~~Chapter - 06~~

~~Architectural design:-~~

28/03/2019

Chapter - 07 Design and Implementation

Object-Oriented design using the UML:-

To develop a system design from concept to detailed object oriented design, there are several things that you need to do:-

1. Understand and define the context and the external interactions with the system.
2. Design the system architecture
3. Identify the principal objects in the system
4. Develop design models.
5. Specify Interfaces.

1. System Context and Interactions:- * The first stage in any s/w design process is to develop an understanding of the relationships b/w the software that is being designed and its external environment.

* understanding of the context also lets you establish the boundaries of the system.

* The system boundaries helps you to decide what features are implemented in the system being designed and what features are in other associated systems.

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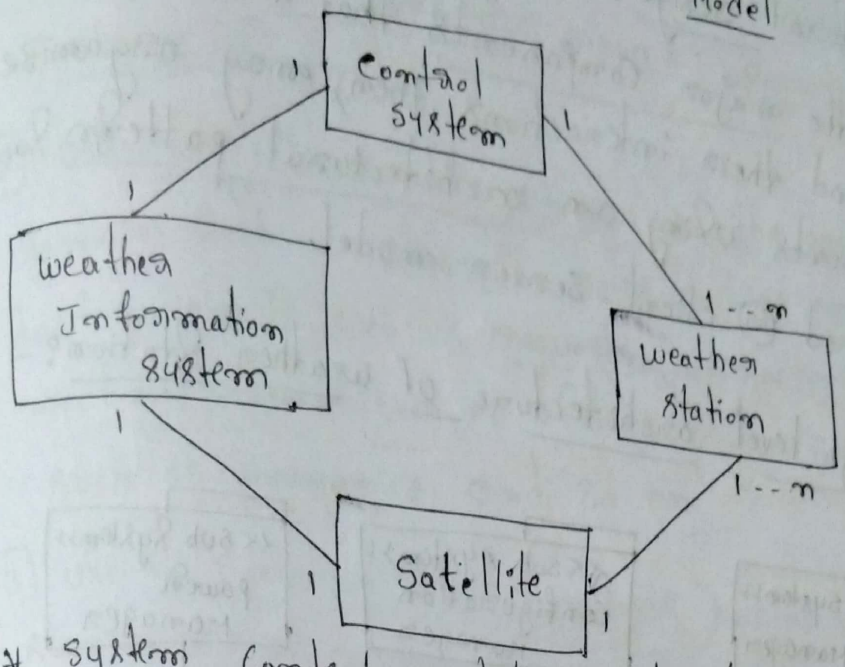
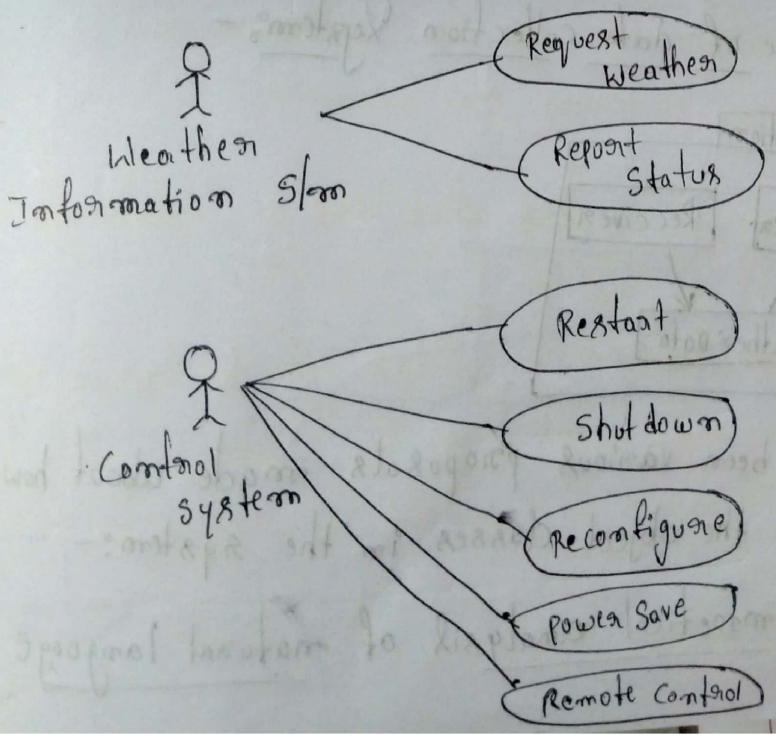
Q:- Weather Station of Context Model



