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***THE CONTRACTING SYSTEM IN BRITISH  
CONSTRUCTION: THE RIGIDITIES OF FLEXIBILITY***

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**Groupe Bagnolet**

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## **THE CONTRACTING SYSTEM IN BRITISH CONSTRUCTION: THE RIGIDITIES OF FLEXIBILITY**

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# THE CONTRACTING SYSTEM IN BRITISH CONSTRUCTION: THE RIGIDITIES OF FLEXIBILITY

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## **RÉSUMÉ**

Le développement du système contractuel britannique est ici envisagé dans le cadre d'une analyse historique. Après avoir défini le concept de système contractuel comme un ensemble de règles du jeu inscrit dans un contexte historique, il s'agit de définir trois types principaux de systèmes successifs. Le premier est le système artisanal avec le maître compagnon ; le deuxième est le système de lots séparés, caractérisé par l'apparition de l'architecte comme acteur apte à pré-concevoir le produit construit; le troisième est le système professionnel caractérisé par l'apparition de l'entreprise générale comme acteur responsable de la planification et de la coordination générale du processus de construction. Le passage d'un type à l'autre est marqué par l'apparition d'un nouveau type d'acteur.

Parallèlement à ces systèmes, les systèmes spéculatifs liés à l'immobilier et aux infrastructures apparaissent comme des systèmes complémentaires mais dont la logique est plus associée à la valorisation des terrains qu'au processus de construction.

Sont ensuite examinées en détail les différentes modalités contractuelles à l'intérieur du système professionnel contemporain, qui aboutissent à des schémas d'organisation différents : éclaté, intégré, ou intermédiaire. Les forces et faiblesses de chaque schéma sont analysées, notamment sous l'angle du transfert du risque. Les évolutions récentes en Grande Bretagne sont décrites avec une attention particulière portée au rapport Latham de 1994 ainsi qu'aux politiques de recherche et développement dans l'industrie de la construction.

En conclusion est posée l'hypothèse de l'apparition d'un quatrième type de système en Grande Bretagne : le système de la concession, lié à l'émergence d'un nouvel acteur, le concessionnaire, responsable principalement du financement du processus de construction.

*Men make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past. The tradition of all the dead generations weighs like a nightmare on the brain of the living.*

## **INTRODUCTION<sup>1</sup>**

The aim of this paper is to present an analysis of the contemporary contracting system in the UK construction industry; in order to do this, it will be necessary to take to heart Marx's (1968 p 97) famous aphorism on Louis Bonaparte - the British contracting system is a product of its history, and the critical juncture in that history occurred in the later years of the industrial revolution. The analysis will cover both building and civil engineering which have many commonalities, but also important differences. After indicating what is meant by a contracting system, the paper will explore some dimensions of the history of the British system before coming on to examine the causes and results of the recent period of rapid change in the system. The paper will close with an appraisal of the contemporary issues, particularly those raised by the Latham Report, and the attempts to reform the system which are presently under way, together with an assessment of the implications of the UK government's current policy for public sector procurement .

As will be shown, the contracting system forms the rules of the game by which firms mobilise resources towards projects to meet client demands. Thus any understanding of how projects are organised must be based in an understanding of how the contracting system, or systems, from which those projects draw their resources are organised. This paper forms one of five which explore the institutional context of the five projects selected for study by the Groupe, and the institutional background of the actors which participate in those projects.

## **THE IDEA OF A CONTRACTING SYSTEM**

The idea of "the system" in British building as a distinctive form of industrial organisation was first espoused by Bowley (1966 p 350). She identified it as a highly structured set of relationships along lines of social class with architects at the top, followed in rank order by engineers, surveyors, and builders. Within this system she identified "the establishment" as the version of the system approved by architects. She then explores in some detail the evolution and malfunctions of the system. Alongside this system one can also identify the systems for civil engineering with the civil engineer in the dominant position, and speculative housing with the developer, or developer/builder in the dominant position. However, it is perhaps indicative of the force of Bowley's argument that when one thinks of the construction industry in Britain, it is the architect-dominated establishment to which one reflexively turns.

