UNIT-4 TEST MANAGEMENT

PREPARED BY : PROF. MENKA CHAINANI

TOPICS OF MODULE

- Test Planning
- Test Management
- Test Process
- Test Reporting

INTRODUCTION

❑ Every project has definite beginning and definite end. The product or service is different in some distinguish way from all similar products or services. Because of we integrate Software Testing in each phase of the product and the software products do not have same type of features, testing also has different characteristics and what is tested in each version could not be same.

❑ Testing itself is considered to be a unique project on its own, planning, execution, tracking and periodical reporting is essential. In this chapter we will see how can we plan to manage all these activities, so that the effective testing can be done in the designated time period.

TEST PLANNING

- ❑ The goal of software tester is to find bugs, find them as early as possible & make sure that they get fixed.

- ❑ To achieve this goal through properly communicated & documented the test effort with well-constructed test plan, test cases & test reports.

- ❑ A Software Test Plan is a document describing the testing scope and activities. It is the basis for formally testing any software/product in a project.

- ❑ It identifies of test items, which features of application to be tested, the different testing tasks, who will perform the respective task & possible risks & their corrective measures.

TEST PLANNING

- ❑ Following are the major activity done as a part of test planning:
- ❑ Preparing a Test Plan
- ❑ - Scope Management
- ❑ - Deciding Test Approach
- ❑ - Setting Up Criteria for Testing
- ❑ - Identifying the Responsibility
- ❑ - Staffing & Training
- ❑ - Resource Requirement
- ❑ - Test Deliverables
- ❑ - Testing Tasks

TEST PLANNING

Preparing a Test Plan:

- ❑ Test plan plays an important role in the execution, tracking and reporting of the whole testing project which covers:

- ❑ What things to be tested? This defines the scope of the testing project.

- ❑ How the testing will be performed? This covers how the project will be divided into the small and manageable modules or tasks.

- ❑ What resources (either machines or humans) are required to conduct tests?

- ❑ What time duration is required to test particular function, module or project?

- ❑ What risk is associated with each testing task?

TEST PLANNING

Scope Management: Deciding Features to be tested or Not

❑ Different testing teams do the testing for various phases of testing. There can be a single test plan for all the phases and all teams, which is known as master test plan or there can be separate test plans are there for different phases and different testing teams.

❑ Scope management refers to specify the scope of a test project. The following activities are included in the scope management.

1.Understanding what constitutes a release of a product.

2.Breaking down the product into multiple release by considering their features.

3.Assigning priority to each release based on features.

4.Deciding what features needs testing and what feature doesn't.

5.Conducting details of testing, so that estimation of the resource requirement can be made.

TEST PLANNING

Deciding Test Strategy:

❑ Once the product is divided into multiple releases based on its features, the next step is to find more details of what is to be tested, so that exact estimation of size, effort can be made and proper scheduling can be arranged. This activity includes:

1. Type of testing for testing functionalities.

2. Configurations and scenario for testing functionalities.

3. Identify the proper integration testing method.

4. What localization validation would be needed?

5. Which non-functional tests are needed?

TEST PLANNING

How to set Testing Criteria:

Different testing phase should have clear entry and exit criteria. To test various features, different type of tests, or combination of different tests has to be used. For each type of test, clear entry criteria have to specify which defines the start of the testing phase. Similarly, for each type of test cycle exit or completion criteria has to be specified which defines the end or completion of particular test cycle.

TEST PLANNING

Identify Staff, Responsibility and Training:

❑ After completion of the above activities, we need to select proper staff to conduct different tests, assign responsibility to that staff and we also need to do arrangement for the training to the staff if it is needed.

❑ Testing project requires different employees to play their role differently. Appointment of test leaders, test manager and testers, and assigning different responsibilities to each role plays vital role in the testing process.

TEST PLANNING

Identify Resource Requirements:

❑ As a part of the planning, after choosing the staff and assigning the responsibilities, providing resources is equally important activity. In the planning which testing team need which resources is planned out. These resources may include:

1.Configuration of Machines (CPU, RAM, Hard-Disk etc.).

