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Implications of ICT Tools Maintenance for E-Commerce and National Development

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Abstract

In the developing countries, awareness on maintenance of ICT (information and communication Technology) infrastructures calls for concern. The same carefree attitude that is inherent in the usage and maintenance of other facilities, be it machineries, agricultural equipment, buildings, roads, bridges and even daily lives also manifests greatly in the mode of usage and interactions with ICT tools. ICT is the bedrock of electronic commerce which in turn contributes immensely to national development. This paper examines the problems usually encountered and wherewithal of the concerned parties on the maintenance of ICT tools, baring in mind the two main tools of ICT namely, Computer systems and its peripherals. The major components of computer system, being hardware and software are examined and issues bothering on degradation, self recovery and preventive maintenance are scrutinized in order for their effects to be appreciated on ICT tools' maintenance

Every system designer's effort is focused on building a computer system that is efficient and reliable, in turn the efficiency and reliability of every computer system is measured through its performance.

The performance of a good system is usually in tandem with the Moore's law which postulates that computer performance improves geometrically, and not linearly.

The best measure of computer system's performance is tied to its maintainability and execution time. The focus of this paper shall be on maintainability, because no matter how fast a system is, the issue of its maintainability cannot be swept aside.

A system not properly maintained is first and foremost a problem to the user and consequently the designer who will be at the receiving end of all complaints about user's (or customer's) dissatisfaction.

Differences in Hardware Systems as Regards Maintainability

In the design of Hardware systems, some creative processes (such as, analysis, design, construction and testing) are translated into physical form, just the same way as it is in the design of software systems. Despite this fact, there are still some characteristics which make the hardware system different from the software systems as will be discussed below:

(a) System Manufacture

Software are developed and not manufactured, unlike in the case of Hardware system. In the process of manufacturing hardware, quality problems (e.g. loss of calibration by the machine used for production) can be introduced, but this is not applicable to the development of the software system.

(b) Cost and Time of Production

During the manufacture of hardware, more hands can be involved in order to increase production, the reverse is the case during software development, as more hands imply more communication which eventually increase the time and cost of production.

(C) Wear and Tear of System

Environmental maladies such as moisture, dust, vibration, temperature and so on, make hardware to wear out. These maladies do not have direct impact on software systems.

Consider the graph below:

