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- > Inorder to define software quality, we need to examine the different purspectives and expectations of users as well as other people involved with the development, management, marketing and maintenance of the software products.

 → Five major views a crossing to (Kitchenham and Pfleeger, 1996; Pfleeger et al., 2002) are:
 - 1) Transcendental view -
 - In this view, quality is hard to clopine is abstract terms but can be recognized if it is present.
- 2) User view -
 - Quality is gitness gos purpose or meeting user's needs.
- 3) Manufacturing view-Quality means conformance to process standards.
 - The jours is on inherent characteristics in the product itself in the hope that controlling there internal quality indica

in the hope that controlling these internal quality indicators will result in improved external product behavior.

- 5) Value based view -
 - Quality ès customers willingness to pay jor a software.
- → Rifferent people will have different views of quality based on their notes and responsibilities.
- → people can be divided into a categories with Jocussing on QA and quality engineering:

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1) Consumers It includes austomers who are responsible gorthe acquisition of reflivere products or services and users who use the

It includes anyone involved in development, management maintenance, marketing and service of software product. Third party participants involved in add-on products & services, software packaging, software certification etc. are also

Quality expectations on the consumer side:-

> The basic quality expectations of a user are that a software system performs useful quantions as it is specified. There are 2 basic elements to this expectation:

(i) it performs sight junctions as specified that gits the user's redo (ii) it performs these specified junctions correctly over repealed use or over a long period of time, or performs its junctions

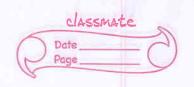
> For many lives of today's ubiquitous software and systems
ease of use or usability may be more important quality
expectation then subiability.

> Ease of installation is another major trend for software
intended for today's population.

Quality expectations on the producer side:

> For software producers, the most important quality question is to julie their contractual obligation by producing software products that conform to product specifications or providing services that conform to service agreement.

> For product and service managers, adherence to pre-selected



software process and relevant standards, proper choice of software methodologies, languages and tools, as well as other factors may be closely sulated to quality. > usability and modifiability may be paramount Jon keople involved with software service, maintainability Jon maintenance personnel, portability Jon third-party on software packaging service providers and profitability and customer value Jon product marketing.

Quality framework and ISO 9126:-

Iso 9126 provides a hierarchical gramework zor quality definition. There are 6 top-level quality characteristics, with each associated with its own exclusive out-characteristics.

I Functionality - A set of attributes that bear on the existences of a set of functions and their specified properties. The functions are those that oatisfy stated or implied needs.

The subcharacteristics include:

a) suitability - rejers to the appropriateness of the junctions of

b) Accuracy - rejers to the correctness of the functions 9 Interoperability - This subcharacteristic concerns the ability of a software component to interact with other components or systems.

d) Security - relater to unauthorized access to the software

2] Reliability - A set of attributes that bear on the capability of conditions gor a stated period of time. The sub-characteristics

10) Maturity - concerns frequency of jailure of the software to Fault tolerance - The ability of porturare to withstand and recover from component or environmental failure of Recoverability - ability to buing back a jailed system 3 Usakility :- A set of attributes that bear on the effort needed for use and on the individual assessment of such use, by a stated or implied set of users. The sub-characteristics include: a) Understandability - Determines the case of which the system functions can be understood, relates to user mental models in Human computer Interaction methods b) Learnability - Learning grort for different users, i.e novice, expert, casual etc. a given user in a given environment. 4 Efficiency - A set of attributes that bear on the relationship between The level of performance of the software and the amount of resources used, under stated conditions. The sub-characteristics include: a) Time behavior-Characterizes response times for a given throughput, i.e. transaction rate. D Resource behavior - characterizes resources used, i e memor

Maintainability - A set of attributes that bear on the effort needed to make specified modifications. The sub-characteristics include:

cpu, disk and network usage.

a) Analyzability - characterizes the ability to identify the stoot cause of a failure within the optione.

b) Change a bility - characterizes the amount of export to change



a system:

a system:

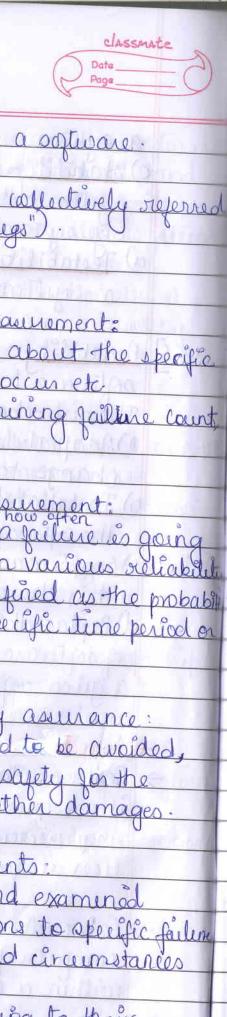
a system:

a system that is the negative impact that may be caused a) Testability - Characterizes the effort needed to verify (test)
a eystem change. 6 Portability - A set of attributes that bear on the ability of oftware to be transferred from one environment to another. The sub-characteristics include: a) Adaptability - characterizes the ability of the system to change to reweperifications or operating environments.

b) Installability - Characterizes the effort required to install the software O conformance - similar to compliance for junctionality this characteristic relates to portability. d) Replaceability - characterizes the plug and play aspect a given resturare component within a specified environment * Correctness and Defects : Definitions, properties and Measurement > Failure: The inability of a system on component to perform
its required functions within specified performance
requirements. It refers to a behavioral deviation from the
user requirement on the product specification. > Fault: An incorrect stop, process or data definition in a computer program. It reject to an underlying condition within a software that causes certain failures to occur.

> Error: A human action that produces an incorrect result.

It rejers to a missing or incorrect human action resulting



in certain faults being injected into a software.

dejects: Failures, jaults and errox are collectively referred to as dejects (also rejected to as "bugs").

Properties and measurements:

D'failure properties and direct jailure moavement:
- Failure properties include information about the specific

failures like, what they are how they occur etc. we can measure these properties by examining failure count, distribution, density etc.

Failure likelihood and reliability measurement:

- Failure likelihood regers to how likely a failure is going to occur. This likelihood is captured in Various reliability measureds, where reliability can be defined as the probability of failure-free operations for a specific time period or for a given set of input.

failure severity moasument and sayety assurance: failures with severe consequences reed to be avoided, contained or dealt with to ensure the sayety for the personnel involved and to minimize other damages.

* fault properties and related measurements: Individual jaults con le analyzed and examinad according to their types, their relations to specific failure and accidents, their causes, the time and circumstances when they are injected etc. faults can be analyzed collectively according to their distribution and density over development phases and

different software components

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	Defeats in context of QA:
	Ensuring quality means dealing with dejects 3 generic way of dealing with dejects (i) deject prevention
. —	3 generic way of dealing with defects
WALF	(i) deject prevention
	i) deject detection and removal
ANGE	(iii) deject containment.
uro5 k	Inminim sup Militar dish palating the water base or
	In the process of dealing with dejects, various direct deject
	measurements and other indirect quality measurements
	can be taken which will form a multi-dimensional mousure-
imile	ment space superved to as quality profile. Using various
w hat	models these measurement results need to be analyzed
	to provide quality assessment and feedback to the overall
copy to	software development process.
Mina	Paragraph pairs and the property of the proper
	Quality engineering can be viewed as deject management
ngv c	can be viewed as a deject management
-	United to the second se
	(i) quality planning before specific QA activities are carried out
	(i) quality planning by one specific QA cictivities are carried out (ii) execution of planned QA activities
361 2	III) measurement, analysis and feedback to monitor &
- 10	Control the QA activities
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