2.Test automation tools.

3.Some supporting tools like compilers, interpreters, data generators, Operating Systems etc.

4.Any special hardware or software if it is need to conduct special type of test conduction.

5.Appropriate number of licenses software.

TEST PLANNING

Identify Test Deliverables:

❑ Test Deliverables are nothing but the outcome, we are expecting from the testing team after completion of the various tests. In the planning phase we need to determine the exact format of the Test Deliverables. The Test Deliverables may have following things:

1. The test plan itself (Master test plan or any other test plan given to perform).

2. Specification of test case design.

3. Test cases with any automation mention in the test plan.

4. Test logs generated during testing process.

5. Summary report of the test.

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TEST PLANNING

Estimation of Size and Effort:

❑ Estimation of size is an important parameter of software development process.

❑ After computing size, we can compute effort needs to be given to the software product and finally based on the effort we can estimate the cost of the software product.

❑ Size of the product is obviously determining the amount of testing that needs to be done. If the product is large in size, then the testing effort will be increased. Few of the measures of the size of the product under test are listed below:

TEST PLANNING

Estimation of Size and Effort:

1.LOC: LOC or Lines of code is one to the parameter to estimate the size of the product. In this method how many lines of code need to write to implement the software product is estimated. Based on number of lines of the code first the size of the software product is estimated and then based on the size, effort and cost will be estimated. Even though, there are some problems are there in this method of size estimation, LOC is still a popular measure for estimation of the size of the software product.

TEST PLANNING

Estimation of Size and Effort:

2.FP: Function Point is another popular method of estimation of the size of the software product. It is difficult to estimated lines of code when the software is yet to build or under development. In this method the size of product is estimated based on the number of functions needs to write and number of IO screen required to implement the software. Lines of Code (LOC) size estimation method only focus on number of lines of code to be written in the software, whereas Function Point (FP) considers number of functions (code), inputs, outputs, interfaces, external data files and enquires too.
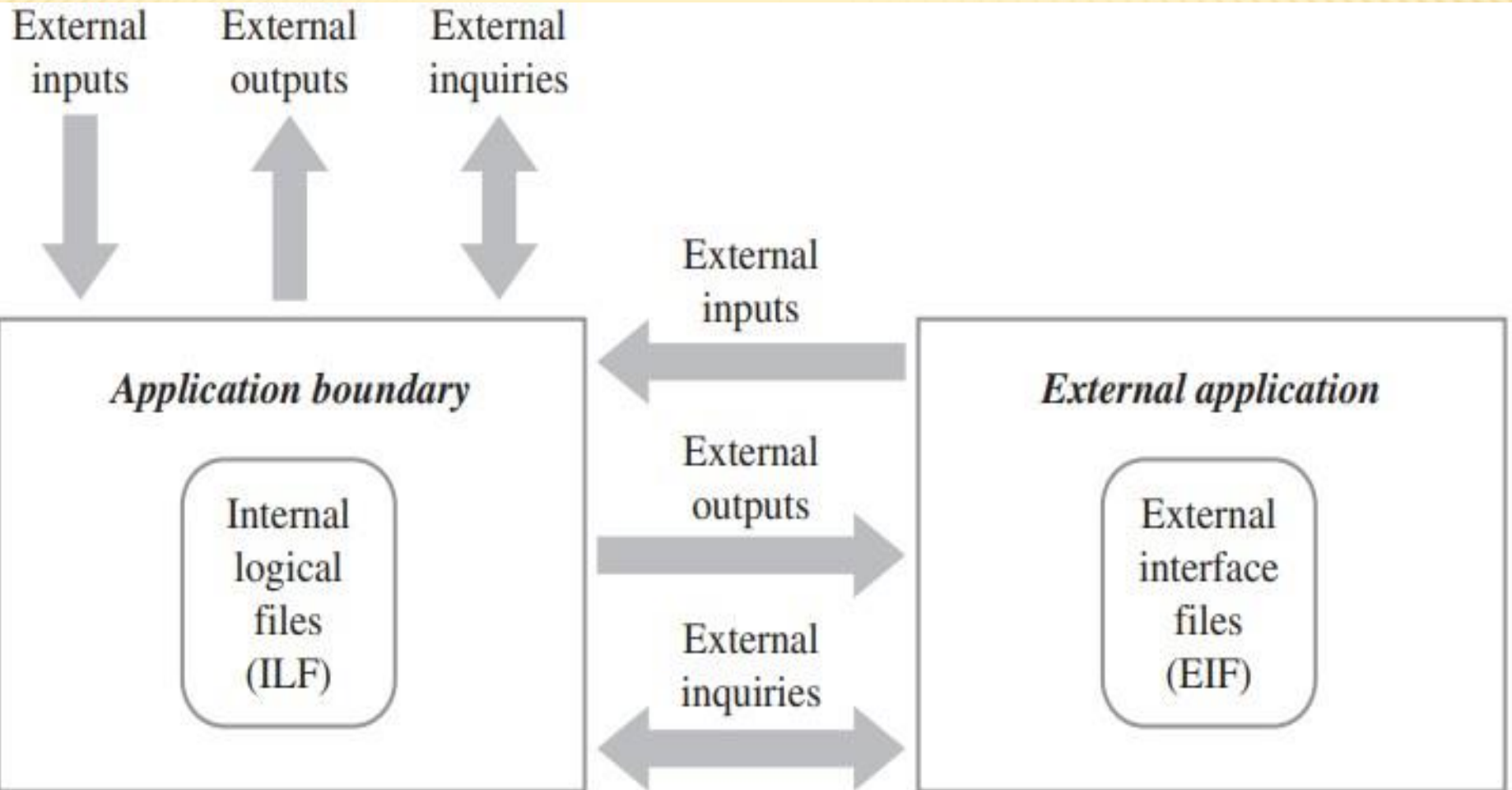
TEST PLANNING

