BRITISH STANDARD

BS EN
13290-7:2001

# Space project management — General requirements —

## Part 7: Cost and schedule management

The European Standard EN 13290-7:2001 has the status of a British Standard

ICS 49.140

# National foreword

This British Standard is the official English language version of EN 13290-7:2001.

The UK participation in its preparation was entrusted to Technical Committee ACE/68, Space systems and operations, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

**Cross-references**

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 August 2001

**Summary of pages**

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EUROPEAN STANDARD

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English version

# Space project management - General requirements - Part 7: Cost and schedule management

Management des projets spatiaux - Exigences générales - Partie 7: Maîtrise des coûts et des délais

Raumfahrt-Projektmanagement - Allgemeine Anforderungen - Teil 7: Kosten- und Zeitplanmanagement

This European Standard was approved by CEN on 20 April 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 13290-7:2001 E

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## Foreword

This European Standard has been prepared by CMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2001, and conflicting national standards shall be withdrawn at the latest by November 2001.

It is based on a previous version[1)] originally prepared by the ECSS Management Standards Working Group, reviewed by the ECSS Technical Panel and approved by the ECSS Steering Board. The European Cooperation for Space Standardization (ECSS) is a cooperative effort of the European Space Agency, National Space Agencies and European industry associations for the purpose of developing and maintaining common standards.

This Standard is one of the series of space standards intended to be applied together for the management, engineering and product assurance in space projects and applications.

Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

The formulation of this Standard takes into account the existing EN ISO 9000 family of documents.

EN 13290 Space project management – General requirements is published in seven parts:

- Part 1: Policy and principles
- Part 2: Project breakdown structure
- Part 3: Project organization
- Part 4: Project phasing and planning
- Part 5: Configuration management
- Part 6: Information / Documentation management
- Part 7: Cost and schedule management

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

Cost and schedule management is defined as a collective system of organized processes and actions in support of project management. Its objective is to establish the optimum use of human resources, facilities, materials and funds, in order to achieve the successful completion of the space project within its established goals of

- cost targets,
- timely completion, and
- technical performance.

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[1)] ECSS-M-60A

To this end, costs and tasks are planned and actively controlled, with care being taken to identify the critical situations that can lead to an adverse impact on the project cost and schedule and recovery actions being proposed.

Cost and schedule management should not be confused with accounting activities.

# 1 Scope

The present Standard, "Cost and schedule management", is part 7 of EN 13290 space project management - General requirements.

The requirements specified herein apply to, and affect the customer and supplier at all levels, when the capability to design and supply conforming product needs to be demonstrated. These requirements, as tailored in related project requirements documents, are applicable to any actor in a space project.

When viewed from the perspective of a specific project context, the requirements defined in this Standard should be tailored to match the genuine requirements of a particular profile and circumstances of a project.

NOTE Tailoring is a process by which individual requirements or specifications, standards and related documents are evaluated and made applicable to a specific project by selection, and in some exceptional cases, modification of existing or addition of new requirements.

# 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13701, *Space systems - Glossary of terms*

IEC 50:1992, *International Electrotechnical Dictionary*

EN 13290-2, *Space project management - General requirements - Part 2: Project breakdown structures*

EN 13290-3:2001, *Space project management - General requirements - Part 3: Project organization*

EN 13290-5, *Space project management - General requirements - Part 5: Configuration management*

prEN ISO 17666, *Space systems - Risk management (ISO/DIS 17666:2000)*

# 3 Terms, definitions and abbreviated terms

## 3.1 Terms and definitions

For the purpose of this European Standard, the terms and definitions given in EN 13701 and the following apply.

**3.1.1**
**cost breakdown structure**
the structure which classifies agreed resources, cost categories and types

**3.1.2**
**cost reimbursement**
a generic type of contract in which the effected payments are depending upon provision of cost incurred

**3.1.3**
**current economic conditions**
the conditions prevalent when the service is provided

**3.1.4**
**direct manpower cost**
the manpower cost to be allotted to the project directly at the agreed rates

**3.1.5**
**estimate (cost) at completion**
the sum of the cumulative costs incurred at the cut-off date plus the respective estimate to completion

**3.1.6**
**estimate (cost) to completion**
the estimate of cost by evaluation of the authorized work remaining to completion including approved contract changes, based on the cumulative costs incurred and the entered commitments

**3.1.7**
**fixed price (contract)**
a type of contract in which payments are predefined in payment plans and are effected upon achievement of the relevant contractual milestone

**3.1.8**
**internal means of production**
specialized technical means which represent, for example, computer facilities and integration hall, for which standard unit charging rates have been established

NOTE The work unit employed is clearly defined.