* System Context model is structural model that demonstrates other System in the environment.
* where, as interaction model is the dynamic model, How the System interacts with it's environment.
* we use an abstract approach that doesn't include too much detail in preparing interaction model, one of the way to use this is 'use case model'

→ The Weather Station Use Case:-



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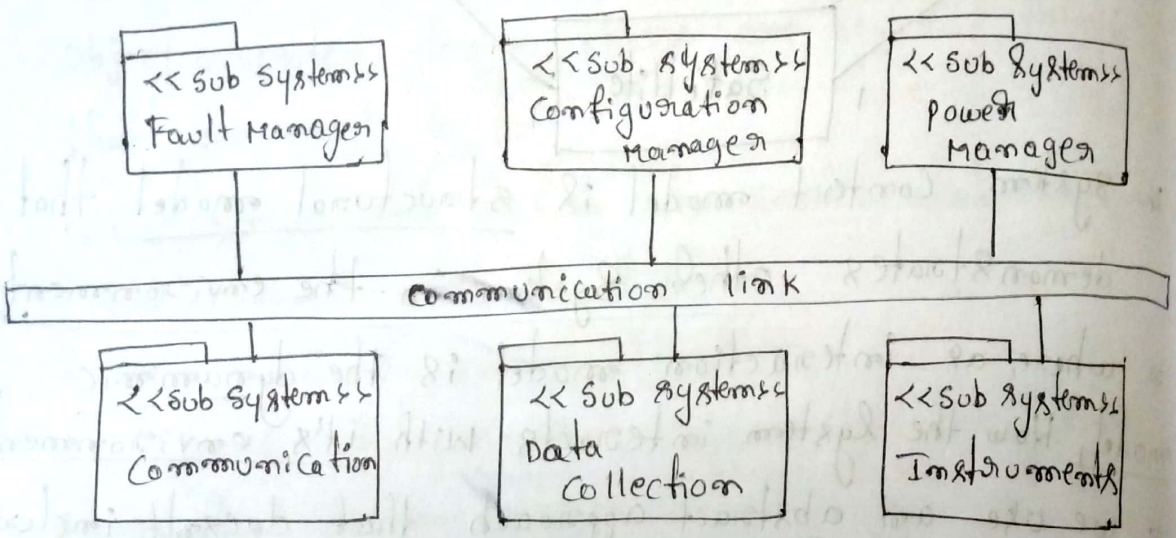
2) Architectural design:- In Architectural Design we identify the major components that make up the systems and their interactions then, may organize the components using an architectural pattern such as a layered or client-server model.

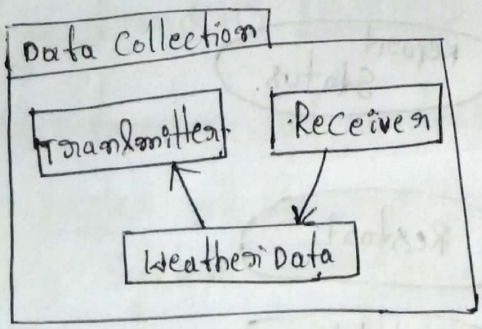
fig: High-level architecture of weather station:-



* By this stage of designing process we got some ideas about essential object in the system.