Bowley's emphasis upon institutionalised sets of interests was a profound insight. The system allocated roles, defined responsibilities, and specified liabilities. Effectively it defined some actors as proactive, and others as reactive; dubbed some with the rank of profession, and tarred others with the brush of commerce. In this system, legitimacy was provided by the principal clients, which increasingly became dominated by the state. Crucially, it established the reward and penalty structure for the actors in the British construction industry in what Crozier and Friedberg (1977 p 286) have defined as a "système d'action concret" which is "un ensemble humain structuré qui coordonne les action de ses participants par des mécanismes de jeux relativement stables et qui maintient sa structure ....par des mécanismes de régulation qui constituent d'autres jeux". For Crozier and Friedberg, actors within such systems of action act rationally, but with a rationality that can only be understood within the logic of the system, as expressed in the rules of the game.

In this perspective then, the contracting systems for building and civil engineering provide the structure of incentives for the actors in the system, encouraging each actor into particular types of behaviour, and tending to punish digressions from these rules of the game. The speculative housebuilding system, which will be outside the scope of this paper, similarly motivates its actors, but in rather different directions. Just as patterns of behaviour become institutionalised so that they act back upon the actors through the process of structuration

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<sup>1</sup> I am very grateful to Graham Ive and Elizabeth Shove for their comments upon this paper.

(Giddens 1984), the rules of the game come to be seen as given, normal, the only way to do things. Careers and status become dependent upon certain rules; threats to those rules become personal attacks. The system has a powerful momentum, and planned change is difficult because no one actor can grasp the whole system. Yet such systems are also dynamic due to the inherent contradictions that they often contain - this point will feature again in the conclusions.

All systems of action have outcomes, or their would be no reason for their existence. The outcome of the contracting system is the realisation of the desire of the client for a built product. In order to achieve this outcome, the process of production, consisting of a flow of information which generates and controls a flow of materials, must accomplish the three Cs (Winch & Campagnac 1995). The building must be *conceived*, it must be *constructed*, and these processes must be *controlled* back against the client's interests. The client capitalises the process of construction, while the actors within the system allocate the required resources to the construction process according to the rules of the game the system lays down. The major variations within and differences between contracting systems concern the rules which specify which actors do which tasks within the 3C's. It is to the historical evolution of these variances in task allocation to which the paper will now turn.

## THE EVOLUTION OF THE BRITISH CONTRACTING SYSTEM

### ▲ *Refurbishing Canterbury Cathedral*

*In September 1174, the choir of Canterbury Cathedral was badly damaged in a fire. Various French and English masters were consulted, but the one who won the confidence of the monks was William of Sens. After a careful survey, he recommended the demolition of the remains of the choir and the construction of a new structure. He arranged the purchase of the stone from quarries in Caen, and devised the lifting tackle for the loading and unloading of the ships that were to transport it across the channel. He also prepared the templates for the masons who were doing the actual carving.*

*He supervised the works in detail for the next five years, until he was badly crippled in a fall when a scaffolding collapsed under him. After attempting to direct the works from his bed, he resigned his commission and returned to France, to be replaced by an English master who was also called William. As the works progressed, it became possible to place the relics of the saints rescued from the tombs in the old choir in their new resting places, and use parts of the structure for worship by 1180. Although no progress was made in 1183 due to lack of funds, 1184 saw the substantial completion of the works with the roofing of the structures. (Harvey 1972 Appendix A)*

The Craft System

Market relations in construction had emerged in the middle ages as the state and church required large concentrations of labour to build their castles and cathedrals, particularly in the period of relative labour shortage after the Black Death in the mid fourteenth century. These demands led to a labour market, particularly for masons, outside the traditional feudal ties of obligation which was how most building was accomplished during the period (Locock 1992). In this period the master craftsman predominated and the prospective owner of the building bought the materials directly, and paid the labour by the day in what might be called the *craft system*. Two examples of this system in operation are provided in The Refurbishment of Canterbury Cathedral, and A Courtier's Castle. On larger projects such as cathedrals, considerable amounts of design activity were required in order to coordinate the works. This was usually carried out by master-masons who became increasingly specialised in design, as opposed to construction, activities, and much sought after by bishops wishing to glorify God in gothic stone (Harvey 1972). However, these "architects" grew from the ranks of masons, and remained intimately involved with the work of the craftsmen they directed. As Kostof put it "the actual separation of the architect conceiver from the reality of the building process did not occur until the Italian Renaissance" (1977 p 93). The craft system passed on its distinctive organisation of construction around the materials used - carpenter, mason, and so on - which is still prevalent today. In the craft system, conception

and construction were the combined responsibility of the master craftsmen, while control was carried out directly by agents of the client such as its clerk of works. Clients were also very happy to involve themselves deeply in the design and construction processes.

