

10

Managing Contracts

Learning Objectives

- Distinguish between the different types of contracts
- Outline the contents of a contract for goods and services
- Plan the evaluation of a proposal or product
- Administer a contract from its signing until the final acceptance of project completion

THE NEXT LEVEL OF EDUCATION

10.1 Introduction

In the Brightmouth College scenario, the college management have decided to obtain their software externally. Given their limited capability for developing new and reliable software, this seems sensible. At IOE,

It is not unusual for a major organization to spend 6 to 12 months and 40% of the total acquisition and implementation budget on package evaluation with major customer service and support applications (Demian Martinez, Decision Drivers Inc., Computing, 23 July, 1998).

Amanda has a team of software developers employed by IOE. However, the demand for development effort fluctuates as projects come and go. The IOE management might therefore decide that it is more cost-effective to employ outside software developers for new development while a reduced group of in-house software development staff maintain and support existing systems.

The buying of goods and services, rather than 'doing it yourself', is attractive when money is available but other, less flexible, types of resource, especially staff time, are in short supply. However, there are risks arising from the considerable staff time and attention still needed to manage a contracted-out project successfully. It is essential that customer organizations such as Brightmouth College and IOE find time to clarify their exact requirements at the beginning, and to ensure that the goods and services delivered are satisfactory.

Potential suppliers are likely to be more accommodating before any contract is signed than afterwards – especially if the contract is for a fixed price. Thus, as much forethought and planning is needed with an acquisition project as with internal development.

In the remainder of this chapter, the different types of contract that can be used will be explored. This is followed by the general steps to be followed when placing a contract. The issues to be considered when drafting a contract are then examined. We conclude by describing some of the things done while the contract is executed.

The bargaining position of the customer will be stronger if their business is going to be valuable. If you are buying a cut-price computer game, you are unlikely to be able to negotiate variations on the supplier's standard contract of sale. (In fact, because of the inequality of the parties, such sales are subject to special consumer protection laws.) Potential suppliers will carefully assess the time and money to be spent responding to a customer's requests as there is no guarantee of the final contract.

It was, for example, reported that two consortia led by Sema and EDS, respectively, had spent £4 million over 2 years bidding for a UK government project to renew the ICT infrastructure in the prison service – the final job was estimated as being worth £350 million (*Computing*, 13 August, 1998).

10.2 Types of Contract

The external resources required could be in the form of *services*, for example staff on short-term contracts carrying out some project tasks. At Brightmouth College, Brigitte could use temporary staff to input employee details needed for the new payroll system. IOE might carry out application-building in-house but augment the permanent staff with contract developers. The contractor might not only supply the new system but also operate it on the customer's behalf. For example, Brightmouth College might abandon buying a package and instead get a payroll services agency to carry out the payroll work.

On the other hand, a contract for a *completed software package* could be placed. This could be:

- a *bespoke* system created specifically for one customer;
- an *off-the-shelf* package bought 'as is' – this is sometimes referred to as *shrink-wrapped* software;
- *customized off-the-shelf* (COTS) software – where a core system is modified to meet the needs of the client.

David Bainbridge
(2007) *Introduction to Computer Law*,
Longman, 6th edition,
is highly recommended
as a guide to the legal
aspects of IT contracts.

Where equipment is purchased, in English law, this is normally a contract for the supply of *goods*. With the supply of software this may be regarded as supplying a service (i.e. to write the software) or the granting of a *licence* (i.e. permission) to use the software which remains in the ownership of the supplier. These distinctions will have legal implications.

Exercise 10.1



Which of the three system options (i.e. bespoke, off-the-shelf or COTS) might Amanda consider with regard to the JOE maintenance group accounts system? What factors would she need to take into account?

Another way of classifying contracts is by the way that the payment to suppliers is calculated. We will look

The section on ways of assessing supplier payments draws heavily on material from Paul Radford and Robyn Lawrie of Charismatek Software Metrics, Melbourne, Australia.

- fixed price contracts;
- time and materials contracts;
- fixed price per delivered unit contracts.

Fixed price contracts

In this situation a price is fixed when the contract is signed. The customer knows that if there are no changes in the contract terms, this is the price they pay on completion. For this to be effective, the customer's requirement has to be fixed at the outset. In other words, when the contract is to construct a software system, the detailed requirements analysis must already have been carried out. Once the development is under way the customer cannot change their requirements without renegotiating the price of the contract.

