Here the company which developed the ERP software may carry out the maintenance phase or it may outsource the maintenance activities for the software. ERP softwares usually come with validity periods. The research paper projects an example of ERP software that undergoes maintenance phases and various problems that are encountered while carrying out the maintenance. When an organization outsources the ERP package for maintenance, the following problems arise:

➢ A clear picture of the software will not be known to the maintenance team

➢ Correct and factual source code may be missing

➢ Contradiction in understanding the new requirements of the customer.

➢ The maintenance team may not know where the problem lies and are not able to draw conclusions to the problems faced by the customer in using the software.

When the company that has developed the ERP software engages in the maintenance activities of the software, the problems faced by the maintenance team are less when compared to the problems faced by the organization who maintain existing software. But there are also many challenges that are faced by the developing and maintenance team. Some of the major challenges include:

➢ Problem in understanding the requirement of the customer.

➢ Users' new requirement is applicable or not.

➢ Changing the source code.

➢ Encounter ripple effect.

Case Study 1

Calcutta canvas developed as ERP package sized 250 kloc, with the development team size of 25 members. The project was undertaken over a period of 18 months. The maintenance of this software was carried out with traditional maintenance model and the software has the following modules:

• Import-export billing

• Stock

• Branch details

• Product details

The client desires to add a new module "invoice" and delete an existing module named "branch details". These modifications are implemented using the traditional method of maintenance process. Once the changes are made, supporters test the software to check for errors and rectify it. Later, the software is handed over to the client for use. The management team in the client's company evaluates the modified software to check if the desired modifications are incorporated.

Table 2: Maintenance using Traditional Model

PARAMETERS	VALUES
DEVELOPMENT TIME	60 Days
COST INCURRED	80 K
LINES OF CODE	90KLOC
.NUMBER OF SUPPORTERS' INVOLVED	11
.EFFORT	270.49

Observation:

The Traditional model fails to analyze the feasibility of the desired request by the client. This leads to high rate of effort, as the supporters' try to implement changes that are not applicable in the existing software. This in return affects the cost factor and the development time.

Case Study 2

Consider another ERP package name "Lata Super Stores' which is of size 200 Kloc developed by 20 developers over the span of 15 months with the development effort of 625.59 at the cost of 3.5L.This ERP has the following modules:

• Sales

• Purchases

• Accounting

• Inventory

- Billing

And it is assumed that the owner of the ERP software needs to add two other modules to the existing software named "Credit Sales" and "Stocks". The process of maintenance is carried out by the same organization that has developed the ERP package for the owner. As mentioned earlier, the challenges are faced by the maintenance team while carrying out the changes leading to delay in the delivery of the product after maintenance.

Thus considering these challenges a maintenance model, Entretian Model, is prescribed in this research paper helps to overcome the problems encountered. A step by step explanation of the various phases of the model with respect to the "Lata Super stores ERP" package is given below.

Change Request: The organization that enters into the maintenance of the ERP package is provided with the changes that are to be incorporated into the existing software in a prescribed manner. In the case example, the software "Lata Super stores " ERP package is to be updated by a way of adding two new modules in the software. These "change requests" made by the client are further examined for feasibility study and time and cost estimation.

Feasibility Study and Estimation: Once the supporters receive the change request, they test for feasibility and estimate the time and cost that will be incurred to incorporate the changes. Feasibility study analyzes whether the modules can be added to the existing software, without affecting the other existing modules of the package. The approximate time and cost that will be incurred in order to make changes to the software is estimated and a proposal is drafted by the maintenance team. The proposal is then handed over to the client for approval.

Client's Approval: The client receives the "feasibility study and estimation" document. The document reveals the cost that will be incurred to establish the changes. The tentative time within which the updated software will be delivered to the customer along with the effort rate is mentioned. If the client is satisfied with cost, time and effort estimates, the approved proposal is sent back to the supporters for development. If the customer calls for further changes, then modifications are made to the document accordingly and resent to the client for approval.

Software Modification: Once the proposal is approved, the supporters carry out the changes in a step by step process of a SDLC Model. First, the

SRS is modified. The new requirements are added to the existing SRS, in order to make it complete and correct. Once SRS is changed, SDD is altered by adding two new modules. Once SRS and SDD are altered, the supporters develop the coding for the two new modules "credit sales and stocks". Once the code is built, it is sent to the pre-production phase.

Pre-Production Phase: In the pre-production phase of Entretian Model, both unit and integration testing is carried out by developing test cases to check for errors, if any. In Unit testing, the two new modules are tested individually to check if any errors are encountered. These modules are then integrated with the existing ERP software to do system testing. This testing tells the supporter if any problem has occurred and if it causes a ripple effect in the modules. If errors are encountered, then new test suites are created to find out the source of errors and are rectified and tested again. Once the testing is done, the software is again put to work.

Production Phase: Once the testing is done and errors are rectified, the working of the software is checked. If all the above constrains are satisfied and the requirements are met, the software package is then handed over to the client to resume their work, with the two new modules "credit sales and stock" added, according to their request to the existing software.

