Software Testing

Presented by

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What is Software?

- ✓ Computer instruction or data.
- ✓ Various kinds of programs are used to operate computers.
- ✓ Anything that can be stored electronically.
- ✓ Set of instruction used to manage and control various function.

What is Testing?

✓ Testing means checking.

✓ Testing is finding out how well something works.

What is Software Testing?

✓ Process of identifying correctness, completeness, security, and quality of developed s/w application.

✓ s/w testing is an activity whether to check the actual result matches the expected result.

✓ Process of executing program or application or s/w with the intent of finding s/w bugs.

Why Software Testing is important?

- ✓ Point out defects & errors that were made during the development phase.
- ✓ It's essential to make sure customer reliability & satisfaction in the application.
- ✓ To prove s/w has no faults (s/w can't be 100% defect free)
- ✓ If s/w is with defect it can't be used by clients.
- ✓ s/w testing is important because s/w bugs could be expensive or even dangerous.

Example

1. China, airline Airbus A300 crashed due to s/w bug 16th Apr,1994 killing 264 people.

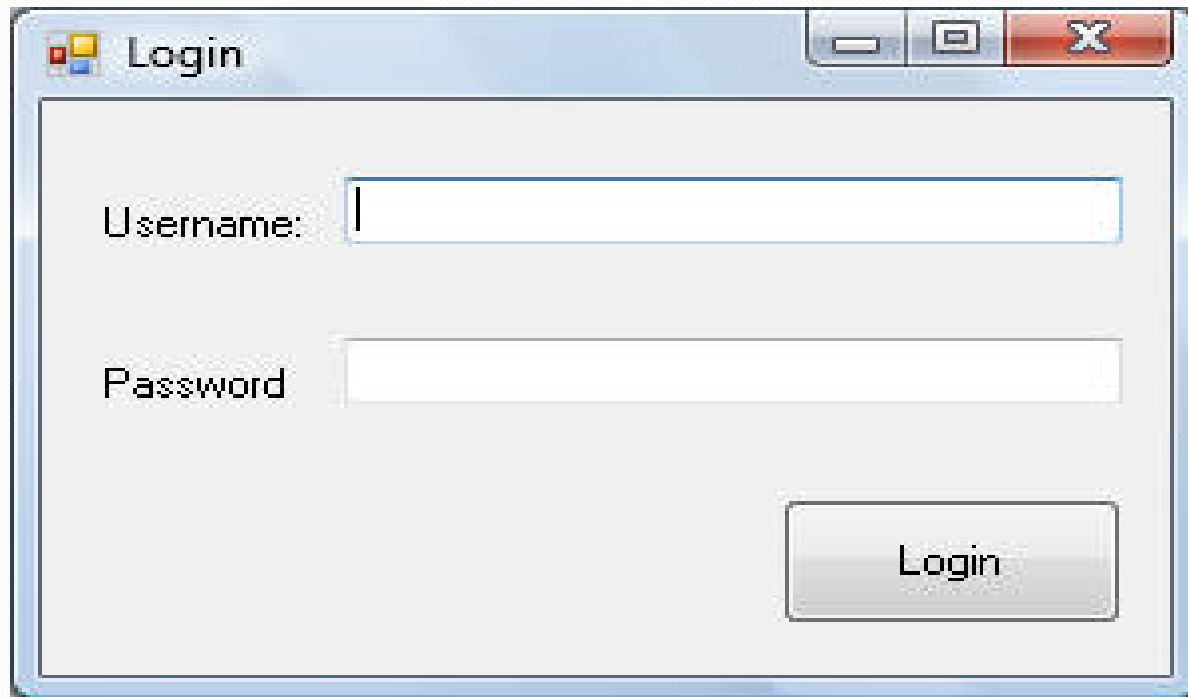2. Canada, Therac -25 radiation therapy which is used on cancer, due to high radiation doses patients dead.

Objective of Testing

- Find defects

- GET them fixed from developer

Why there is a need of tester?

- ✓ Human can't find their own mistakes.
- ✓ The Developer will do only positive testing.
- ✓ The Developer may ignore their own faults.
- ✓ Developer constructs s/w but by removing s/w faults tester. construct quality & they try to break the s/w application.
- ✓ Tester checks are s/w in positive & negative ways.
- ✓ Tester will find more defects than the developer.
- ✓ The Tester's mindset is different from the developer's.