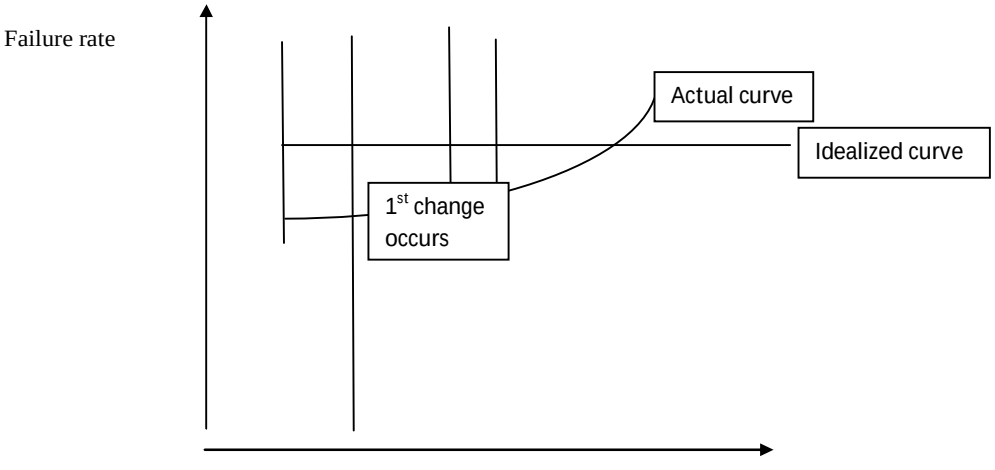


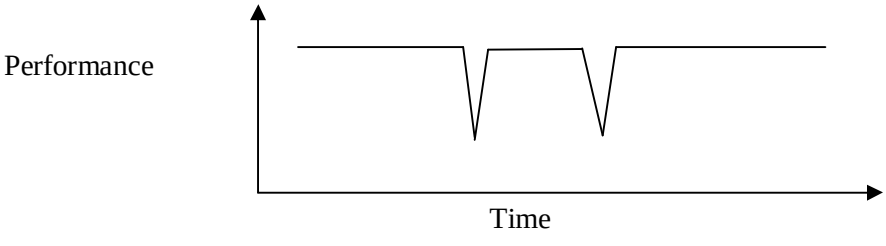
Fig. 1: Actual failure rate of software

In its lifespan, software will undergo changes during maintenance (i.e. fixing of errors and patches) due to some reasons. The spikes in the above graph indicate that the first changes level begins to increase because of maintenance. Most software failures imply an error in design and it is unlike the case of hardware failure whereby worn-out parts can be replaced, as such software maintenance is more complex than the maintenance of Hardware.

Degradation, Self-Recovery/Preventive Maintenance and Fault Tolerance

There is no doubt that any system is prone to degradation, that is, loss of quality which is usually overtime. In the course of planning and designing systems, designers often times consider the design of a fault tolerant system, that is, a system which is capable of operating normally even in the event of failure of some its component parts. This is also referred to as graceful degradation.

Consider the figure blow:



Another term used for graceful degradation is self-recovery, as seen in the graph above, the system's performance once a while fails, but it quickly recovers back to the utmost performance level. The dip in the graph shows failure in one or more of the system components at a particular time.

Operating Methods of Fault Tolerance

(a) Role Duplication: More than one components of the system have the same tasks directed to them and the correct result is chosen based on the highest number of components returning the same output/results.
(b) Failover: In case of failure from a component of the system, another component takes over the tasks of the failed components.

Fault-Tolerance Requirements

(a) Multiple Point of Repairs: Failure of a component does not stop the operation of the whole system during repairs.
(b) Fault Isolation: The system isolates the failed component to that offending component alone.
(c) Fault Containment: Overall system failure might occur when some components fail, this is avoided by disallowed the failure's propagation to the rest of the system.

Preventive Maintenance

This can be explained as the care and serving carried out on the systems for the purpose of keeping them in satisfactory operating condition through systematic inspection, error detection and correction of anticipated failures either before they occur or before they develop into major defects. Preventive maintenance is usually a planned maintenance whereby the maintenance is carried out before the fault occurs. It can also in some eases be condition-based maintenance whereby the conditions of operation of the system informs the need for the maintenance tasks to be executed. Wherever type of prevent maintenance adopted can also be achieved through remote maintenance operations, which means that maintenance work can be monitored and supervised automatically from remote locations.

User's Role in the Maintenance of ICT Systems

(a) Handle all system as specified or advised in the user's manual.
(b) In case of failures, users should gather all accurate and relevant information as regards such failures.
(c) User's should endeavour to have product specification handy at all times when reporting faults.

(d) User's can maintain a system's fault report in case the need arise to change technical.

Conclusion

That ICT systems are expensive and useful in virtually all sphere of personal and national life can not be overemphasised. The system makes communication to be faster and work flows to be smooth efficient. There is the need therefore to ensure that issues of ICT system maintenance is accorded the utmost seriousness it deserves.

Recommendation

(a) Systems should be designed in such a way that if a component fails, the whole of the system repairs the failed component(s).
(b) The function of each components can be replicated by other components so that if one component fails, others can pick up the tasks of the failed component.
(c) Users/customers of the system should ensure the proper usage of the system and make accurate and relevant report of malfunctioning of the system.

References

Roger, S. Pressman (1988). *Software engineering: A beginner's guide;* McGraw Hill Book Company; USA.

Degradation: Accessed from http://en.wikipedia.org/wiki/degardation on 15 June, 2012.

Faul Tolerant system: Accessed from htt://en.wikipedia.org/wiki/faulttolerant system on 15 June, 2010.

Graceful degradation: Accessed from htt://en.wikipedia.org/wiki/graceful degradation on 15 June 2010.

Researchers Create Self-Healing Computer Systems for Spacecraft; Accessed from http://www.physorg.com/news128009580.html on 15 June, 2010.