TABLE 3: Maintenance using Entretian Model

PARAMETERS	VALUES
DEVELOPMENT TIME	45 Days
COST INCURRED	60 K
.LINES OF CODE	80KLOC
NUMBER OF SUPPORTERS' INVOLVED	7
.EFFORT	239.031

The below mentioned points justifies that implementation of "Entretian Model" to carry out maintenance of the ERP software overcomes all major problems that are encountered during the maintenance phase of the software development lifecycle.

> Users' new requirement is applicable or not.

The request made by the client is analyzed to check, if the request is feasible to be incorporated without damaging the existing software.

> Changing the source code.

The supporters may not incorporate the changes in SRS and SDD which results in incomplete and incorrect SRS and SDD. This is overcome in the Software Modification phase, where changes are made in SRS and SDD to make IT complete and correct.

> Encounter ripple effect.

Once the modules are created they are tested individually and then integrated with the existing software to test if there is any ripple effect. If any error occurs, they are rectified and then handed over to the customers.

Observation:

Entretian model helps the supporters' to analyze whether the particular change request made by the owner of "Lata super stores" can be implemented into the existing software without much effort, cost and time utilization. The study makes both the supporters' and client clear about the implementation of the requirements. The supporters' need not put efforts to implement requests which cannot be implemented in the existing software. This will reduce the effort rate, cost factor and the maintenance phase can be carried out in the less time.

TABLE 4: Factors considered during maintenance using Traditional Model and Entretian Model

PARAMETERS	EFFORT (PERSON MONTH)	COST INCURRED (Thousand)	LINES OF CODE (KLOC)	DEVELOPMENT TIME (Days)
ERP 1- Calcutta Canvas (Traditional method)	270.49	80	90	60

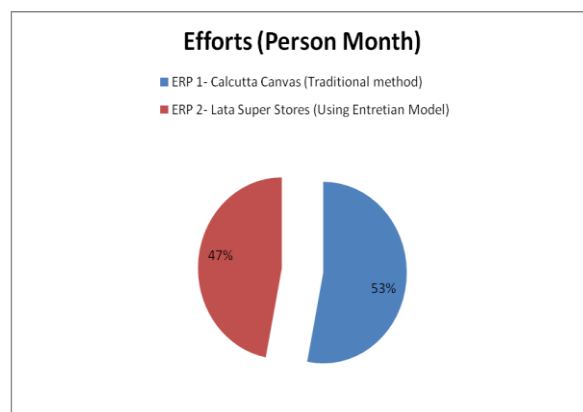|				
ERP 2- Lata Super Stores (Using Entretian Model)	239.031	60	80	45

Figure 3: Change in Effort (Person Month) using Traditional model and Entretian model
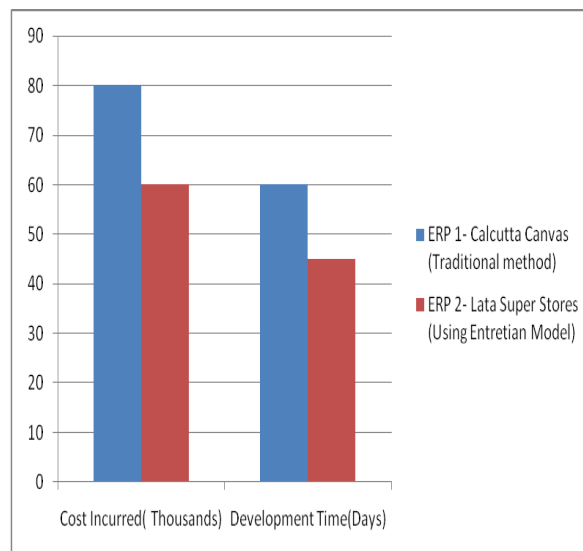

Figure 4: Comparative Chart to show the change in Cost Incurred (in Thousands) and Lines Of Code (KLOC)

4. Conclusion

Software maintenance is a broad activity that includes improving process efficiency or performance or restructuring the software to improve changeability. But In general, maintaining

software after delivering it to the customers is assumed to be an easy task. But the fact is, maintenance is the most important and challenging phase of an SDLC model. The maintenance of software differs from one application domain to the other. Though the change request varies from one project to another depending on the desires of the client, the development time, cost incurred and effort of the project can be compared as parameters in order to arrive at conclusions The minimum development effort required is also calculated in prior without affecting the time and cost estimations.

From Table (4) we infer that the effort in person months, cost incurred and lines of code of an ERP are drastically reduced if the newly designed "Entretian model" is used for maintenance. The traditional maintenance method holds good only for software packages with less complexity. But if the software is large, the complexity and challenges gradually increases which calls for an effective maintenance model like Entretian model, to reduce the development effort, cost and other development factors. An ERP can even be maintained using the traditional models but usage of Entretian model will overcome many challenges and also help in reducing the time and cost effectively. This maintenance model is highly recommended for the maintenance support team to handle most of the challenges faced during maintenance of software.

9. References

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