Example

What are the qualities of a good s/w tester?

- ✓ Analytical skills
- ✓ Technical skills
- ✓ Good verbal & written communication
- ✓ Great attitude test to break
- ✓ Willingness to learn & suggest process improvement
- ✓ Passion of testing
- ✓ Ability to apply basic fundamental knowledge
- ✓ Out-of-the-box thinking

Role of Tester

- ✓ To understand requirements.
- ✓ To write test scenarios & test cases.
- ✓ Execute test cases.
- ✓ To make defect report.

SDLC (Software Development Life Cycle)

It is a process used by the s/w industry to design, develop and test high-quality the s/w.

SDLC aims is to produce a high-quality s/w that meets customer expectations, completed within time and cost.

1. Requirement Gathering and Analysis
2. Design
3. Coding
4. Testing
5. Deployment
6. Maintenance

1. Requirement Gathering and Analysis

Requirement- need of the customer

Gathering- a collection of requirement

Analysis- doing a detailed study

- ✓ Business Analyst (BA) person gathers all the requirements from the customer. BA is a domain expert.
- ✓ BRS & SRS document created here. BRS (Business Requirement Specification & Software Requirement Specification)

2. Design

- ✓ Done by s/w designer.
- ✓ HLD & LLD document created here. (High-Level Design- Structural & Low-Level Design- Program Level)

3. Coding

- ✓ Done by s/w developer (coder).
- ✓ Source code (.exe file) document created here.

4. Testing

- ✓ Done by tester.
- ✓ Test Plan, Test Scenario, Test Case, and Defect Report document created here.

5. Deployment

- ✓ Done by Installation Team.
- ✓ User Manual document created here.

6. Maintenance

- ✓ Done by Configuration Management Team.
- ✓ Change Request Document created here.
- ✓ When a customer starts using the developed system then actually the problem comes up & needs to solve from time to time the process where care is taken for the developed product is known as maintenance. (upgrade, enhancement & bug fixing)
- ✓ If the OS version changes it may necessary to introduce some changes in the program.
- ✓ New modules are to be added to the existing system this is nothing but the enhancement.

MODEL's

- ➢ Waterfall Model
- ➢ Multi-waterfall Model
- ➢ Spiral Model
- ➢ Agile Model

Waterfall Model (Linear Sequential Model)