Estimation of Size and Effort:

Figure 6.5 The Application Boundary for Function Point Analysis

TEST PLANNING

Estimation of Size and Effort:

For example, let's say that after reviewing an application system, the following was determined:

- ❑ ILF: 3 Low, 2 Average, 1 Complex
- ❑ EIF: 2 Average
- ❑ EI: 3 Low, 5 Average, 4 Complex
- ❑ EO: 4 Low, 2 Average, 1 Complex
- ❑ EQ: 2 Low, 5 Average, 3 Complex

TEST PLANNING

Estimation of Size and Effort:

Table 6.1 Computing UAF

	Complexity			Total
	Low	Average	High	
Internal logical files (ILF)	3 × 7 = 21	2 × 10 = 20	1 × 15 = 15	56
External interface files (EIF)	___ × 5 = ___	2 × 7 = 14	___ × 10 = ___	14
External input (EI)	3 × 3 = 9	5 × 4 = 20	4 × 6 = 24	53
External output (EO)	4 × 4 = 16	2 × 5 = 10	1 × 7 = 7	33
External inquiry (EQ)	2 × 3 = 6	5 × 4 = 20	3 × 6 = 18	44
Total unadjusted function points (UAF)				200

TEST MANAGEMENT

- ❑ Execution can be either manual or automatic. The user will have to perform all the test steps manually and inform the result of the tests. There are several ways to run tests.

- ❑ The simplest way to run a test is to run a test case. The test case can be associated with other test artifacts such as test plans, test scripts, test environments, test case execution records, and test suites.

- ❑ The ultimate goal of test management tools is to deliver sensitive metrics that will help the manager in evaluating the quality of the system under test before releasing

TEST MANAGEMENT

Choice of Standards:

❑ Standards plays important role in the planning of an organization. There are two types of standards – External Standards and Internal Standards.

❑ External Standards are standards that a product should obey with, which are externally visible and are usually stipulated by external people.