**3.1.9**
**non-production expenses**
all the expenses including costs for distribution, general administration, and financing costs including applicable overheads for the whole company and subcontracts and which are chargeable according to a rate

**3.1.10**
**parametric (cost) estimate**
cost estimate based on quantifiable parameters, such as mass, power, development status and maturity of technology

**3.1.11**
**reference economic conditions**
the conditions prevalent when the decision to commit to the project is taken

NOTE For a contract, they are the economic conditions at the time the contract prices are drawn up.

**3.1.12**
**subcontract**
in the customer-supplier chain, a contract between a contractor and the subordinate contractor, to obtain matériel in this manner

**3.1.13**
**supplies and other direct cost**
cost for parts to be incorporated, with or without transformation, into the final product, or sub-contracts or services relating to study or manufacturing

## 3.2 Abbreviated terms

The following abbreviated terms are defined and used within this European Standard.

| Abbreviation | Meaning |
|---|---|
| **EAC** | estimate at completion |
| **MPP** | milestone payment plan |
| **WBS** | work breakdown structure |
| **WP** | work package |

# 4 Principles for cost management

## 4.1 Cost estimation and planning

### 4.1.1 General principles

All the required cost and price estimates, analysis, processing and reporting are based on the following project breakdown structures

- work breakdown structure, and
- cost breakdown structure

specifying the costs associated with each work package, broken down into the cost categories of the cost breakdown structure.

Cost estimates and reporting are based on defined economic conditions as specified by the purchaser or those prevailed at the time the estimates were made and reporting was done.

Reference economic conditions are those prevalent when the decision to commit to the project is taken. For a contract, they are the economic conditions specified in it. Current economic conditions are the conditions prevalent when the service is provided.

Price variation formulas, if applicable to the contract type, are established for each contractor to ensure that the data for planned, actual or forecast costs are comparable for the project lifetime by linking current economic conditions with reference economic conditions. They are submitted to the purchaser for approval. These formulas are called escalation formulas.

Escalation amount is not considered to be a cost category, but a specific item of the contract.

### 4.1.2 Cost breakdown structure

The total cost planned per each work package is broken down depending on the nature of the work (labour, non-labour, subcontracted work) and its destination (e.g. drafting, product assurance and manufacturing, depending upon the contractor internal structure). This leads to the cost breakdown structure (see Figure 1).

The division of costs between direct and indirect cost categories is declared by the contractor to the purchaser if required.