Requirement Gathering and Analysis

⬇

Design

⬇

Coding

⬇

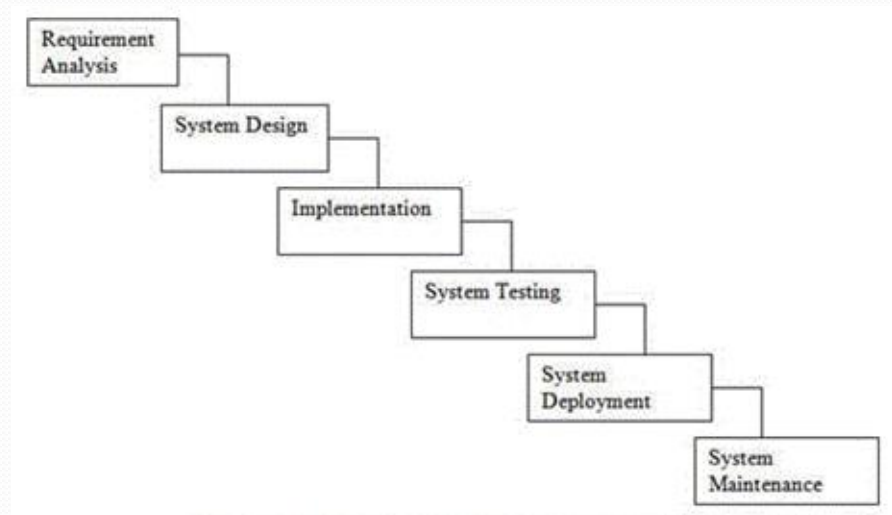Testing

⬇

Deployment

⬇

Maintenance

- Waterfall means rainfalls, once it goes down it can't be reverted back.
- When 1st phase is finished then and then only we will jump to the next phase.
- After the design phase, we can't go back to the RGA phase.
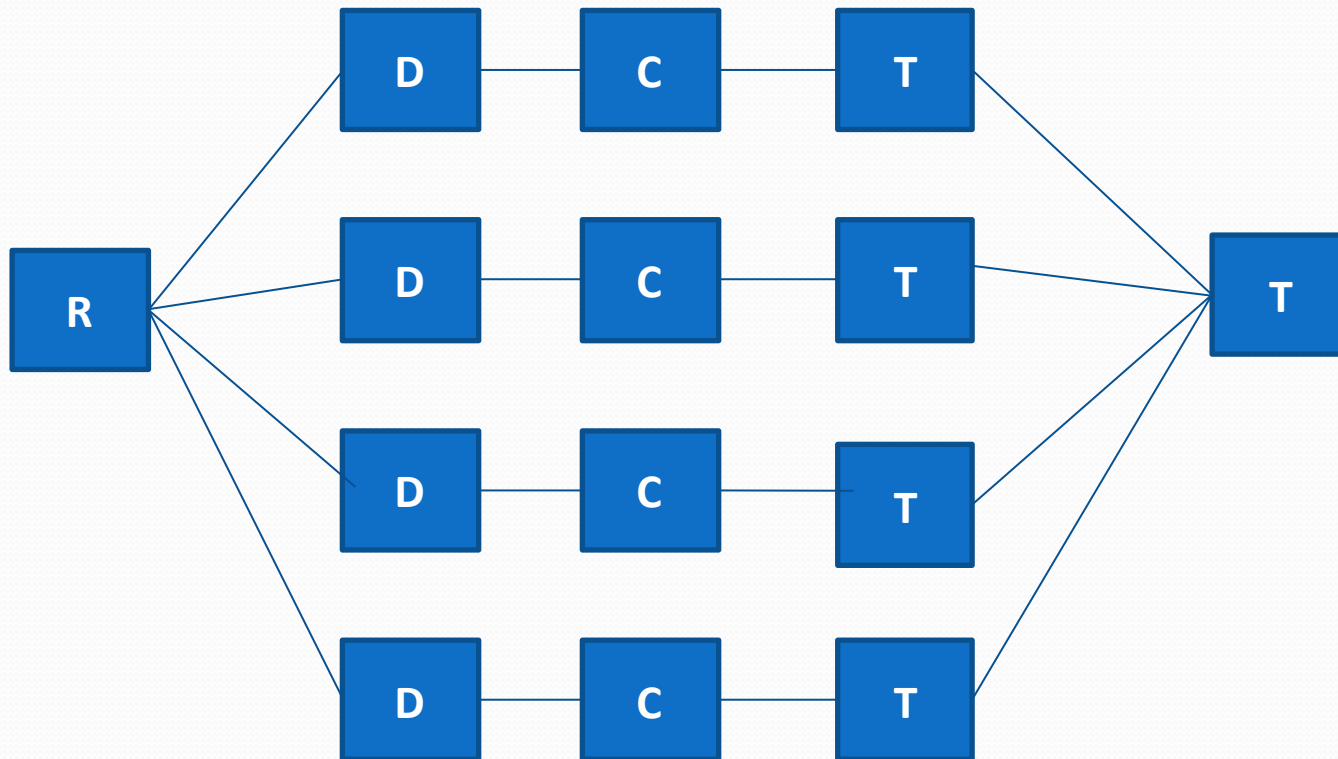- Only used when a customer is cleared about his requirement.

Advantage

- Good for small projects.
- Required less budget & time.

Disadvantage

- Not good for large projects.
- Future adjustment is not possible.
- Defects are carried forward.

Multi-waterfall Model (incremental/iterative model)