→ object class identification:-

Architecture of data collection system:-



There have been various proposals made about how to identify the object classes in the system:-

1] use a grammetical analysis of natural language

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description of the system to be constructed. objects and attributes are nouns: operations (or) services are verbs

2) use tangible entities (things) in the application domain such as aircraft, roles such as manager (or) doctor, events such as requests, interactions such as meetings, locations such as offices, organizational units such as companies and so on.

3) use a scenario-based analysis) where various scenarios of system use are identified and analyzed in turn.

ex: weather station objects

weatherStation
identifier
reportWeather() reportStatus() powerSave(instruments) - - -

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Chapter: 08 · SOFTWARE TESTING

Definition:- Testing is a process of software verification, ~~Inspection~~, validation and review of Software Inspection.

(On) Software Testing:-

Software Testing is a process intended to show that a program does what it is intended to do and to discover the program defects before it is put into use.

Testing process has two distinct goals:-

1) To demonstrate the developer and customer that the software meets it's requirements.

2) To Discover the situations in which the behaviour of software is incorrect undesirable and doesn't Confirm to it's specification.

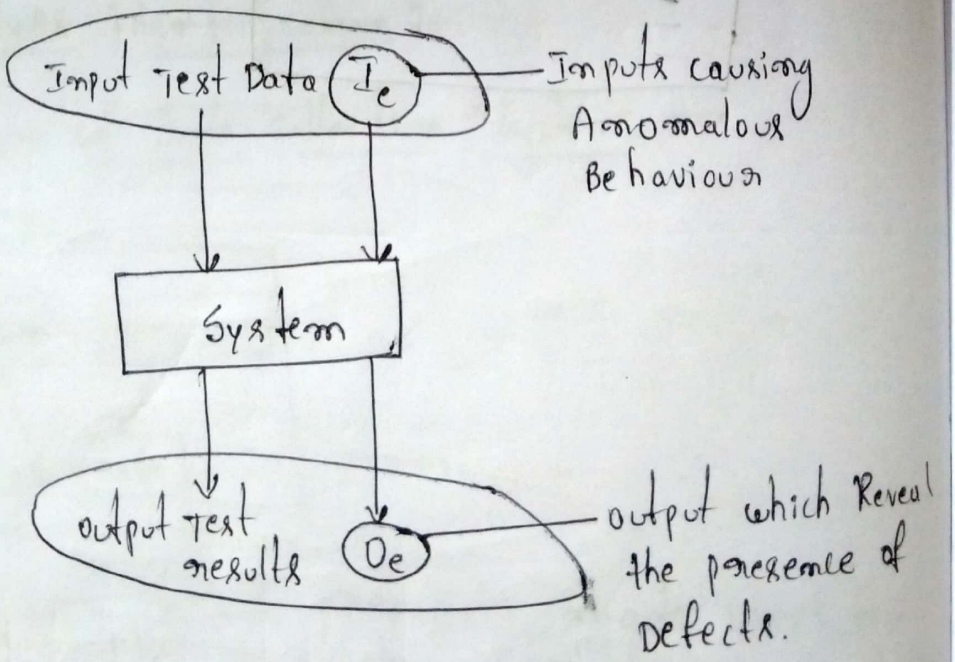

fig: Input - output model of program testing

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* Testing can show presence of errors, not their absence.
* Testing is the part of Broader process of S/w verification and validation.

- Verification:- Are we building the product right?
- Validation:- Are we building the right product?

* Verification and validation are the processes concerned with checking that software being developed meets its specification and the expected functionality.

* These checking process starts as soon as requirements become available.

* Verification is to check the s/w meets it's stated functional and Non-Functional requirements.
* Validation is to ensure that the s/w meets the customer expectations.

* The ultimate goal of the verification and validation process is to establish the confidence that the s/w system is "fit for purpose"

The purpose are namely:-

1) s/w purpose
2) User expectations
3) Marketing environment.

* As well as s/w testing the verification and validation process may involve - s/w inspection and reviews.