The advantages of this method are:

- *Known customer expenditure* As long as the requirements are precise and not changed, the customer has a known cost.
- *Supplier motivation* The supplier has a motivation to work in a cost-effective manner.

The disadvantages include:

- The cost could still be lower than in-house development because the supplier may be able to exploit economies of scale and also expertise acquired doing similar jobs in the past.
- *Higher prices to allow for contingency* The supplier absorbs the risk for any errors in the estimates. To reduce the impact of this risk, the supplier will add a margin to the price quoted.
- *Difficulties in modifying requirements* The need to change the scope of the requirements may become apparent during development – this may cause friction between the supplier and customer.
- *Upward pressure on the cost of changes* When competing against other potential suppliers, the supplier will try to quote as low a price as possible. Once the contract is signed, if further requirements are put forward, the supplier is in a strong position to demand a high price for these changes.
- *Threat to system quality* The need to meet a fixed price could mean that the quality of the software suffers.

Time and materials contracts

With this type of contract, the customer is charged at a fixed rate per unit of effort, for example per staff-hour. The supplier may provide an initial estimate of the cost based on their current understanding of the customer's requirements, but this is not the basis for the final payment. The supplier usually invoices the customer for work done at regular intervals, say each month.

The advantages of this approach are:

- *Ease of changing requirements* Where a project has a research orientation and the direction of the project may change as options are explored, then this may be an appropriate method of payment.
- *Lack of price pressure* The lack of price pressure may promote better quality deliverables.

The disadvantages of this approach are:

- *Customer liability* The customer absorbs the risks associated with poorly defined or changing requirements.
- *Lack of incentives for supplier* The supplier has no incentive to work in a cost-effective manner or to control the scope of the deliverables.

Because the supplier appears to be given a blank cheque, this approach does not find favour with customers. However, the employment of contract development staff may in effect involve this type of contract.

Fixed price per unit delivered contracts

This is often associated with function point (FP) counting. The size of the system to be delivered is calculated or estimated at the outset of the project. The size could be estimated in lines of code, but FPs can be more easily derived from requirements documents. A price per unit is also quoted. The final price is then the unit price multiplied by the number of units. Table 10.1 shows a typical schedule of prices.

Function point counting was discussed in Chapter 5.

TABLE 10.1 A schedule of charges per function point

Function point count	Function design cost per FP	Implementation cost per FP	Total cost per FP
Up to 2,000	\$242	\$725	\$967
2,001–2,500	\$255	\$764	\$1,019
2,501–3,000	\$265	\$793	\$1,058
3,001–3,500	\$274	\$820	\$1,094
3,501–4,000	\$284	\$850	\$1,134

This table comes from David Garmus and David Herron (1996) *Measuring the software process*, Prentice Hall.

The company that produced this table in fact charge a higher fee per FP for larger systems. For example, a system to be implemented contains 2600 FPs. The overall charge would be $2000 \times \$967$, plus $500 \times \$1,019$, plus $100 \times \$1,058$.

The company in question was RDI Technologies in the USA. These figures are now several years old.

We have already noted that the scope of the application can grow during development. It would be unrealistic for a contractor to be asked to quote a single price for all the stages of a development project: how can they estimate the construction effort needed when the requirements are not yet established? One approach would be to negotiate a series of contracts, each covering a different stage of system development.

Alternatively, the software supplier might first carry out the system design. A charge could then be made for design work based on the figures in the 'Function design cost per FP' column. This, if the designed system was counted at 1000 FPs, would be $1000 \times \$242$, i.e. \$242,000. If the design was then implemented, and the actual software delivered, then the additional $1000 \times \$725$ would be charged, i.e. \$725,000. If the scope of the system grows because the users find new requirements, these new requirements would be charged at the combined rate for design and implementation, e.g. if new requirements amounting to 100 extra FPs were found, then the charge for this extra work would be $\$967 \times 100$, i.e. \$96,700.

Exercise 10.2

A system to be designed and implemented is counted as comprising 3200 FPs. What would be the total charge according to the schedule in Table 10.1?