- ✓ Combination of one or more waterfalls.
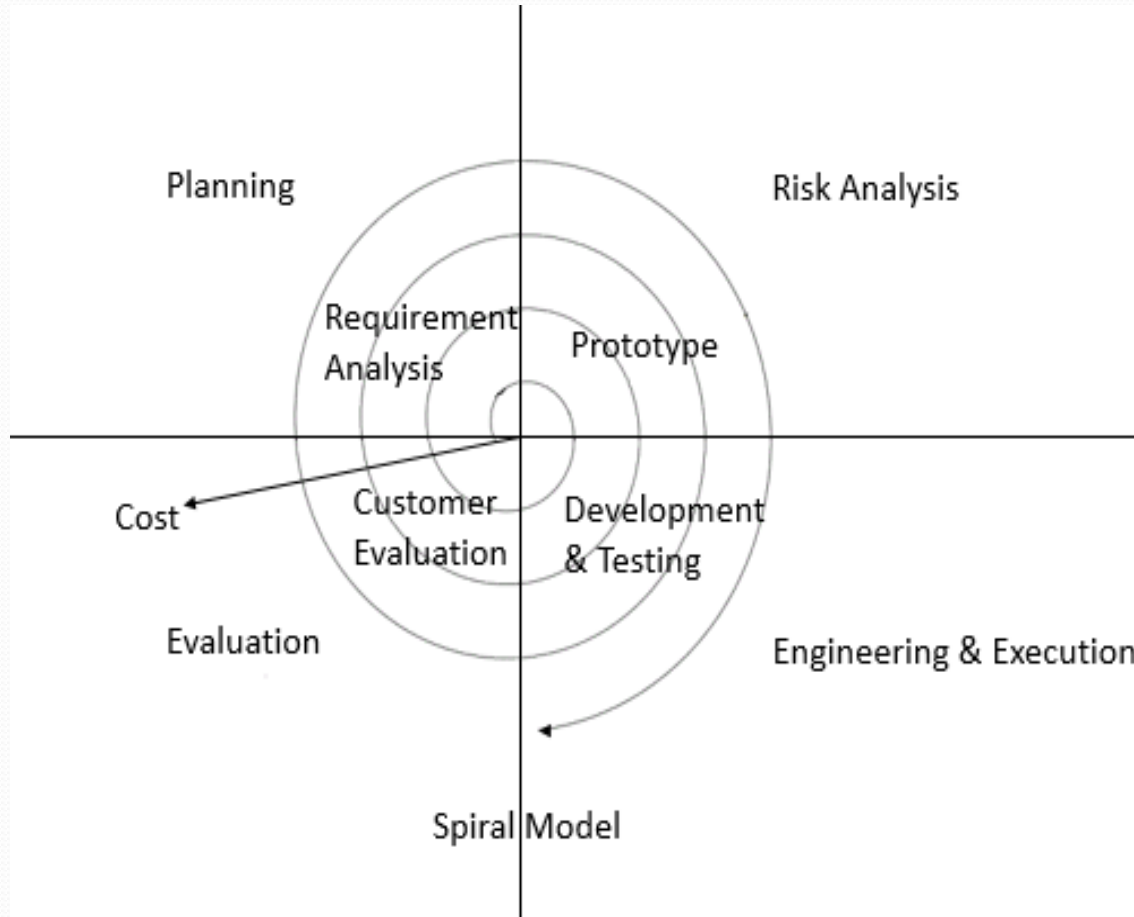- ✓ Requirements are divided then each module is developed separately.

Advantage

- Less time.

- High-level design.

- Building & improving product step by step, hence we can track defect step by step.

Disadvantage

- Costly.

- Required more man power.

- Needs good planning and design.

Spiral Model (incremental/prototype)