#### ▲ **A Courtier's Castle**

*The workings of the craft system can be illustrated by the building of Kirby Muxloe Castle . Work commenced in 1480 on a large rectangle with towers at each corner on the site of an earlier castle, from which were incorporated some of the foundations. The client, Lord Hastings appointed his steward as clerk of works who made all the payments to the craftsmen and labourers who were paid on day-rates. Many of the workers were local, but the labourers came from Wales, while a number of bricklayers came from Flanders to execute patterned brickwork. The master-mason was not on site continually, but came for a few weeks each year. Unfortunately, both the client and the project were cut short when the former was beheaded in June 1483 by "a poisonous bunch-backed toad", but his widow carried on and completed the works that were already in hand (Emery 1989).*

#### The Craft System

The rise of a rich merchant class in fifteenth and sixteenth century Florence led to the emergence of a new actor - the architect - who was capable of articulating the merchants' desire for expression through building (Goldthwaite 1980). The architect took on the task of coordinating the building crafts that had emerged from the medieval guilds, but now had a much reduced range of responsibilities in what might be called the *trade system*, which became widespread throughout Europe. It is distinguished from the craft system by the role of the architect independent of the crafts<sup>2</sup>. Perhaps the most important legacy of the trade system is in the organisation of conception in the role of the architect - particularly as theorised by Alberti - as a unique combination of conception and control actor. Acting simultaneously as the artist of the built form, the client's advisor on cultural matters, and coordinator of the construction process, the architect slowly developed as the principal actor in the system. For the first time, under the trade system, a project actor emerged who could *preconceive* the built form on behalf of the client independently of the construction process.

The trade system was slow to diffuse to England, but during the 16th century houses became more explicitly designed (Airs 1978; Newman 1988). During the great rebuilding of country houses during Tudor era (Hoskins 1953; Platt 1994), an architectural consciousness slowly emerged with Robert Smythson, a master-mason, as its best known exponent. Inigo Jones, widely acknowledged as the first English architect in the Renaissance sense, practised as Surveyor of the King's Works during the first half of the 17th Century. However, it was not until the even larger rebuilding of country houses after the restoration (Machin 1977; Platt 1994), and the rebuilding of London after the Great Fire of 1666 that the trade system became fully established, heralding the first golden age of English architecture. Because the works were now conceived in advance, new forms of payment could emerge, and the tradesmen were increasingly paid on a measure and value basis, in which they were paid on the basis of the work done. Thompson (1968) argues that the number of surveying treatises published at the time show that surveying, in the sense of after-measurement, was also being placed on a much more systematic footing. Yeoman's study of the building of the Queen Anne Churches provides a good illustration of the logic of the trade system.

#### ▲ **The Queen Anne Churches**

*In the early 18th century, a programme of church building was commissioned - a programme that became known as the. "Queen Anne churches". The surveyors appointed were responsible for designing the church, providing an estimate of its costs, selecting the trade contractors, measuring their work, and supervising the works on site. These surveyors include some of the most illustrious names of English architecture, notably Hawkemore. Contractors for each trade were selected*

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<sup>2</sup> This can be clearly seen by comparing Goy's (1992) account of the building of the Cà d'Oro in medieval Venice during the 1420 and 30ss, with Goldthwaite's (1973) account of the building of the Strozzi palace in renaissance Florence during the 1490s and 1500s .

*on the basis of a competitive tender - known as a "proposal" - organised at the appropriate point in the construction programme. Masonry was by far the most important trade, but bricklaying, plastering, carpentry, plumbing and plastering were also significant elements of the works. The tender was on a schedule of rates, and payment was on the basis of the weight or quantity of materials fixed, or the area of work completed against this schedule. While the proposals were against a previously developed architectural design, they tended to include such details as timber sizes. The surveyors were also in the habit of changing the design as the works progressed. Trade contractors normally supplied their own materials and labour. In addition, dayworks would also be agreed with the surveyor. Cost and time overruns were endemic on this building programme, and there were continual problems with the quality of the bricks supplied to the works by the bricklaying trade contractors (Yeomans 1988).*