The advantages of this approach are:

- *Customer understanding* The customer can see how the price is calculated and how it will vary with changed requirements.
- *Comparability* Pricing schedules can be compared.
- *Emerging functionality* The supplier does not bear the risk of increasing functionality.
- *Supplier efficiency* The supplier still has an incentive to deliver the required functionality in a cost-effective manner (unlike with time and materials contracts).
- *Life-cycle range* The requirements do not have to be definitively specified at the outset. Thus the development contract can cover both the analysis and design stages of the project.

The disadvantages of this approach are:

- *Difficulties with software size measurement* Lines of code can easily be inflated by adopting a verbose coding style. With FPs, there may be disagreements about what the FP count should really be: in some cases, FP counting rules may be seen as unfairly favouring either the supplier or customer. Users, in particular, will almost certainly not be familiar with the concept of FPs and special training may be needed for them. The solution to these problems may be to employ an independent FP counter.
- *Changing requirements* Some requested changes may affect existing code drastically but not increase the overall FP count. A change made late in the development cycle will usually require more effort to implement than one made earlier.
- To reduce the last difficulty, one suggestion from Australia has been to vary the charge depending on the point at which they have been requested – see Table 10.2.

TABLE 10.2 Examples of additional charges for changed functionality

This table comes from the draft *Acquisition of Customised Software Policy* document, published by the Department of State Development, Victoria, 1996.

	Pre-acceptance testing handover	Post-acceptance testing handover
Additional FPs	100%	100%
Changed FPs	130%	150%
Deleted FPs	25%	50%

Exercise 10.3



A contract stipulates that a computer application is to be designed, constructed and delivered at a cost of \$600 per FP. After acceptance testing, the customer asks for changes to some of the functions in the system amounting to 500 FPs and some new functions which amount to 200 additional FPs. Using Table 10.2, calculate the additional charge.

There are other options and permutations of options for payments. The implementation of a specification could be at a fixed price, with any additions or changes to the requirements to be charged per FP. Where the contractor has to buy in equipment, the price of which may fluctuate, it is possible to negotiate a contract where the final price contains a fixed portion for labour plus an amount that depends on the actual cost of purchased components.

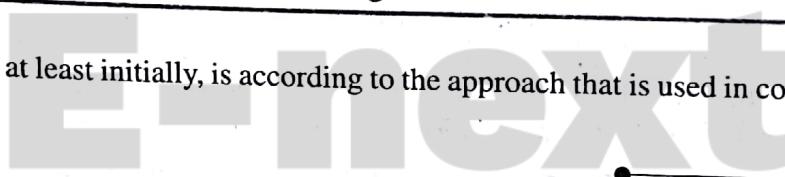
Exercise 10.4



It is easy to see why passing on fluctuations in equipment costs may be advantageous to the contractor. However, is there any advantage to the customer in such an arrangement?

Another way of categorizing contracts, at least initially, is according to the approach that is used in contractor selection, namely

- Open
- Restricted
- Negotiated



This categorization is based on European Union regulations.

Open tendering process

In this case, any supplier can bid to supply the goods and services. All bids compliant with the original conditions in the *invitation to tender* must be considered and evaluated in the same way. With a major project this evaluation process can be time consuming and expensive.

- Invitation to tender (ITT) and request for proposal (RFP) are interchangeable terms.

There has been a global movement towards removing barriers to businesses in one country supplying goods and services in another. Examples of this are efforts by the World Trade Organization (WTO) and the European Union to ensure that public bodies do not unfairly favour local businesses. Among the agreements overseen by the WTO is one on government procurement which lays down rules on tendering processes. Where the client is a public body, an open tendering process may be compulsory.

Restricted tendering process

In this case, there are bids only from suppliers who have been invited by the customer. Unlike the open tendering process, the customer may at any point reduce the number of potential suppliers being considered. This is usually the best approach to adopt.

Negotiated procedure

There may, however, be some good reasons why the restricted tendering process may not be the most suitable in some particular sets of circumstances. Say, for example, that there is a fire that destroys some ICT equipment. The key concern here may be to get replacement equipment up and running as quickly as possible and there may simply not be the time to embark on a lengthy tendering process. Another situation might be where a new software application had been successfully built by an outside supplier, but some extensions are required to the system. As the original supplier has staff familiar with the existing system, it might be inconvenient to approach other potential suppliers via a full tendering process. In these cases, an approach to a single supplier may be justified. However, approaching a single supplier could expose the customer to charges of favouritism and should only be done with a clear justification.