❑ From a testing point of view, these standards include standard tests supplied by external people and acceptance tests supplied by customers.

❑ Compliance of the external standards is usually done by external parties.

❑ Internal standards are standards formulated by the internal staff of the testing organization to bring consistency and predictability. Testing organization itself standardize the processes and working methods within the organization. Internal Standards includes:

1. Naming conventions for the test artifacts.

2. Standards of document produced and used.

3. Test coding standards.

4. Test reporting standards

TEST MANAGEMENT

Choice of Standards:

1.Naming convention for the test artifacts: Every test artifact should have proper and meaningful name. If the test artifacts have proper and meaningful names then it made it easy to identify the tests artifacts. Proper and meaningful naming convention process also made easy mapping between the functionality and its corresponding test cases. For an example: Product P with modules M01, M02 and M03 are mapped with test suits PM01nnnn., PM02nnnn., PM03nnnn.. This two-way mapping between the product functionalities and tests enables identification of proper tests to be modify and run when product functionality changes.

TEST MANAGEMENT

2.Documentation Standards: Most organization set standards for documentation and coding for their ease communication convenience within the internal staff of the organization. Documentation standards are set of rules of preparing documentation. Documentation Standards specifies how to capture information of the particular test and its result. The documentation standard may include:

1. Suitable header to the beginning of a file that indicates the functions to be served by that particular test.

2. Enough in-line comments, which explains the functions served by the test.

3. Up-to-date information of change history and recording of all events.

TEST MANAGEMENT

3.Test coding standards:

Test coding standards enforce how the test cases themselves are written. It goes one level deeper into the tests. These standards may be:

1. Enforce the right way to initialize the test, and indicates how the test makes the results autonomous of other tests.

2. Indicates the ways of how to name variables within the code to make sure the program is readable and understand it easily.

3. Test coding standard also encourage of reusability of test artifacts.

4. It also includes standards interfaces like hardware, operating system and so on to the external entities

TEST MANAGEMENT

4.Test reporting standards:

Testing process is tightly interlinked with the quality of the product; all the stakeholders must get timely and consistent view of the test progress. Test reporting address this issue and provide guidelines to the testers, up to which of details should be produced in the reports.

TEST MANAGEMENT

Test Infrastructure Management:

Testing needs a robust infrastructure to be planned in advance. The essential elements of the Test

Infrastructure management are listed below:

1. Test Case Database (TCDB)

2. Defect Repository (DR)

3. Software Configuration Management Tool and Repository (SCM).

Test Case Database (TCDB) is a database which records all required information about all test cases

of an organization. Some entities and its attributes are given in the following table

TEST MANAGEMENT

Test Infrastructure Management:

Entity	Attributes	Description
TestCase	• TestCaseID • TestCaseName • TestCaseOwner • AssociatedFiles	Stores the static details of the test cases.
TestCase_Product_CrossReference	• TestCaseID • ModuleID	This table stores the mapping details between various modules and its test cases.
TestCaseExecutionDetails	• TestCaseID • Execution Date • Time taken • Test Result	This table records the details of the execution of a test case and its results
TestCase_Defect	• TestCaseID • DefectIDRef (Points to defect Repository)	This table maps the defect with particular test is executed on particular project.

TEST MANAGEMENT

Test Infrastructure Management:

Defect repository records all the details related to defect reported on particular product. The defect repository plays an important role in communication that affect work flow within an organization. The Defect Repository records the following information:

TEST MANAGEMENT

Test Infrastructure Management:

Entity	Attributes	Description
Defect_Details	• DefectID • Defect_Priority • Description • Affected_Products • Product_Version • Environment_Info • Problem_Statement • DateTime_Defect	Stores all the static information about defect.
Defect_Test	• TestCaseID • DefectID	Map the Test Case with particular Defect.
Fix_Details	• DefectID • Defect_Fix_Details	Map the Defect with Steps taken to fix the defect.
Communication	• TestCaseID • DefectID • Communication_Details	Records the communication done between internal staff to resolve defect on particular test case.

