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## CERN - **ST** Division

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### ST LHC BUDGET FOLLOW-UP

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#### Abstract

The ST division is deeply implicated in the LHC project, with a budget of more than 20% of the overall cost of the project. It is therefore important to monitor future estimates, the actual situation and to see where there are divergences between the two. A database has been created presenting the figures for each contract, group, and for the division as a whole. Despite the various types of contract management, the system presents the results in a uniform manner. It allows the initial, present and future situations to be easily reviewed. This highlights any problem areas, facilitates decision-making and enables us to inform the hierarchy of any changes that may have occurred.

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## **1 INTRODUCTION**

The ST division has a significant role in the LHC project with a budget of more than 20% of the overall cost of the project. Thus it is important to monitor future estimates, the actual situation and to identify variances between them. The aim of this paper therefore is to look at budgeting in theory, to analyse the diverse activities of the ST-LHC project and show how the budgeting database has drawn together this information to respond to the needs of the division.

## **2 PROCESS COST MANAGEMENT THEORY**

Process Cost Management is a process which ensures that a project is completed within the approved budget. This entails:

- Cost Estimating - developing an estimate of the costs of the resources needed to complete project activities;
- Cost Budgeting - allocating the overall cost estimates to individual work items;
- Cost Control - controlling changes to the project budget.

Project cost management should consider the different requirements of those involved in the project as project costs may be measured in different ways and at different times.

### **2.1 Cost Estimating**

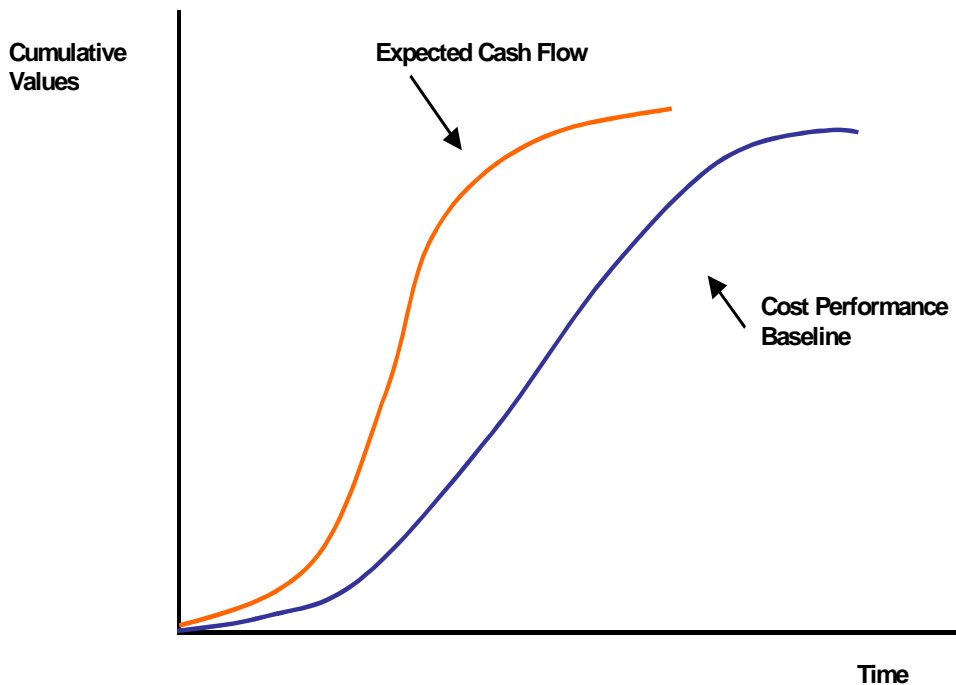
Cost estimating involves developing an assessment of how much it will cost the organisation to provide the product.

This is carried out by identifying the project elements that will need resources and assessing the costs of the resources required. To assist in these calculations past projects may be examined, and/or estimations of individual work items calculated with the aid of computerised tools. This gives the cost estimate of the project.

### **2.2 Cost Budgeting**

Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance.

Once the cost estimate has been established this is used together with the project schedule, to add up the estimated cost by period to provide a cost baseline. This is a time phased budget that will be used to measure and monitor the cost performance of the project, which is usually displayed in the form of an S-curve as illustrated in Figure 1.



**Figure 1: Cost Baseline**

### 2.3 Cost Control

Cost control is concerned with influencing the factors which create changes to the cost baseline to ensure that changes are beneficial, determining that the cost baseline has changed and managing the actual changes when and as they occur.

The cost baseline is thus used as a base for :

- revising cost estimates - modifications to the cost information used to manage the project,
- budget updates - changes to the approved cost baseline,
- corrective action - bringing expected future performance into line with the project plan,
- estimates at completion - forecasts
- lessons learned - the cause of the variances and the reasoning behind the corrective action.