10.3 Stages in Contract Placement

Requirements analysis

This discussion assumes that a feasibility study has already provisionally identified the need for the intended software.

Before potential suppliers can be approached, you need to have a clear set of requirements. It is easy for this step to be skimped where the user management have day-to-day pressures and little time to think about future developments. In this situation, an external consultant could draw up a requirements document. Even here, users and their managers need to look carefully at the resulting requirements document to ensure that it accurately reflects their needs. As David Bainbridge has pointed out: '*the lack of, or defects in, the specification are probably the heart of most disputes resulting from the acquisition of computer equipment and software*'.

The requirements document might typically have sections with the headings shown in Table 10.3.

TABLE 10.3 Main sections in a requirements document

1 Introduction
2 A description of any existing systems and the current environment
3 The customer's future strategy or plans
4 System requirements
— mandatory
— desirable
5 Deadlines
6 Additional information required from potential suppliers

Chapter 13 on software quality discusses how aspects of quality can be measured.

The requirements define carefully the *functions* of the new application and all the necessary *inputs* and *outputs* for these functions. They also state any *standards* that apply, and the existing systems with which the new system should be compatible. There will also need to be operational and quality requirements, concerning such matters as the required response times, reliability, usability and maintainability of the new system.

In general, the requirements document should state *needs* as accurately as possible and avoid technical specifications of possible solutions. The onus should be placed on the potential suppliers to identify the technical solutions judged to meet the customer's needs as they should be technical experts with access to the most up-to-date information about current technology.

Each requirement needs to be identified as being either *mandatory* or *desirable*.

- **Mandatory** If a proposal does not meet this requirement then the proposal is to be immediately rejected.
- **Desirable** A proposal may be deficient in this respect, but other features of the proposal could compensate for this.

For example, in the case of the Brightmouth College payroll package acquisition project, Brigette might identify a mandatory requirement that any new system carry out all the processes carried out by the old system. However, a desirable feature might be that the new payroll package should be able to produce staff costing details in a format accessible to the college's accounting computer system.

The requirements document issued to potential suppliers would also contain requests for information needed to judge the standing of the organization itself. This could include financial reports, references from past customers and the CVs of key development staff.

One suggestion is that the weighting between product criteria and supplier criteria when selecting software ought to be 50:50 (Demian Martinez, Decision Drivers Inc., Computing, 23 July, 1998).

Evaluation plan

Having drawn up a list of requirements, we now need a plan of how the proposals are to be evaluated. The situation will be different if the contract is for a system that is to be specially written rather than an off-the-shelf package. In the latter case, it is the *application* itself that is being evaluated while in the former situation it is a *proposal* for an application.

Ways of checking that the mandatory requirements are met need to be identified. The next consideration is how the desirable requirements can be evaluated. The problem here is weighing the value of one quality against another. The ISO 9126 standard, which is discussed in Chapter 13 on software quality, can assist in deciding whether one system has more of some quality than another, but if there is a difference in price between the two, we need to estimate if the increase in quality is worth the additional price. Hence 'value for money' is often the key criterion. For example, a financial value could be placed on a link between the payroll and accounting applications. If we were to cost clerical effort at £20 an hour and knew that four hours of clerical effort a month went into inputting staffing costs into the accounting computer system, we could conclude that over a four-year period ($\text{£}20 \text{ an hour} \times 4 \text{ hours a month} \times 48 \text{ months}$), or £3,840, would be saved. If system A has this feature and costs only £1,000 more than system B which does not, this would give system A an advantage.

The costs to be taken into account are those for the whole of the lifetime of the proposed system, not just the costs of acquiring the system. Also, where the relationship with the supplier is likely to be ongoing, the supplier organization needs to be assessed as well as its products.

Exercise 10.5



One desirable feature sought in the Brightmouth College payroll is the ability to raise staff automatically to the next point in their salary scale at the beginning of each payroll year. At present, the new

scale points are entered clerically and then checked. This takes about 20 hours of staff effort each year, which costs £20 an hour. System X has this feature, but system Y does not. System X also has a feature which can automatically produce bar charts showing payroll expenditure per department. Such a report currently is produced twice a year by hand and on each occasion takes about 12 hours' effort. With system Y, changes to department names can be carried out without any coding effort whereas in the case of system X, the supplier would charge a minimum of £300 to do this. The college authorities estimate there is a 50% chance that this could occur during the expected four-year lifetime of the system. System X costs £500 more than system Y. Given this information, which system appears to give better value for money?