TEST MANAGEMENT

Test Infrastructure Management:

Apart from Test Case Database (TCDB) and Defect Repository (DR) one more repository is needed in Test Management is Software Configuration Management repository. It is also as Configuration Management or CM repository, which maintain change control and version control of all the files which are associated to particular software product. Change control ensures the following things:

1. Changes made in the particular Test file, is done by the authorize person and in controlled fashion.

2. Changes made by a test engineer should not be lost or overwritten by another test engineer.

3. Each change (at any particular time) generates a unique new version of the file.

4. Every test engineer should have access to the recent version of test file at any point of time.

Test Infrastructure Management:

Test Case Database (TCDB), Defect Repository (DR) and Software Configuration Management (SCM) repository are complements to each other and work together in integrated manner as shown in the following figure. DR links different defects, their fixes and tests, where the necessary files will be in SCM. Meta data about the modified files of tests will be in TCDB.

TEST MANAGEMENT

Test People Management :

❑ The importance of skilled testing has been proven during many software projects. An application or product success is high just because of use of efficient & effective testing techniques.

❑ It is commonly said that bugs/defects are found based on the skills & knowledge of a tester & the dedication of the test teams. A test team is formed of people with varying skills & experience levels.

❑ Also these team members come up with different expertise levels, different attitudes & different expectations & interest level. So in order to maximize quality, all these factor has to be integrated correctly & have to bridge the skill gap if necessary.

❑ They need to work together, follow the applied test processes & deliver the work within specified schedule. This generates the need for test management which is perform by test lead.

TEST MANAGEMENT

Test People Management :

Test Lead Skills:

To lead team of tester with full efficiency. This is required to meet the product goal & ultimately organization goal.

Test Lead Responsibility:

☐ Identify how the test team are formed & aligned within an organization

☐ Decide the way through which roadmap for the project & organization can be achieved

☐ Identify the scope of the testing using requirement document

☐ Create healthy environment for all resources to gain maximum throughput

☐ Identify skill gap present or not & Identify the tools required during testing

☐ Check what skills are required for testing

TEST PROCESS

Test process is a process of testing any software project to improve the quality of that software. Test process is a process of series of main activities like:

[1] Preparing test plans

[2] Designing test cases

[3] Execution of test cases and

[4] Reporting outcome of test cases.

The test process can be explained with following activities

TEST PROCESS

[1] Baselining Test Plan:

❑ A Test Plan represent multiple points in the form of single document, which will act as an anchor for the whole testing process.

❑ An organization design several templates for the test cases and each testing project has to be tested based on the template. Any change in the template is applied after careful deliberations.

❑ Before any modification in the template, the test plan is revied by many designated people of an organization. It will be then approved by competent authority and then it will be applied into the template and then test plan is baselined into the Software Configuration Management (SCM) repository.

TEST PROCESS

[2] Test Case Specification:

With the help of test plan, testing team will design the test case specifications, which will become the base in the preparation of individual test cases. The test case should have following things:

1. Purpose of Test Case.

2. Items to be tested with their versions and releases.

3. Environment needed to conduct the test case.

4. Input data to be used in the test case.

5. Steps to execute test case.

6. Expected result or outcome.

7. Steps to compare actual result with expected result.

8. Relationship if any between this test case to other test cases.

TEST PROCESS

[3] Developing Test Cases:

❑ Test engineer needs to develop Test Cases based on Test Case Specification. In this phase, test engineer can choose any method, that testing is done using manual test cases or by using automation system. Here the specification is transformed into the Test Cases.

❑ If the test engineer has chosen, automation instead of writing manual test cases, then in this phase a test engineer has to write automation scripts.

TEST PROCESS

[4] Executing Test Cases:

❑ The prepared test cases will be executed at appropriate time on the project. During the execution of the test cases the defect repository will be updated with:

1.Defects from the earlier test cycles that are fixed in the recent build

2.New defects if any, found during the current test run.