- In this model, the product undergoes each phase repeatedly calls a spiral.
- Changes are done but the product does not release till the customer is not satisfied.
- This model is used only when the customer is not clear about his requirement.
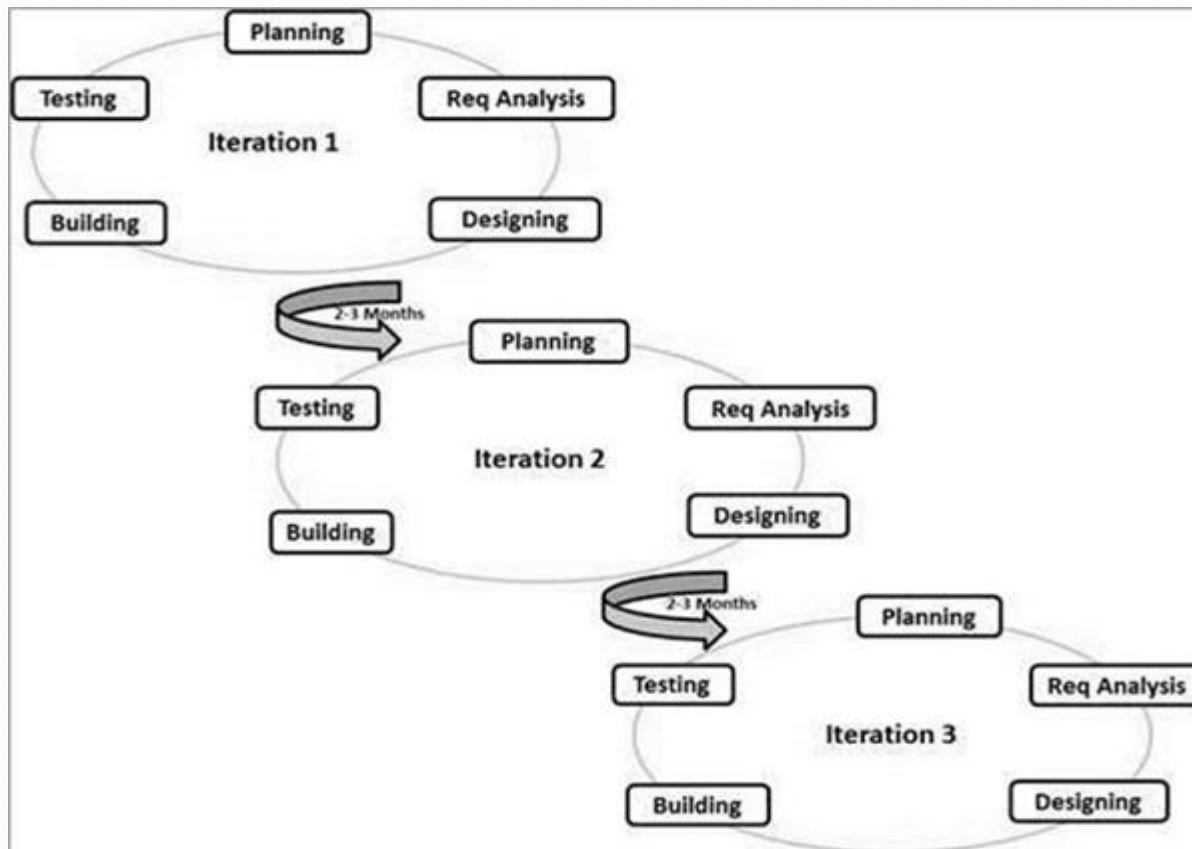
Advantage

- Rollback is possible.

- Importance is placed on risk.

- s/w get ready in the early stage.

Disadvantage

- Not good for a small project.

- Need expertise.

- Costly.

Agile Model

- ✓ Type of incremental model.
- ✓ You can release your product and can get feedback.
- ✓ Very fast development done in agile.
- ✓ Used in critical applications.

Advantage

- Customer satisfaction by rapid continuous delivery of useful s/w.

Users, developers, and testers constantly interact with each other.

- A Face-to-face conversation is the best form of communication.

- Regular adaptation to changing circumstances.

Even late changes in requirements are welcome.

Disadvantage

- Problems in designing and documentation.

QMS (Quality Management System)

Definition of Quality

- ✓ Measuring customers satisfaction is difficult because customer can't clearly specify in numeric values what makes them satisfied.

- ✓ Meeting requirements, expectations, and needs of customers.

s/w being free from defect.

- ✓ Quality in a product or service is not what suppliers put in. It is what the customer gets out and is willing to pay for.

- ✓ Measurement of correctness and completeness of your product.

A Quality product is one which is fit for use to perform it's intended function, with reasonable cost & within time.

IEEE, CMMI, ISO, ANSI, Six Sigma (Motorola)

QA (Quality Assurance)

  QA ensures that approaches, techniques, methods & processes designed for the project are implemented correctly.

QC (Quality Check)

  QA ensures that approaches, techniques, methods & process designed for the project are followed correctly.

Difference between QA & QC

QA	QC
QA aim is to prevent the defect	QC aim is to identify the defect
Process oriented	Product oriented
s/w is not executed here	s/w is executed here
Planning for doing process	Action for executing planned process
Responsible for SDLC	Responsible for STLC
Verification	Validation

Cost of Quality

1. Preventive Cost (before building)

2. Appraisal Cost (after building)

3. Failure Cost (after release)

- Defect- It is variance between actual result and expected result.
- Error- Error term is used by programmer.

  Run-time error & compile time error.