Invitation to tender

Having produced the requirements and the evaluation plan, it is now possible to issue the invitation to tender to prospective suppliers. Essentially, this will be the requirement document with a supporting letter containing information about how responses to the invitation are to be lodged. A deadline will be specified and it is hoped that by then a number of proposals with price quotations will have been received.

In English law, with certain exceptions, a contract does not have to be in writing. Clearly it is desirable that it should be.

In English law, for a contract to exist there must be an offer on one side which is accepted by the other. The invitation to tender is not an offer itself, but an invitation for prospective suppliers to make an offer.

Certain problems might now emerge. The requirements specified could be satisfied in various ways. The customer not only needs to know a potential supplier's price but also how they intend to satisfy the requirements – this will be particularly important where the contract is to build a completely new system.

In relatively straightforward cases, it would be enough to have post-tender clarification and negotiation to resolve issues in the supplier's proposal. With more complex projects a more sophisticated approach may be needed. One way of getting the detail of the suppliers' proposals elaborated is to have a two-stage tendering process.

In the first stage, technical proposals are requested from potential suppliers who do not necessarily quote any prices. Some of these proposals can be dismissed as not meeting mandatory requirements. The remaining ones could be discussed with representatives of the suppliers in order to clarify and validate the technical proposals. The suppliers might be asked to demonstrate certain aspects of their proposals. Where shortcomings in the proposal are detected, the supplier could be given the opportunity to remedy these.

This approach has been recommended for government ICT contracts in the United Kingdom.

These discussions could result in a *Memorandum of Agreement* (MoA) with each prospective supplier. This is an acceptance by the customer that the proposed solution (which might have been modified during discussions) offered by the supplier satisfactorily meets the customer's requirement.

Tenders are then invited from the suppliers who have signed individual Memoranda of Agreement. The tender would incorporate the MoA and would be concerned with the financial terms of a potential contract.

If a design has to be produced as part of the proposal made by a supplier in response to an invitation to tender then the supplier would have to do a considerable amount of work with only a limited prospect of being paid for it. One way of reducing this burden is for the customer to choose a small number of likely candidates who will be paid a fee to produce design proposals. These can then be compared and the final contract for construction awarded to the most attractive proposal.

Evaluation of proposals

We have already mentioned the need to produce an evaluation plan describing how each proposal will be checked against the selection criteria. This reduces risks of requirements being missed and ensures that all proposals are treated consistently. It would be unfair to favour a proposal because of the presence of a feature not requested in the original requirement.

We noted earlier that an application could be bespoke, off-the-shelf, or customized. In the case of off-the-shelf packages the software itself could be evaluated and it might be possible to combine some of the evaluation with acceptance testing. With bespoke development it would be a proposal that is evaluated, while COTS may involve elements of both. Thus different approaches would be needed.

The process of evaluation may include:

- Scrutiny of the proposal documents
- Interviewing suppliers' representatives
- Demonstrations
- Site visits
- Practical tests

The proposal documents provided by the suppliers can be scrutinized to see if they contain features satisfying all the original requirements. Clarification might be sought over certain points. Factual statements made by a supplier have a legal commitment if they influence the customer to offer the contract to that supplier. It is therefore important to get a written, agreed, record of these clarifications. The customer might take the initiative here by taking minutes of meetings and then writing afterwards to the suppliers to get them to confirm their accuracy. A supplier could, in the final contract document, attempt to exclude any commitment to any representations made in pre-contract negotiations – the terms of the contract need to be scrutinized for this.

Where there is an existing product there could be a demonstration. A danger is that demonstrations can be controlled by the supplier and as a passive observer it may be difficult to maintain full attention for more than, say, half an hour. Because of this, the customer organization should have their own schedule of what needs to be demonstrated, ensuring that all the important features are seen in operation.

With off-the-shelf software, the customer could actually try out the package. For example, a demonstration version could be made available which closes itself down after 30 days. Once again a test plan is needed to ensure that all the important features are evaluated in a complete and consistent manner. Once a package is identified as the most likely candidate, it needs to be examined for any previously unforeseen factors that might invalidate this choice.