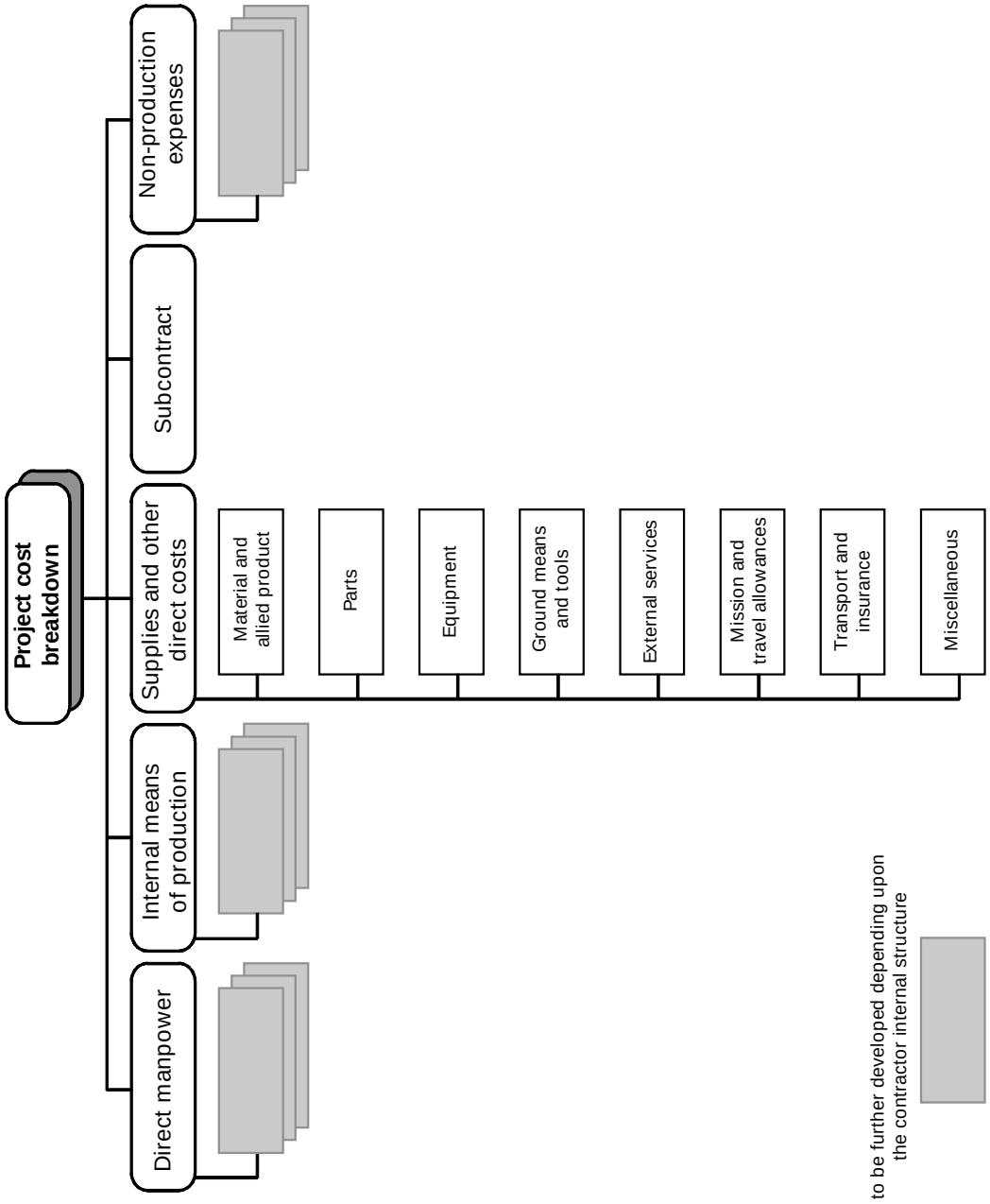


**Figure 1 - Cost breakdown structure**

The following main categories apply:

- Direct manpower cost

  This is the manpower cost to be allotted to the project directly at the agreed rates. The work unit used is one man–hour and a specific hourly rate is applied. These time quantities are expressed either as one of the manpower categories used or as one of the internal cost accounts employed in accordance with the company's usual accounting principles and methods.

- Internal means of production

  These are specialized technical means which represent, for example, computer facilities and integration hall. for which standard unit charging rates have been established. The work unit employed is clearly defined.

- Supplies and other direct costs

  These are, either parts to be incorporated, with or without transformation, into the system, or subcontracts or services relating to study or manufacturing work.

  - Materials and allied products
    Raw or semi-worked supplies which are subject to transformation and assembly operations.

  - Parts
    These are the smallest items used in a piece of equipment and are reckoned to be indivisible. They can be standard or specific to space projects (e.g. high reliability EEE components).
    In general, parts are provided by the contractor, or through a procurement agent;

  - Equipment
    Worked items such as sets, devices and modules that perform a complete function, usually designed by a specialized contractor for the benefit of one or several purchasers, to be directly incorporated without transformation into a larger set with or without adaptation.

  - External services
    Services to be rendered by a third party, such as hire of facilities, computer services, manpower services and surface treatments.

  - Ground means and tools
    Facilities, apparatuses, machines, instruments, consoles, test racks, containers, gauges, vehicles which are not part of the contractor's usual means of production and which are bought in order to develop, test, store or transport the system; costs which correspond to rental or acquisition;

  - Missions and travel allowances
    Transport and accommodation costs for direct personnel who need to travel for work requirements outside the geographical zone near the place of production.

  - Transport and insurance
    Transport and insurance costs of the deliverable items or part thereof.