TEST PROCESS

[5] Preparation of Test Summary Report:

- ❑ After completion of a test cycle, a detailed summary report of the testing is produced. This test summary report will be observed by senior management and decide the fitness of the product to be release.

TEST PROCESS

Update of Traceability :

☐ Requirement Traceability Matrix (RTM) is a document that maps and traces user requirement with test cases.

☐ It captures all requirements proposed by the client and requirement traceability in a single document, delivered at the conclusion of the Software development life cycle.

☐ The main purpose of Requirement Traceability Matrix is to validate that all requirements are checked via test cases such that no functionality is unchecked during Software testing.

TEST REPORTING:

❑ Process of testing needs continues communication between the testing team and other teams. There are two types communications that are needed:

[1] Test Incident report

[2]Test Cycle report and

[3] Test summary report.

[1] Test incident report:

Test incident report is basically a communication report, used during the testing cycle when the defect is found in the project.

Test incident report is nothing but data entry is made in the defect repository when the defect is detected during the testing process.

Those defects which have high impact on the project is mentioned in the test summary report.

TEST REPORTING:

[2] Test Cycle Report:

❑ Testing project needs many test cycles to complete. During each test cycle planning and execution of various test cases are conducted. After completion of each test cycle a newer build of product is form, which will be more stable version of the product then it's previous build. At the end of each test cycle, a test cycle report is produced which gives the following information:

1.A summary of all activities conducted during entire test cycle.

2.Details of the uncovered defects, detected during the test cycle.

3.Progress of the current build compare to the previous build of product.

4.Defects which are pending to be fix in the current test cycle.

5.Variation if any observed in effort or schedule.

TEST REPORTING:

[3] Test Summary Report:

Test summary report is the final report produced after completion of all test cycle and software product is ready to release. Test summary report summarize the results of a test cycle reports produce during each test cycle.

Usually, test summary reports are of two types:

1.Phase-wise test summary report.

2.Final test summary report. (Which is produced at the time of product release).

A summary report should present the following things:

1.A detailed summary of the activity conducted during the test cycle.

2.Difference if any observed between the activity performed during testing and actually planned.

3.Summary of the result like test that failed with its reasons, impact of the defect on the project which is uncovered yet etc.

4.Complete evaluation and recommendation for the release.

EXERCISE

Question:1 Answer the following Questions in brief.

1.What is test management? Explain choice of standards in brief.

2.Explain elements of test infrastructure management in test management.

3.Write a short note on test process.

4.What is test reporting? Explain different types of test summary reports.

5.What is test planning? List all the steps of it. Explain any two in detail.

EXERCISE

Question:2 Fill in the blanks.

1. The _____ criteria specify when a test activity is started.
2. The _____ criteria specify when a test cycle can be completed.
3. A test cycle is an isolated activity. [True/ False].
4. _____ is done based on estimation of effort involved and availability of time for release.
5. _____ standards are externally visible to the customers.
6. _____ standards are formulated by a testing organization.
7. The elements of test infrastructure management are _____, _____ and _____.
8. TCDB stands for _____.
9. DR stands for _____.
10. SCM stands for _____.
11. The _____ contains all the information about the test cases in an organization.
12. The _____ captures all the details of defects reported for a product.
13. A _____ keeps track of change control and version control of all the files.
14. A _____ is a tool used to validate that every requirement is tested.
15. Using the test plan, the _____ is designed.
16. A report that summarizes the results of a test cycle is the _____ report.
17. A _____ is a communication that happens through the testing cycle when defects are encountered.
18. A _____ gives summary of the activities carried out during the testing cycle.

EXERCISE

Answers:

Que	Answer	Que	Answer
1	Entry	10	Software Configuration Management
2	Exit	11	TCDB
3	False	12	DR
4	Staffing	13	SCM or CM
5	External	14	Traceability Matrix
6	Internal	15	Test case specification
7	TCDB, DR, CM	16	Test summary report
8	Test Case Database	17	Test incident report
9	Defect Repository	18	Test cycle report