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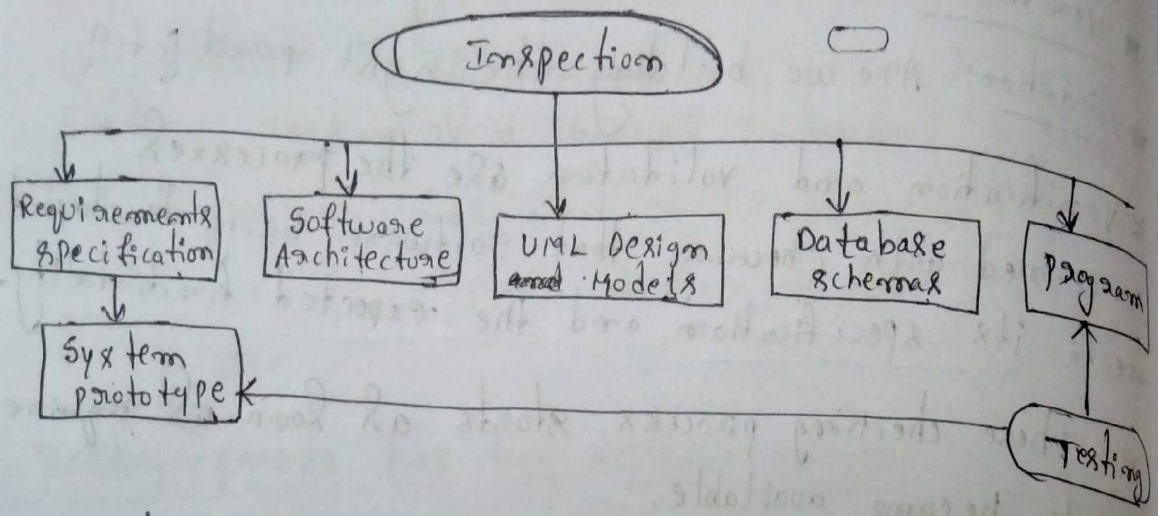
* Inspection and reviews analyzed and check the System requirements, design models, the program source code, and even proposed system tests. There are so-called 'static' V and V techniques.



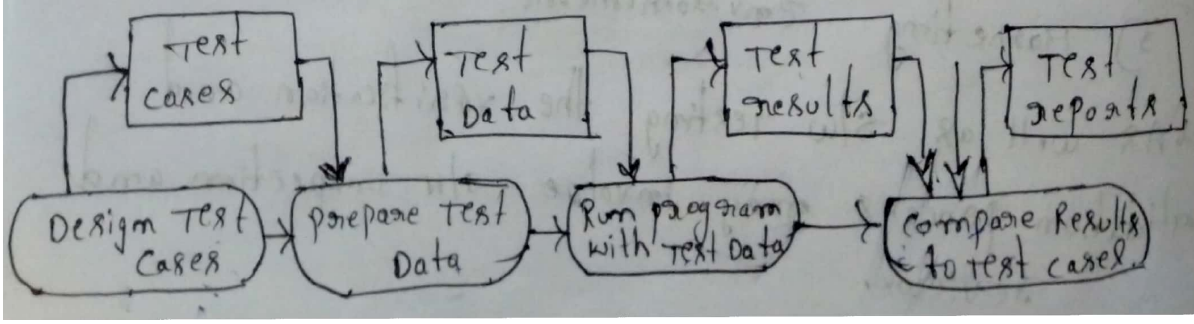
Advantages of S/W Inspection over Testing:-

1) During the error can hide other errors. It's leads to unexpected outputs.

2) Incomplete versions of a system can be inspected without additional costs.

3) Searching for program defects, an inspection can also consider broader quality attributes, compliances with standards and portability and maintainability.

=> The commercial s/w system has to go through three stages of testing:-



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1) Development Testing:- where the System is tested during development to discover bugs and defects.

2) Release Testing:- where a seperate testing team tests a complete version of the system before it is released to users.