A frequent problem is that while an existing application works well on one platform with a certain level of transactions, it does not work satisfactorily with the customer's ICT configuration or level of throughput. Demonstrations might not reveal this problem. Visits to operational sites already using the system could be more informative. In the last resort a special volume test could be conducted.

Exercise 10.6



How would you evaluate the following aspects of a proposal?

- (i) The usability of an existing software application.
- (ii) The usability of a software application which is yet to be designed and constructed.
- (iii) The maintenance costs of hardware to be supplied.
- (iv) The time taken to respond to requests for software support.
- (v) Training.

Where substantial sums of money are involved, legal advice on the terms of the contract is essential.

A decision is made to award the contract to a supplier. One reason for a structured and, as far as possible, objective approach to evaluation is to demonstrate that the decision has been made impartially. In most large organizations, placing a contract involves the participation of a second party within the organization, such as a contracts

department, who can check that the correct procedures have been carried out. Also, the final legal format of a contract will almost certainly require some legal expertise. Not only should the successful candidate be notified but the unsuccessful candidates should also be told of the decision. This might not be simply a matter of courtesy: under WTO or EU rules, there is a legal requirement to do this in certain circumstances. It makes dealing with unsuccessful bidders easier if they can be given clear and objective reasons why their proposals did not find favour.

10.4 Typical Terms of a Contract

In a textbook such as this, it is not possible to describe the all necessary content of contracts for ICT goods or services. It is possible, however, to outline some of the major areas of concern.

Definitions

The terminology used in the contract document may need to be defined, e.g. who is meant by the words 'client' and 'supplier'.

Form of agreement

For example, is it a contact of sale, a lease, or a licence? Also, can the subject of the contract, such as a licence to use a software package, be transferred to another party?

Goods and services to be supplied

Equipment and software to be supplied This should include an actual list of the individual pieces of equipment to be delivered, complete with the specific model numbers.

Services to be provided This would cover such things as:

- Training
- Documentation
- Installation

- Conversion of existing files
- Maintenance agreements
- Transitional insurance arrangements

Ownership of the software

Who has ownership of the software? There may be two key issues here: first, whether the customer can sell the software to others and, second, whether the supplier can sell the software to others. Where an off-the-shelf package is concerned, the supplier often simply grants a licence for the customer to use the software. Where the software is written for a specific customer then that customer may want exclusive use of the software – they might object to software which they hoped would provide a competitive edge being sold to rivals. They could ensure this by acquiring the copyright to the software outright or by specifying in a contract that they should have *exclusive use* of the software. Where a core system has been customized by a supplier then there is less scope for the customer to insist on exclusive use.

Where software is written by an employee as part of their normal job, it is assumed that the copyright belongs to the employer. Where the customer organization has contracted an external supplier to write software for them, the contract needs to make clear who is going to retain the copyright – it cannot, in this case, be automatically assumed that it is the customer. The customer may decide to take responsibility for maintenance and development once the software is delivered and would need the source code. In other cases, where the customer does not have an adequate in-house maintenance function, the supplier may retain the source code, and the customer may have to approach the supplier for any further changes. There are dangers with this, for example that the supplier could go out of business. An *escrow* agreement can be included in the contract so that up-to-date copies of the source code are deposited with a third party. In the United Kingdom, the NCC Group provides an escrow service.

Any assignment of copyright would need to be in writing.

Environment

THE NEXT LEVEL OF EDUCATION

Where physical equipment is to be installed, the demarcation line between the supplier's and customer's responsibilities with regard to such matters as accommodation and electrical supply needs to be specified. Where software is being supplied, the compatibility of the software with the existing hardware and operating system platforms would need to be confirmed.

Customer commitments

Even when work is carried out by external contractors, a development project still needs the participation of the customer. The customer may have to provide accommodation for the suppliers and perhaps other facilities such as telephone lines.

Some customers find that specially written or modified software is not thoroughly tested by the supplier before delivery. Some suppliers seem to think that it is cheaper to get the customer to do the testing for them!

Acceptance procedures

Good practice is to accept a delivered system only after user acceptance tests. Part of the contract would specify such details as the time that the customer will have to conduct the tests, deliverables upon which the acceptance tests depend and the procedure for signing off the testing as completed.