  - Miscellaneous
    All the other items of direct costs, not covered by the headings above, in so far as they enter into works production costs (e.g. translation and document reproduction).

- Non–production expenses

  All the expenses, including costs for distribution, general administration, and financing costs including applicable overheads, for the whole company and subcontracts and which are chargeable according to a rate.

- Subcontracts

  Costs deriving from subcontracts between purchaser and contractors established with a view to undertaking work with its own end and which is sufficiently important and specific to require the drawing up of particular technical specifications; it excludes those elements which fall under a definition contained under "supplies and other direct costs".

- Profit margin

  The profit margin, is the difference between the system cost and the selling price, and can include penalties or incentives.

#### 4.1.3 Financial audits

Cost categories associated with direct manpower costs, internal means of production and non–production expenses receive specified rates during financial audits performed between the first level purchaser and the concerned contractor, independent of the contractor price type. These rates are the basis of costs estimates and reporting, they are valid for the defined economic conditions.

In case of cost reimbursement contract the first level purchaser has the right to verify the correctness of the reported cost data with respect to the internal company accounts of the contractor.

#### 4.1.4 Cost expenditure profile

The project cost broken down per work package or cost categories is time phased in accordance with the associated work package planning, which leads to work package manpower and cost plan.

For reporting purposes, the work package manpower and cost plan can be summarized at a level to be agreed between the actors, as the actual level of control. The selected work packages are then called control work packages.

In establishing the work package manpower and cost plan, non–labour costs are entered when committed.

Commitments are defined as the value of purchase orders placed minus the value of booked invoices for purchase orders.

Expenditure profiles are generated by apportioning the commited non-labour costs in accordance with the actual expenditure over time.

Cost and expenditure profiles are built on the same economic condition reference.

#### 4.1.5 Sensitivity of estimation

The cost estimate of space projects can be defined using different methodologies, depending on the maturity of the design and similarity to other space projects. Only methods proven prior to their utilization on the project are selected.

In the early project phases parametric estimates for the total project duration are normally developed and presented at each major project review, and to support trade-offs.

The parametric estimates are based on dedicated methodologies for hardware and software and are calibrated and proved in their key factors with respect to the contractor peculiarities.

Parametric estimates are based on the fact that significant parameters of a project (technical parameters, development and production context) have an impact on the cost of the project.

Parametric estimates are developed on the basis of cost data banks for work packages or groups of work packages, and taking into consideration key parameters such as engineering budgets, development status and schedule.

As the details of design and development programme progress, parametric estimates are refined, accompanied and subsequently substituted by detailed cost estimates per task or group of tasks in the work package.

Lessons learned from other projects are constantly considered. See also EN 13290-3:2001, clause 5.

The projected cost estimate takes into account the risks associated with the defined scope of work, in terms of technical performances of the project components, development and commercial risks.

This analysis eventually leads to the definition of a reasonable risk margin considered to be part of the projected life cycle cost; this risk margin is continuously monitored during the project development, and is progressively reduced with increased technical confidence. See also prEN ISO 17666.

#### 4.1.6 Design to cost

The design to cost method is especially aimed at controlling a series of production and operational costs for products developed from the early definition phases.

This method involves the following, for all the products to which it applies:

- establishment of recurring cost targets as from the start of the engineering process;
- identification and selection of technical solution alternatives, which achieve both cost targets and development requirements (quality, performance and delivery dates);
- management of recurring costs throughout the definition phase, under taking into account performances, quality and delivery date parameters.

Design to cost approach establishes a cost requirement, as one among the many other performance parameters of the project or system.

#### 4.1.7 Geographical distribution

Geographical distribution describes the cost sharing among the industries of participating countries.

Geographical distribution is deduced from the contract structure.

In some cases, a dedicated geographical distribution can be imposed as a requirement, together with specific application rules.

## 4.2 Cost control

### 4.2.1 Gereral

The set of technical, schedule and financial data on which the purchaser and the contractor have reached an agreement constitutes the contractual baseline. It corresponds to the notified contract. The associated financial data include the cost baseline for the project at the defined economic conditions.

The cost baseline serves as a basis for actively exercising manpower and cost monitoring, controlling and reporting, and for assessing any change to the contractual baseline.