3) User Testing:- where users (or) potential users of a system test the system in their own environment.

1) DEVELOPMENT TESTING:- During the Development testing may be carried out at three levels of →

i) unit testing
ii) component testing
iii) System testing

i) unit testing:- It is the process of testing program components such as methods (or) object classes.
* where the individual functions (or) methods are tested.

→ Functionalities of unit testing:-

* Test all operations associated with the objects
* Set and check the values of all attributes associated with the objects.
* Put the objects into all possible states. This means you should simulate all events that cause the state change.

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→ Choosing unit test cases:-

* Testing is expensive and time consuming; so it is important that you choose effective unit test cases. Effectiveness in this case means two things:-

1) The test cases should show that, when used as expected, the component that you are testing does what it is supposed to do.

2) If there are defects in the component, these should be revealed by test cases.

ii) Component testing:-

iii) System testing:- System testing during development involves integrating components to create a version of the system and then testing the integrated system.

* S/w testing checks that components are compatible, interact correctly and transfer the right data at the right time across their interfaces.

Two important things to be considered during S/m testing are:-

1) Reusable components are identified

2) Components developed by different team members or groups may be integrated at this stage. System testing is a collective rather than an individual process.

* S/m Sequence Diagram and Use case modeling are used to focus on interaction b/w the components and objects that make up a system.

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Test driven Development:-

* It is an approach to program development in which we interleave testing and code development.
* Such that the code increamentally along with the test for increments: we don't move on to the next increments until the code that have developed passes it's test.
* Test driven development are introduced as a process of 'Agile method'

Process of Test Driven Development:-

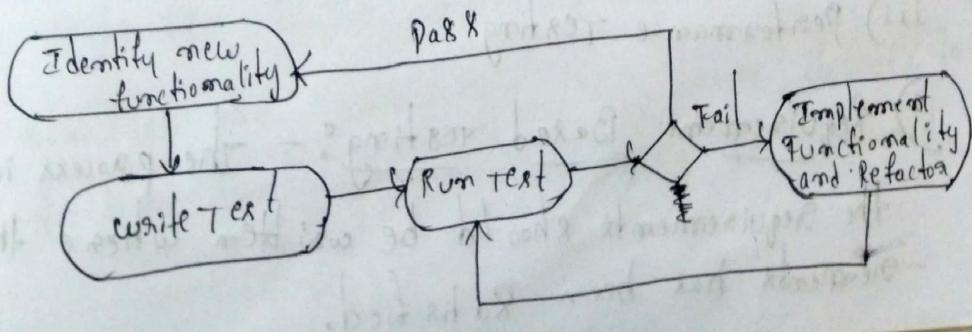
1] we start by identyfying the increment of functio-nality that is required.

2] write the Test for this functionality and implement this as an automated test.

3] Run the test, along with all other tests that have been implemented.

4] then Implement the functionality and re-run the test. This may involve refactoring existing code to improve it and add new code to what's already there

5) once all tests run successfully, you move on to implementing the next chunk of funtionality.



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- Advantages:-

1) Code Coverage
2) regression testing
3) Simplified debugging
4) System Documentation.

2) RELEASE TESTING:- Release testing is a process of testing that is intended for use "outside of the development team"

The two important difference b/w Release and S/m testing:-

1) A seperate team not been involved in the system development should be responsible for release testing
2) System testing by the Development team should focus on discovering bugs in the system.
3) Release testing is usually belongs to "Black Box Testing Process"

Types of testing:-

i) Requirement Based testing
ii) Scenario testing
iii) Performance testing

1) Requirement Based testing:- The process in which the requirements should be written where the requirements has been satisfied.

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Requirement based testing, therefore, is a systematic approach to test cases design where you consider each requirement and derive a set of tests for it.

2) Scenario Testing:- Scenario testing is an approach to release testing where you devise typical scenarios and develop the test cases for the system. A scenario is a story that describes one way in which the system might be used.