Standards

This covers the standards with which the goods and services should comply. For example, a customer could require the supplier to conform to the ISO 12207 standard relating to the software life cycle and its documentation (or, more likely, a customized sub-set of the standard). Within the European Union, government customers with contracts for projects above a certain threshold value must, by law, ensure that the work conforms to certain standards.

Project and quality management

The arrangements for the management of the project must be agreed. These include the frequency and nature of progress meetings and the progress information to be supplied to the customer. The contract could require that appropriate ISO 9001 standards are followed.

Timetable

This provides a schedule of when the key parts of the project should be completed. This timetable will commit both the supplier and the customer. For example, the supplier may only be able to install the software on the agreed date if the customer makes the hardware platform available at that time.

Price and payment method

Obviously the price is very important. What also needs to be agreed is when the payments are to be made. The supplier's desire to be able to meet costs as they are incurred needs to be balanced by the customer's requirement to ensure that goods and services are satisfactory before parting with their money.

Miscellaneous legal requirements

This is the legal small print. A contract may require clauses which deal with such matters as the definition of terms used in the contract, the legal jurisdiction that will apply to the contract, what conditions would apply to the subcontracting of the work, liability for damage to third parties, and liquidated damages. *Liquidated damages* are estimates of the financial losses that the customer would suffer if the supplier were to fall short of their obligations. It is worth noting that under English law, the penalties laid down in penalty clauses must reflect the actual losses the customer would suffer and cannot be unrealistic and merely punitive. Even this limitation may not be enough in some cases as far as the supplier is concerned. As computer systems assume increasingly critical roles and in safety-critical applications can even be life-threatening in the case of malfunction, consequential damage could be astronomical. Suppliers will try to limit this liability. The courts (in England and Wales) have tended to look critically at such attempts at limiting liability, so that suppliers may, in the case of major contracts, take out insurance to cover such liabilities.

If there is a dispute, resorting to litigation, while being lucrative for the lawyers involved, is likely to be time-consuming and expensive. An alternative is to agree that disputes be settled by *arbitration*. This requires disputes to be referred to an expert third party whose decision on the facts of the case is binding. Even this procedure might not be quick and inexpensive and another option is *alternative dispute resolution* where a mediator acts in an advisory capacity only and attempts to broker an agreement between the two sides.

10.5 Contract Management

We have already noted that forms of communication between the supplier and customer during the project could be specified in the contract. It would probably suit all concerned if the contractor is left to get on with the work. However, at certain *decision points* (or *milestones*) the customer might wish to examine work already done and make decisions about the future direction of the project. The project could require representatives of the supplier and customer to interact at key points in the development cycle – for example, users may need to provide information to assist interface design.

One way of identifying the decision points is to divide a large project into increments. For each increment there could be an interface design phase, and the customer might need to approve the designs before the increment is built. There could also be decision points between increments.

For each decision point, the deliverables from the suppliers, the decisions to be made by the customer and the possible outcomes need to be defined. These decision points have added significance if they are the basis for payment to the contractor. The customer also has responsibilities at these decision points – for example, the contractor should not be delayed unnecessarily awaiting customer approval of interim deliverables.

There will be concerns about the quality of contracted work. The ISO 12207 standard envisages the possibility of there being agents, independent of both the supplier and customer, who will carry out verification, validation and quality assurance. It also allows for joint reviews of project processes and products to be agreed when the contract is negotiated.

We saw earlier that changes to requirements will vary the contract terms. Oral evidence is not normally admissible to contradict, add to, or vary the terms of a written contract, so that agreed changes need to be documented. A change control procedure must record requests for changes, the supplier's agreement to them and the cost for additional work.

The supplier might not meet a legal obligation. This might not be their fault, if, for example, the customer causes the delay by lateness in giving the necessary approvals for intermediate products. If no action is taken when the default occurs, this might imply that the customer in fact condones the failure and could lead to the loss of legal rights. The customer should protect their legal rights by officially notifying the supplier that the failure has been recognized. It will be recalled that under English law any claim for liquidated damages should be based on actual losses, so the customer needs to keep an accurate record of the actual losses incurred as a result of the default.