  Fault

  Failure   This term used by end user.

  Incident

  Problem

- Bug- When programmer confirms that defect is present then it is termed as bug.

Defect categories

1. Functional Defect

A. Wrong

B. Missing

C. Extra

2. Non-Functional Defect

GUI, performance & security-related defects.

Difference between wrong, missing & extra

Wrong	Missing	Extra
s/w does thing that specification says it should not do Eg.2+2=5	s/w does not do something that specification say it should do Eg.2+2	s/w does something that specification does not mention Eg.2+2=4.0

Methods of Testing

1. Black Box Testing
2. White Box Testing

Black Box Testing
- ✓ It's a software testing method in which the internal structure of the item being tested is not known to the tester.
- ✓ Also known as behavioural testing.

Techniques of Black Box
1. ECP
2. BVA
3. Error Guessing

ECP (Equivalence Class Partitioning)

✓ Divide data into two classes Valid & invalid

✓ Take a minimum of 3 values to test.

✓ If any 1 value is accepted it means all values will be accepted because behaviour is the same.

Requirement- a/c should accept temperature between 16-32

In-valid	Valid	In-valid
...............................15	16------------------32	33..................

12,18,35

Advantage

- It reduces no. of i/p data & test cases also.
- It saves your time without affecting test coverage.

As per the tester's experience, they found lot of defects at the boundary that's why BVA comes into the picture.

There is a chance of misplacing the operators by the developer.

For E.g. if temp>16

Then accepted

If temp<32

Then accepted

BVA (Boundary values analysis)

- ✓ Divide data into two classes Valid & invalid.

- ✓ Take values like -1 min +1 & -1 max +1.

- ✓ 6 values we can test. We can reduce 1 value. (Test either 17 or 31)

In-valid	Valid		In-valid
	16-------------------32		
	16 32		
15	17 31		33

15,16,17,31,32,33

Error Guessing

- ✓ Done by anyone, fresher as well as experienced people.
- ✓ Experience people will find more defects than freshers.
- ✓ As they will concentrate on boundaries.
- ✓ Random Testing is done during this.
- ✓ No document is followed.

White Box Testing

- ✓ It's a software testing method in which the internal structure of the item being tested is known to the tester.

- ✓ Generally, it is done by the developer.

- ✓ White Box Testing is also known as Clear Box Testing, Open Box Testing, Glass Box Testing, Transparent Box Testing, Code-Based Testing, or Structural Testing.

STLC (Software Testing Life Cycle)

Software Testing Life Cycle (STLC) is the process used to improve the quality of the product.

1. Test Planning & Control
2. Test Analysis & Design
3. Test Implementation & Execution
4. Evaluating Exit Criteria & Reporting
5. Test Closure Activity

1. Test Planning & Control

- ✓ Planning is very important to achieve goals within time.
- ✓ A **Test plan** is a document created by the test manager.
- ✓ In this document, he will mention when to start testing, when to stop testing, scheduling, and approaches.
- ✓ To make a test plan document he will refer to SRS, development plan, and project plan.
- ❖ SRS- Technical document.
- ❖ Development plan- When to start testing.
- ❖ Project plan- When to stop testing.

- ✓ In the control phase, Sr. person will take the follow up with Jr. If they are following the test plan document or not. if they are not following, Sr. person can take action or give suggestions.

2. Test Analysis & Design

- ✓ Sr. tester will analyse SRS document.
- ✓ Testable requirement funded here.
- ✓ Test scenario document created by Sr. tester.
- ✓ Sr. person will set up the environment according to clients expectations.

3. Test Implementation & Execution

- ✓ In this phase Sr. tester will create a test case by referring scenario document & in execution Jr. person will execute the test case. Jr. tester will create an execution log in which he will mention how many test cases are passing & fail.
- ✓ Jr. person will create a defect report document in which he will mention all failed test cases.

4. Evaluating Exit Criteria & Reporting

✓ Exit criteria mean when to stop testing, that criteria is mentioned in the test plan document.

✓ In this phase Jr. tester will evaluate the execution log, if he achieves the desired quality of the product, he will exit testing activity & reporting he will create summary report of defects.

5. Test Closure Activity

✓ In this phase whatever documents are created in above 4 phases will submit to a concerned person & who will make a track list of a defect for future reference.

Thanks! for watching..