If you have used scenarios test should be ~~a~~ narrative story that as part of the requirement engineering process, then you may able to reuse these as testing scenarios.

3) Performance Testing:- Once a system has been completely integrated, it is possible to test for emergent properties, such as reliability.

Performance Test have to be designed to ensure that the system can process its intended load. This usually involves running a series of tests where you increase the load until the system performance becomes unacceptable.

Performance testing has two functions:-

1) It tests the failure behaviour of the system.

2) It stresses the system and may cause defects to come to light that would not normally be discovered.

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1) Development testing
2) Release Testing
3) User Testing

3) User Testing:- The Slw is tested along with the users

1) Alpha Testing
2) Beta Testing
3) Acceptance Testing

User / Customer Testing:- It is a stage of user testing in which user (or) cus provide i/p and advice on Slm Testing.

3 differe Types:

1) Alpha Testing:- where the users of the slw work with Development team to test the Slw at developer site.

2) Beta Testing:- where release of the Slw is made available for users

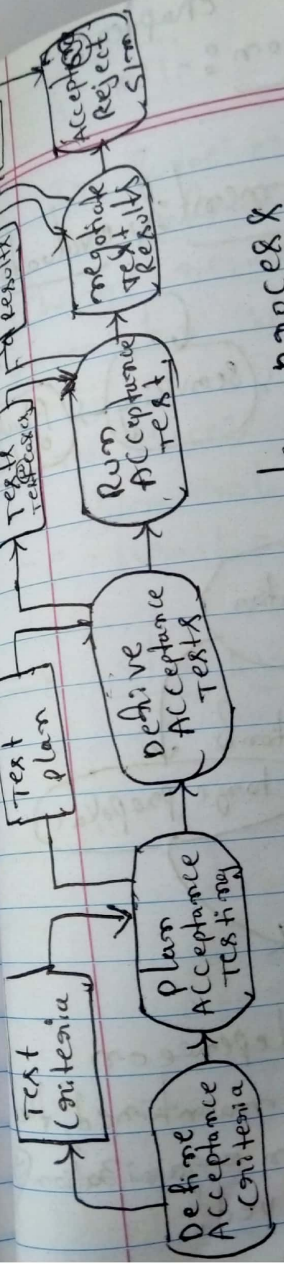

fig:- Acceptance testing process

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Software Evolution:-

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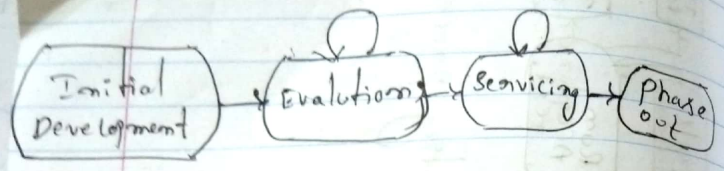
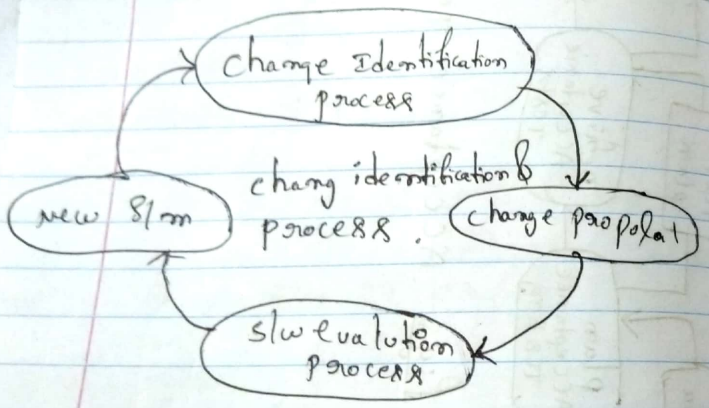
Spiral Model Development & evaluation:-





* S/w evalution process depence on the type of the S/w being maintained, the development process used in organization & skill of the people involved.