Cost control is actively performed, without limiting it to accountancy and reporting only. It includes control of open commitments.

Responsibility of keeping the planned task results inside the specified cost (and time) constraints is allocated in a clear way. WP responsible plans and controls his WP cost.

Deviations from the cost baseline are analysed identifying reasons and trends, reported and classified according to the classification of the risks, for necessary recovery actions as part of the overall risk management.

In the case where implementation of recovery actions requires a modification of the contractual baseline, the purchaser concurrence is needed.

### 4.2.2 Estimate at completion and estimate to completion

On the basis of the cumulative costs incurred and the entered commitments, the estimated cost of the authorized work remaining to completion, including the approved contract changes, form the estimate to completion.

The date at which the estimate to completion is evaluated constitutes the cut-off date.

The sum of the cumulative costs incurred at the cut-off date plus the respective estimate to completion forms the estimate at completion (EAC).

EAC is prepared at predefined intervals along the project duration and submitted by the contractor to the purchaser for concurrence.

As part of the EAC, the contractual changes submitted for approval and potential cost items are identified (see 4.2.4).

### 4.2.3 Cost versus progress control - performance measurement

Upon establishment of the contractual baseline, the cost control task is not performed independantly of the progress of activities.

Prerequisite of performance control is therefore the measurement and analysis of the cost, schedule and technical progress of the space project, i.e. to clearly indicate the amount of actual progress of the work on the space project, and properly relate cost, schedule and technical achievement to that work.

Formalized methods for performance measurement exist, e.g. earned value, event based planning.

Earned value is defined by the budgeted cost of the work performed. Budgeted cost of the work (or earned value) is the sum of the budgets for completed work packages, and completed portions of open work packages, plus the portion of the budgets for tasks of level of effort and apportioned types (see EN 13290-2) as relevant for the above. The budgeted cost of the work performed is evaluated with respect to other factors such as the actual cost of work performed and the budgeted cost of work scheduled.

The actual cost of work performed is the sum of the actual cost incurred in accomplishing the work performed at a specified point. The budgeted cost of work scheduled is the sum of budgets for, for example, of all the work packages, planning packages, scheduled to be accomplished (including in-process work packages), plus the amount of level of effort and apportioned effort scheduled to be accomplished within a given time period.

Event based planning relies on establishing milestones, their significant tasks and the criteria on which completion of significant tasks are determined.

Through these methods, an effective evidence of cost/schedule deviations can be obtained and cost and schedule performance indexes can be evaluated.

#### 4.2.4 Potential cost items

During the duration of the space project, unexpected technical or commercial modifications can require implementations.

These modifications or items which potentially lead to programmatic impacts such as to the cost and schedule are traced during the project evolution, becoming an essential element for the updating of the estimate at completion.

#### 4.2.5 Inventory control

Inventory control function is to provide the necessary accountability to the first level purchaser of his own hardware and software items during the duration of the contract.

The inventory items are maintained, stored, refurbished and revalidated within the requirements of the contract; in particular the contract specifies the lowest value of an item in inventory.

When no longer required and, at the latest, upon completion of the contract, all the items under inventory control are disposed of as prescribed by the first level purchaser.

#### 4.2.6 Change of contractual costs

Any change proposal affecting the cost baseline of the project is forwarded by the contractor to the purchaser for approval.

The change proposal is notified with accompanying documentation defining classification of the change, technical, schedule and cost impacts in accordance with the specified contractual regulations.

If approved by the purchaser, the cost change constitutes a modification to the cost baseline, resulting in a modified cost baseline, called current cost baseline, against which cost control, analysis and reporting is performed (for change control management, refer to EN 13290-5).

### 4.3 Cost reporting

The routine monitoring of project progress by the purchaser is performed on the basis of schedule and cost information reported by the contractor.

Details of schedule and cost data are given for the control work packages, which are agreed between the purchaser and the contractor prior to contract award (see EN 13290-2).

The type of cost data to be reported is driven by the type of contract between purchaser and contractor.

The incurred expenditures are reported for cost reimbursement type of contract, while in fixed price environments reporting is limited to invoice the specified price value in payment plans upon the achievements of the payment event.

