Cumulative Percentage Cutoff: 80%	
#	Causes	Defects	Cumulative%
1	Jan-17	120.00	10.0%
2	Feb-17	135.00	21.3%
3	Mar-17	150.00	33.9%
4	Apr-17	140.00	45.6%
5	May-17	90.00	53.1%
6	Jun-17	30.00	55.6%
7	Jul-17	110.00	64.9%
8	Aug-17	185.00	80.3%
9	Sep-17	110.00	89.5%
10	Oct-17	50.00	93.7%
11	Nov-17	35.00	96.7%
12	Dec-17	40.00	100.0%

Fig. 5: Pareto Chart

3.6 Run Chart

- Run Chart is one of the seven basic tools of quality control.
- A Run chart is a line graph of data plotted over time.
- Run Charts are often used with baseline data at the beginning of a project.
- It reveals important information about a process before you have collected enough data to create reliable control limit.

Date	Number of Defects		Mean Defects
	Sample 1	Sample 2	
01/01/2017	1	4	4.0
02/01/2017	6	8	8.0
03/01/2017	1	2	2.0
04/01/2017	4	5	5.0
05/01/2017	2	3	3.0
06/01/2017	5	7	7.0
07/01/2017	3	5	5.0

Fig. 6: Run Chart

Weekly Defect Run Chart

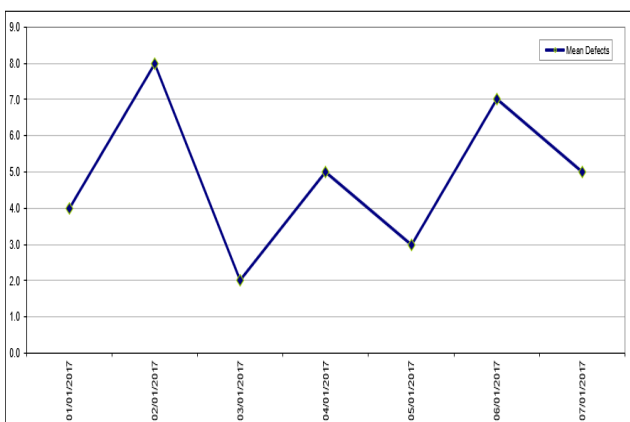


Fig. 7: Run Chart

Defect Types/ Event Occurrence	Dates												TOTAL
	January	February	March	April	May	June	July	August	September	October	November	December	
Defect 1	60	55	60	60	45	10	70	80	90	40	30	15	615
Defect 2	60	20	90	80	45	20	40	105	20	10	5	25	520
TOTAL	120	75	150	140	90	30	110	185	110	50	35	40	1135

Fig. 8: Check List

3.7 Check Sheet/Check List

- Checksheet is one of the seven basic tools of quality control.
- The check sheet is a form (document) used to collect data in real time at the location where data is generated.
- The data it captures can be quantitative or qualitative.

When the information is quantitative, the check sheet is sometimes called a tally sheet.

Checksheet can be used when collecting data on the frequency or patterns of events, problems, defects, defect causes, etc.

4. STATISTICAL ANALYSIS OF CONTINUOUS IMPROVEMENT

4.1 5 WHY / 5Y

This method of error detection is based on the principle of iterative why questions, in an order of 5 which enables to detect or arrive at the root cause of the problem. It can also be used in combination or in conjunction with “Ishikawa” diagram in order to do root cause analysis.

As per the analysis of different types of AOL problems, we have come across a particular error detection technique known as 5 whys which will enable to detect at the root cause of the problem.