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* In some organization evalution may be an informal process where the change request mostly come from, conversation b/w S/m users and developer.

* The process of change ~~evalution~~ identification and S/m evalution are cyclic and continue through out the life time of the S/m

=> S/w Evalution process:-

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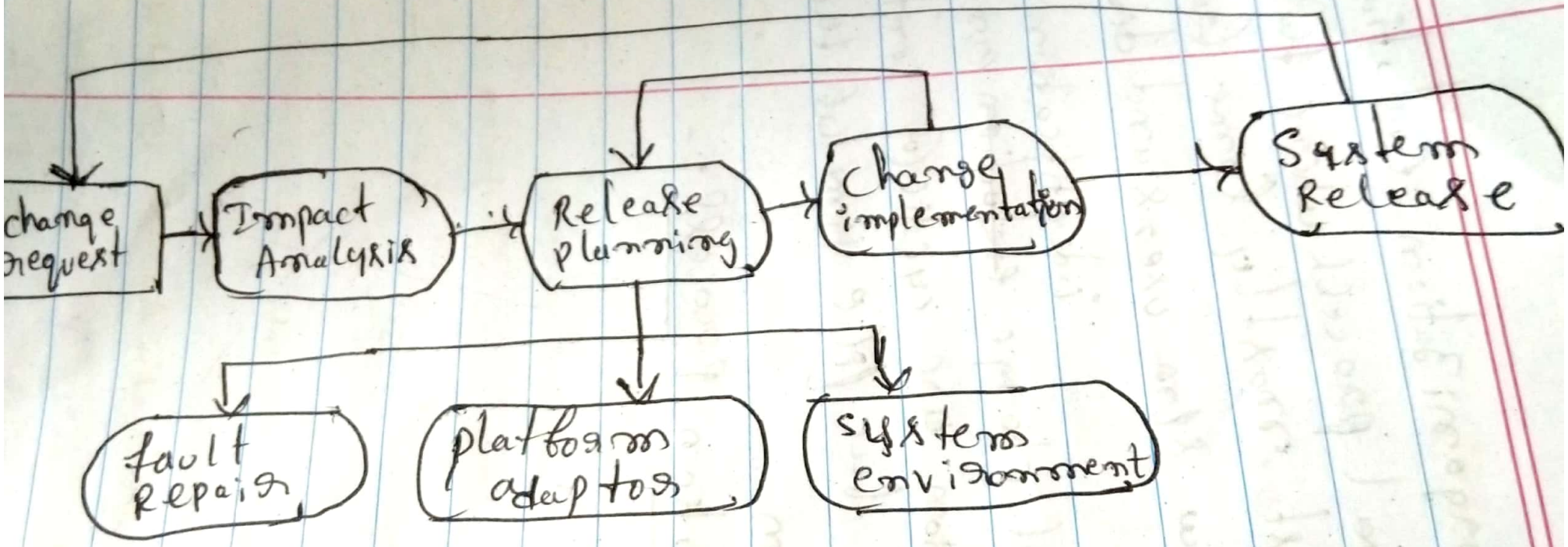

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Maintanance prediction:-

add entire feature to maintance.

Legacy System Management:-

For new S/w system developed using modern S/w engg process such as incremental development and component based. S/w engg it is possible to plan S/m development and evolution. More and more companies are started understanding that the S/m development process is whole life cycle process and ~~there is~~ a seperation b/w S/w development and S/w maintainance is un helpful that however there are still many legacy S/m there are critical business S/m. and fail have

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- to be extended and adopted to changing E-business practices.

The main strategic options of legacy SIM are:

1) scrap the SIM completely
2) leave the SIM unchanged with regular maintenance
3) reengineer the SIM to improve its maintainability
4) replace all parts of the SIM new SIM

1) Supplier stability
2) failure rate
3) age 4) performance
5) Support requirement
6) maintance cost 7) Interoperability

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