### 4.3.1 Cost reimbursement

Cost reimbursement is a generic type of contract in which the effected payments depend upon the provision of evidence of the costs incurred.

For all activities taken on undertaken under a cost reimbursement contract incurred expenditures are periodically reported.

Data are reported with direct manpower cost and supplies and other direct costs being split per control work package and by comparing actual costs against the cost baseline and the current cost baseline.

The current cost baseline includes modifications to the contractual baseline induced by the agreed changes.

Reporting of expenditures is accompanied by an analysis of the deviations between the values specified in the current cost baseline and actuals for all the control work packages having a cost deviation beyond the specified value defined in the contract.

Cost summaries per contractor are also provided, including financial commitments, fees, incentives and penalties (as applicable).

### 4.3.2 Fixed price

It is a type of contract in which payments are predefined in payment plans and are effected upon achievement of the relevant contractual milestone. It can coincide with one or several technical key-events chosen by agreement between the purchaser and the contractor before notification of the contract. It serves as an indication of the progress of work justifying the release of a payment.

For a fixed price type of contract the following cost data are kept current and reported periodically by the contractor to the purchaser:

- Milestone payment plan (MPP), defined according to the contract structure (see EN 13290-2) and identifying payment events, associated value and contractual and planned dates;
- list of submitted change proposals and approval status;
- fees, incentives and penalties as applicable.

Each MPP specifies values in currency as defined by the contract.

At contract award, the MPP is agreed between the actors.

The contractor formally requests the approval of payment milestone achievement by the purchaser.

For fixed price environment, EAC consists of an update of the milestones payment plan.

### 4.3.3 Geographical distribution reporting

As part of the EAC or MPP update, the geographical distribution is reported, in terms of cumulative return status resulting from the reported actual costs and geographical distribution forecast at total contract level.

#### 4.3.4 Invoicing and payment reporting

Invoicing status is routinely reported on by the contractor to the purchaser, specifying submitted invoices and payments received.

## 5 Requirements for cost management

### 5.1

Taking into consideration the principles described in clause 4, the following subclauses define the requirements for the cost management.

### 5.2

The cost estimate shall be based on the work breakdown structure.

AIM: Achieve accuracy and coherence of all the cost data.

EXPECTED OUTPUT: Reliable and traceable cost estimates.

### 5.3

A cost shall be associated to each work package broken down by the cost categories of the cost breakdown structure.

AIM: Achieve accuracy and coherence of all the cost data.

EXPECTED OUTPUT: Reliable and traceable cost estimates.

### 5.4

The economic conditions per each cost estimate and reporting shall be specified.

AIM: Allow proper correlation between planned and actual costs.

EXPECTED OUTPUT: Cost data based on specified economic conditions.

### 5.5

Every escalation formula shall be defined by each contractor and agreed with his purchaser.

AIM: Allow proper correlation between planned and actual costs along the life cycle of the project.

EXPECTED OUTPUT: Escalation formula.

### 5.6

Cost categories shall receive the rates as agreed upon by the first level purchaser.

AIM: Ensure coherence of cost data.

EXPECTED OUTPUT: Audited rates.

### 5.7

The cost baseline of the project shall be time phased.

AIM: Establish an agreed costs and expenditures plan.

EXPECTED OUTPUT:
- Work package manpower and cost plan, and
- expenditure profile.

### 5.8

Any parametric estimate shall be based on proven methods.

AIM: Ensure reliability of cost estimates.

EXPECTED OUTPUT: Parametric data and parametric estimates.

### 5.9

The contractor shall define the anticipated geographical distribution for his project prior to the project start according to the contract structure.

AIM: Allow visibility of the planned geographical distribution.

EXPECTED OUTPUT: Geographical distribution table, task allocation list per country.

### 5.10

Any planned project change to the established baseline shall specify the impacts to the corresponding geographical distribution.

AIM: Establish proper geographical distribution trends and keep geographical distribution status current.

EXPECTED OUTPUT: Forecast geographical distribution.

### 5.11

Manpower and cost control and reporting shall be based on the current cost baseline.

AIM: Identify variations and trends with reference to the current cost baseline.

EXPECTED OUTPUT: Cost report.

### 5.12

Financial commitments shall be controlled.

AIM: Get proper visibility of cost incurred and trends.