Thus cost control monitors variances from the plan. It ensures that all appropriate changes are recorded accurately in the cost baseline. It prevents incorrect, inappropriate, or unauthorised changes from being included in the cost baseline and finally keeps those involved in the project informed of authorised changes [1].

### 3 ST-LHC BUDGET DATA

The above theory has been applied to the ST-LHC project. Cost estimates were drawn up giving the '95 estimate' for the activities of the different Groups. The cost baseline was the contract which priced and scheduled the works. The costs of the project are controlled by revising cost estimates and carrying out budget updates.

Within the ST-LHC project there are many contracts, different types of contract and different ways of presenting and measuring cost.

### 3.1 Types of contract

There are two main types of contract in ST:

"Fixed Costs" contracts : F - according to SPL classification

Contracts based on the "Bill of Quantities" : B,C,E,L,S,X,T - according to SPL classification

Both types of contract start with a Call for Tender. The difference being the way the cost of the contract is arrived at. For the "Fixed Costs" contracts a price is quoted in the tender which will correspond to the payment. For the contracts based on the "Bill of Quantities" a unit price is quoted in the tender and the quantities estimated or not and the payment will correspond to the actual quantities. In some cases, for example, the "T" contracts, the actual quantities will be remeasured on site.

Variations to the contract price occur for a number of reasons.

For the "Fixed Costs" contract variations are mainly the result of:

- modification made by CERN;
- additional works.

Whilst for the contracts based on the "Bill of Quantities" variations are mainly the result of:

- remeasurement (for example, the "T" contract);
- new unit prices (for example, the EL "contrat cadre");
- alternative solutions;
- risks;
- modification made by CERN;
- additional works.

Each person who is technically responsible for a contract is required to follow up and explain each variations, keeping the positive variations to a minimum.

### 3.2 Presentation of the Data

According to the strategy adopted by each group, there are different ways of presenting the data. For the 'F' contracts each contract is presented in a table format giving each item, cost centre and year. For the 'T' contracts, the information is presented as a tender forecast and compared to a current ongoing forecast taking account of variations and claims. For the Group EL the "contrat cadre" is used for all projects not only LHC and therefore information for the LHC project must be identified and extracted.

## 4 ST-LHC BUDGET FOLLOW-UP

To have an overview of the project a system was required that drew together this diverse information into a uniform format. This was achieved by building a tailor-made database in ACCESS.

### 4.1 Structure of the database

There are 2 main tables :

- **Entrée** : each field corresponds to a work package, which is as follows :
  - generalities : responsible technical person, group, contract,
  - planning : dates of being and end of works,
  - estimates and costs : partly financed by 'machine', costs base 95, new estimate and justification in case overspending, contractual price, variations agreed, variations foreseen, payments et commitments,
  - budget codes.

- **Contrat :**

- generalities,
- references (n° IT, n° Divisional Request, n° contract),
- planning ( Market Survey to order).

Access to the database is limited to the Group Leader and his deputy, to ensure confidentiality.

#### **4.2 Updating the database**

The information for each Group is updated on a monthly basis. There are different phases of modification:

- when a contract has just passed through the adjudication stage;
- when a cost estimate for a work package is revised;
- for monthly payments.

This gives accurate up-to-date information.

There are two ways for the information to be entered into the database. The figures can be sent by the group directly and entered into ACCESS or they can be sent electronically using Excel and be automatically imported into ACCESS or vice versa. As each Group is responsible for its budget. The data should be modified by the Group and sent to the Administrator.

#### **4.3 Controlling the Costs of the LHC project**

As a result this information can be used in a number of ways:

- To foresee divergences from the contract price.
- To draw up budget forecasts by adjusting estimates with actual costs and variations.
- To understand why costs are increasing or decreasing.

This enables Group Leaders to use this information easily and for the hierarchy to be informed of any changes.

It also makes it possible to inform the management at any time of the project's final cost, with our knowledge of the situation at that time.

There are 3 types of report :

- **Summaries:** 95 estimates and actual estimates by group and for the division.
- **Financial Planning:** budget LHC (machine and experimental zones), experiments or the two together, this is for the division or by group.
- **Contract follow-up :**
  - detail for each contract : number, title, contractual price, variation agreed, claims, variations foreseen, actual payments et payments by percentage,
  - concrete estimate by group,
  - likely forecast which integrates the variations foreseen.

All this data integrates forecasts and only concerns ST-LHC supplies and services.

The system has the flexibility to create more reports as the needs arise.

## **5 CONCLUSION**

The theory of process cost management showed the importance of drawing up budgets and controlling costs. The ST-LHC project has carried out budgeting activities with the aid of a database which draws

together the diverse activities of the division into a uniform format. This has provided a powerful tool which can show the level of payments for the project, the variations and justification for these variations, and draw up forecasts, thus efficiently monitoring costs.

#### **REFERENCES**

- [1] Project Management Institute, A Guide to the Project Management Body of Knowledge, 1996