10.6 Acceptance

When the work has been completed, the customer needs to arrange acceptance testing. The contract may limit how long acceptance testing can take, so the customer must be organized to carry out this testing before the time limit for requesting corrections expires.

We have already noted that some software suppliers are rather cursory with their pre-acceptance testing. It seems that they would rather the users spent their time on testing than them. This imposition can be reduced by asking to approve the supplier's internal test plans. An associated pitfall is that once the main development work is completed, the supplier not unnaturally wants to reallocate their most productive staff to other projects. The customer could find that all their problem reports are being dealt with by relatively junior members of the supplier's staff, who may not be familiar with all aspects of the delivered system.

ISPL Euromethod offers guidance about how decision points may be planned.

Chapter 4 discusses incremental delivery.

Part or all of the payment to the supplier should depend on this acceptance testing. Sometimes part of the final payment is retained for a period of operational running and is paid if the levels of performance are as contracted for. There may also be a period of warranty during which the supplier should fix any errors found for no charge. The supplier might suggest a very short warranty period of, say, 30 days. It may be in the customer's interests to negotiate a more realistic period of, say, at least 120 days.

Conclusion

Some of the key points in this chapter have been:

- The successful contracting out of work requires considerable amounts of management time
- It is easier to gain concessions from a supplier before a contract is signed rather than afterwards
- Alternative proposals need to be evaluated as far as possible by comparing costs over the whole lifetime of the system rather than just the acquisition costs
- A contract will place obligations on the customer as well as the supplier
- Contract negotiation should include reaching agreement on the management of the supplier-customer relationship during the execution of the project

Further Exercises

1. At IOE, the management are considering 'outsourcing' the maintenance accounting system, i.e. getting an outside specialist organization to take over the operation, maintenance and support activities associated with the system. Write a short memorandum to management outlining the advantages and disadvantages of such a reorganization.
2. Further exercise 4 at the end of Chapter 1 concerned a software house that needed a training course developed to introduce new users to an order processing application that they had developed. Assume that you are an independent training consultant who has been approached by the software house to develop the training package. You have agreed in principle and now a contract is being negotiated for the work.
 - (a) List the points that you would want clarified and included in the contract.
 - (b) Having produced the list of points requiring clarification, examine it from the point of view of the software house. Are there any additional points that they would want clarified?
3. In each of the following cases, discuss whether the type of application package to be adopted would be most likely to be bespoke, off-the-shelf or COTS.
 - (a) A college requires a student fees application. It is suggested that the processes required in the application are similar to those of any billing system, with some requirements that are peculiar to the administration of higher education.
 - (b) A computer-based application is needed at IOE to hold personnel details of staff employed.
 - (c) A system is required by a national government that calculates, records and notifies individual taxpayers about income tax charges.
 - (d) An expert system for use in a hospital to diagnose the causes of eye complaints.

4. The schedule of charges per function point shown in Table 10.1 has higher rates for larger systems. Give arguments explaining why this might be justified and also arguments against.
5. Table 10.2 has a charge of 25% and 50% of the normal rate for deleting transactions from an application. This may seem to be rather high for simply removing code. What work would be involved in deleting functionality that could justify this cost?
6. Assume that IOE has decided on a COTS solution that will replace the whole of the existing maintenance accounting system rather than simply plugging in additional modules to deal with annual contracts. Write a memorandum that Amanda could send to IOE's legal department outlining the important provisions that a contract to supply this system should have.
7. For each of the following questions, exactly one option is correct. Select the appropriate option.
 - (i) Which one of the following is typically not expected in a fixed price contract?
 - (a) Vendors tend to overprice the bids.
 - (b) The selected vendor may demand higher price to accommodate new requirements.
 - (c) Better quality of software is realized compared to time and material contracts.
 - (d) Best model to follow when the bidder has stringent budget restrictions.
 - (ii) Which one of the following contractor selection procedure is likely to result in the lowest price bid?
 - (a) Open tendering
 - (b) Restricted tendering including nonlocal vendors
 - (c) Negotiated contract
 - (d) Restricted tendering among local vendors
 - (iii) Which one of the following contractor selection procedure for a certain item can result in the fastest deployment?
 - (a) Open tendering
 - (b) Restricted tendering including nonlocal vendors
 - (c) Negotiated contract
 - (d) Restricted tendering among local vendors