EXPECTED OUTPUT: Open commitments as part of cost report, EAC.

**5.13**

Recovery actions requiring a modification of the contractual baseline shall be implemented upon approval of a contract change.

AIM: Maintenance of the contractual baseline.

EXPECTED OUTPUT: Updated contractual baseline.

**5.14**

Estimate at completion shall be prepared at predefined intervals along the project duration.

AIM: Visibility on cost trends and reference for cost reporting and budgeting.

EXPECTED OUTPUT: Estimate at completion, current cost baseline.

**5.15**

The contractor shall prepare and report a listing of potential cost items.

AIM: Definition of potential recovery measures, active cost and schedule control.

EXPECTED OUTPUT: Potential cost item list as part of progress reporting, EAC.

**5.16**

The contractor shall identify, protect, mark, record, segregate and maintain all the items belonging to the first level purchaser.

AIM: Definition and conservation of the first level purchaser properties.

**5.17**

The contractor shall report on the status of the inventoried items belonging to the first level purchaser.

AIM: Definition of the first level purchaser properties.

EXPECTED OUTPUT: Inventory list.

**5.18**

Cost reports shall identify direct manpower cost, supplies and other direct costs per control work package.

AIM: Visibility and control of incurred expenditures for cost reimbursement management.

EXPECTED OUTPUT: Cost report.

**5.19**

Cost summaries per contractor shall be reported.

AIM: Visibility and control of project cost status per contractor.

EXPECTED OUTPUT: Cost report.

**5.20**

Cost report shall show the current cost baseline and the cost baseline.

AIM: Evaluation of deviations from cost baseline and EAC.

EXPECTED OUTPUT: Cost report.

**5.21**

Milestone payment plans (MPP) shall specify measurable payment events, contractual and planned dates, payment values in currency.

AIM: Cost and payment management, evaluation of geographical distribution.

EXPECTED OUTPUT: Milestone payment plan (MPP).

**5.22**

MPP shall be established according to the contract structure.

AIM: Cost and payment management.

EXPECTED OUTPUT: MPP per contractor.

**5.23**

MPP shall be kept current and changes reported.

AIM: Definition of the current contractual baseline for fixed price contracts.

EXPECTED OUTPUT: Updated MPP as part of EAC and change proposals.

**5.24**

Invoicing and payments per contractor shall be reported.

AIM: Effective management of payments.

EXPECTED OUTPUT: Invoicing and payments status list.

**5.25**

The recurrent cost target shall be agreed between the purchaser and contractor, in accordance with the technical specification for the system, before starting the development phase.

AIM: Conduct the design in order to respect the recurrent cost target.

EXPECTED OUTPUT: Recurrent cost target.

**5.26**

The contractor shall periodically report on the expected recurrent cost of the system to the purchaser.

AIM: Control the effectiveness of the design to cost process.

EXPECTED OUTPUT: Updated expected recurrent cost of the system.

# 6 Principles for schedule management

## 6.1 General

The work to be performed for every project is planned to a level of detail appropriate to the project phase for which the schedule planning is established.

Any planning drawn up is linked to the work breakdown structure such that per each project phase all the major project milestones (including the contractual ones), the significant development and test campaigns, deliveries, start and end events of work packages can be identified.

After the contract award for the relevant project phase the work progress is actively monitored during the phase and periodically reported to the purchaser.

## 6.2 Schedule creation

Schedule creation is a task which is performed prior to the start of the project phase and normally as part of the proposal definition process, in conjunction with the identification of the project objectives and the associated development approach.

The schedule planning is established following an iteration process internally at the supplier and between the supplier and the customer, until data are consolidated and mutually agreed.

The schedule planning is specific for each project phase, showing milestones and required inputs and outputs.

Activities are grouped according to the project work breakdown structure, in a way which renders possible identification of WP start and end dates at least at the agreed selected level.

Task duration and planning are established with constraints of available resources (manpower and facilities) unless specifically directed by the customer to consider unlimited resources.

A reasonable margin is accounted for in evaluating the task duration, avoiding unnecessary schedule extension while reducing the overall schedule risk.

All the required planning data is established by utilizing computerized methodologies, creating logical time sequence of activities from which bar charts and related list of milestones can be derived.

Networks are created using standardized methods.