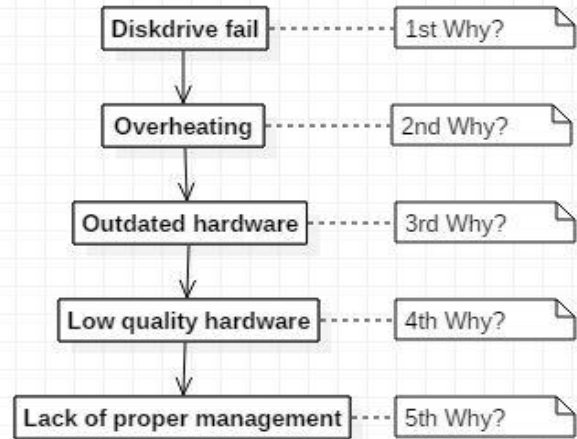


Fig. 9: 5 Why / 5Y

4.2 Poka Yoke

This method of statistical analysis in order for continuous improvement is from an angle of defect prevention rather than defect detection. It may be applied in the continuous improvement method to design for defects which are detected.

As per findings this defect prevention technique used to prevent AOL Server Crash problem.

The preventive measures are as follows:

- Introduction of Machine Learning and elements of AI to maintain the servers.
- Physical and logical load balancing and clustering.
- Use of Air cooled AC’s to transfer the heat from space to the air for preventing heat issues.
- Utilization of Cloud managed services.
- Backup of information in case of an emergency like a fire, flood, etc.

4.3 Takt Time

This is a unit of measure for productivity frequency and gets its influence from the "Takt" used to control orchestras playing music.

Takt time is the rate at which a finished product needs to be completed in order to meet customer demand. An organization is primarily driven by "Cycle time".

During the financial year January to December, it is observed that the errors are varying for every month.

For the month of January, the total number of Server errors are 120 and these errors have to be solved in 3 hours sprints considering 9 hours' work shift. The server maintenance team consists of 10 people.

$$\text{The Takt Time for the month of January} = \frac{9(\text{Shift})}{10(\text{People}) * 3(\text{Sprints}) * 120(\text{Server errors})}$$

So, the Takt Time for the month of January is 0.0025/sec

As per the above calculation, the formula is used for the rest of the months

- The Takt Time for the month of February with 75 server errors is 0.007/sec
- The Takt Time for the month of March with 150 server errors is 0.002/sec
- The Takt Time for the month of April with 140 server errors is 0.0021/sec
- The Takt Time for the month of May with 90 server errors is 0.003/sec
- The Takt Time for the month of June with 30 server errors is 0.01/sec
- The Takt Time for the month of July with 110 server errors is 0.0027/sec
- The Takt Time for the month of August with 185 server errors is 0.001/sec
- The Takt Time for the month of September with 110 server errors is 0.0027/sec
- The Takt Time for the month of October with 50 server errors is 0.006/sec
- The Takt Time for the month of November with 35 server errors is 0.008/sec
- The Takt Time for the month of December with 40 server errors is 0.007/sec

5. CONCLUSION

The Project has been carried out in order to define the role and importance of seven basic quality tools (7QC tools) within the quality management system. It is shown that 7QC tools can be used in all process phases from the beginning of a software development up to the management of a process, on a day to day basis, in a systematic manner.

In modern processes, it is necessary to implement an integrated quality management system that involves quality management, responsible environmental performance, and a safe working environment. In the frame of integrated management system quality tools can be much wider applied with certain success. Furthermore, systematic application of 7QC will enable successful quality improvement process.

As it is shown in the above graphs and charts, quality tools have an important place in data collecting, analyzing, visualizing and are most helpful in troubleshooting issues related to quality. All the processes are affected by multiple factors and therefore statistical quality tools can be applied to any process.

The continuous use of these tools upgrades the personal characteristics of the people involved. It enhances their ability to think, generate ideas, solve problems, and do proper planning.

These 7 Quality tools are helpful for AOL in every stage of defect removal. The issues that were detected by the company such as the Server issue, Dial-up Internet were resolved with help of in detail study and analysis using these various Quality tools. The tools helped the company to identify its obstacles by analyzing the number of reports generated by the customers on a monthly or weekly basis. This was accomplished by analyzing various charts and graphs generated through the collected data. The issues that were reported by the customers are rectified to a certain extent and it is also experienced by the users in the past few months.

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