Contents of schedule documents are structured to satisfy the information requirement for the schedule control system and the method of performance measurement to be adopted.

## 6.3 Schedule control

The planning data established for the supplier’s proposal once agreed with the customer constitute the reference for actively planning, controlling and progress reporting.

This reference is the single source of data based on which manpower, resources and cost and expenditures are planned and controlled.

If changes to the contractual baseline are proposed, schedule implications are highlighted.

Upon agreement of a contractual change, the contractor updates his schedule data and re-submits to the purchaser the appropriate planning documents.

Deviations from the reference planning are analysed identifying reasons and trends, reported and classified according to the classification of the risks, for necessary recovery actions as part of the overall risk management.

Each project actor implements throughout the project duration an active schedule control, anticipating backup solutions to potential problem rather than facing schedule delays once it has occurred.

## 6.4 Schedule reporting

The schedule data part of the contractual baseline is maintained by each project actor via the schedule control task. They are periodically reported to the purchaser implementing the progress achieved at the specified reporting date.

Following items are reported as a minimum:

- activities started, recording actual start date;
- activities completed, recording actual finish date;
- correctness of schedule completion date for task in progress;
- statement that sequence, relationships, constraints of planned activities are still valid.

Above data are accompanied by synthetic description of assumptions and resulting effects.

Evolution of major project events selected as project milestones for schedule control purposes are reported in conjunction with above information.

If an unexpected event occurs at any time during the project that significantly affects the achievement of the schedule objectives, the contractor formally notifies the purchaser, independently from the nominal reporting cycle, within the agreed short time notice.

## 6.5 Schedule review meetings

The customer performs specific planning and schedule review meetings with the supplier in addition to any routine progress reviews whenever a schedule criticality is highlighted to require special attention.

## 6.6 Schedule deviations

For any delay indicating the presence of a not previously reported problem an immediate evaluation of the cause(s) is performed and recovery measures are developed and implemented.

In case the deviation affects one or more events selected as project milestones for schedule or performance control purposes, the customer approval is obtained prior to implementation.

# 7 Requirements for schedule management

## 7.1

Taking into consideration the principles described in clause 6, the following subclauses define the requirements for schedule management.

## 7.2

a) The project schedule shall be linked to the work breakdown structure, showing all major milestones (including contractual ones) and required input and outputs.

b) The project schedule should show the control work packages, planned and actual start and end times of the control work packages, milestones, critical path.

AIM: Establish and maintain a coherent management system.

EXPECTED OUTPUT: Agreed project schedule with, for example, networks, bar charts, milestones list, critical path analysis, as appropriate to the methodology applied.

## 7.3

Task duration and planning shall be established taking into consideration the available resources.

AIM: Reconcile planning and available resources.

EXPECTED OUTPUT: Realistic planning.

## 7.4

Schedule margins management shall be implemented, and margins shall be shown.

AIM: Optimize margins inside the schedule.

EXPECTED OUTPUT: Schedule showing available margins (duration and allocation).

## 7.5

Contents of schedule documents shall be structured to satisfy the information requirement, support the schedule control system and the performance measurement.

AIM: Coherency of planning.

EXPECTED OUTPUT: Scheduling documentation, performances matrix.

## 7.6

Schedule planning and control shall be established in relation to the planning part of the contractual baseline.

AIM: Coherency of data.

EXPECTED OUTPUT: Schedule documentation update, trend charts, progress report, based on contractual baseline.

### 7.7

Pro-active schedule control shall be implemented.

AIM: Minimization of schedule problem areas, definition of backup solutions.

EXPECTED OUTPUT: Element of progress report and critical path analysis.

### 7.8

Schedule reporting shall include description of assumptions and resulting affects.

AIM: Get adequate and clear understanding of schedule progress.

EXPECTED OUTPUT: Progress report, schedule documentation update.

### 7.9

Unexpected events which could significantly affect the achievement of schedule objectives shall be notified between the actors within the agreed short time notice.

AIM: Minimize impacts of unexpected events.

EXPECTED OUTPUT: Problem notification report.

### 7.10

Modification of planning affecting contractual milestones shall be implemented upon approval of a contract change proposal.

AIM: Maintain a coherent project planning between the various actors.

EXPECTED OUTPUT: Contract change proposal.

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