The Trade System

Under the pressures generated by the French wars in particular, and the industrial revolution more generally, the trade system began to break down. The Barrack Office was established in 1793 in order to provide accommodation for the unprecedentedly large numbers of soldiers mobilised against France. At first this relied upon the trade system, but the urgency of the building programme meant that a shift to "contracting in gross" where a single contractor undertook financial responsibility the entire works in a single contract was made. Thus both pre-design and pre-measurement became essential parts of the new system, and the first important British general contractor - Copland - emerged. A government enquiry in 1828 pronounced in favour of the new system, despite complaints from architects. Although contracting "by the great" was not unknown in previous centuries (Locock 1992), it does not appear to have been in conjunction with a separate surveyor, and was not typical. The dynamics behind the emergence of the professional system are well illustrated by Cubitt's London Institution project.

▲ **The London Institution**

*London Institution contract was undertaken by Cubitt in 1815. This building, now demolished, was let on a contracting in gross basis, to a very tight programme. It was a very large contract for its time, and the Institution was in a hurry for the building. Stiff penalty clauses for non-completion within the specified time were therefore attached to the contract. In order to reduce his risk in the face of this penalty clause, Cubitt decided to employ all the trades directly, rather than subcontracting them. The project ran into a number of problems that remain depressingly familiar - the haste of the work meant inadequate preparation; considerable modifications were required to the foundations of the building; the architect was slow to deliver the working drawings; and considerable cost overruns were experienced. However, the project was successfully completed, the blame for the problems fell largely on the architect, and the project formed the basis of Cubitt's subsequent career (Hobhouse 1971 chap 1).*

The Emerging Professional System

Increasingly during the latter part of the 18th century, the task of after-measurement had been delegated to the measurer by the architect. As general contracting emerged, the measurer began to take responsibility for measuring the quantities to be built in advance so as to facilitate the accuracy and fairness of the tendering process. This new task became institutionalised in the role of the quantity surveyor, around the distinctive competence of the bill of quantity as a control tool. The task of coordinating the separate trades was delegated to the new master builder who took on the entire works for a fixed price. The architect was left mainly with the tasks of conception and quality control; indeed those occupied with measuring or building were excluded from membership of the Institute of Architects which was founded in 1834. Thus the architect's role became even more clearly focused on conception, with important control tasks delegated to the quantity surveyor, and all responsibilities for coordinating construction passed to the general contractor. These changes had the advantage for the architect of reinforcing his role as a professional rather than a craftsman; a gentleman rather than a tradesman (Saint 1983; Wilton-Ely 1977).

These developments were not a foregone conclusion. Much of what we now call Georgian London (Summerson 1991) had been built by speculative developers, some of whom aspired to considerable architectural status. The like of Nash and Adam were developer/architects, yet in the debates around the role of the newly emerging architectural identity, the strand of architect/surveyors which descended from Jones and Wren through to Soane as crown appointed surveyors won the day, as the developer/architects faced rising competition from the developer/builders such as Cubitt (Saint 1983 chap 3). Webster (1995) argues that the professional position of the architect was much reinforced by the provisions of the 1818 Church Building Act which provided for the formalisation of the architectural role. From the end of the 17th century on, this *speculative system* has existed alongside the trade and professional systems, yet stands apart because its logic of action is the valorisation of land, rather than generating profits from the construction process itself. Its dynamics are well illustrated by the building of Somers Town.

▲ **From Brill Farm to Somers Town**

*The development of the Somers Town area of London illustrates the way in which the speculative system, by which so much of London was built, operated. The architect/developer Leroux took on the principal lease of the area of Brill Farm from Lord Somers in 1783 in return for the additional income from the improved ground rents with the obligation to provide all the urban infrastructure for the area. Leroux then sold building leases on a 99 year basis to artisanal builders who developed a small number of units at a time, and were reimbursed for their efforts through renting out the completed houses to tenants. Leroux also had the rights from Lord Somers to manufacture bricks on the site, which he then sold to the artisanal builder/developers. The rhythm of brick-making meant that Leroux had an interest in ensuring a steady rate of construction on the site, and he facilitated this through providing mortgages to the developer builders, and even loans for working capital. Progress was checked by the recession of the 1790s, and when building restarted in the early 1800s under John Johnson, a paving contractor who had acquired Leroux's interest after his death, the developer builders were more substantial enterprises taking on leases for up to 10 houses at a time. This was associated with a shift towards maximising not the ground rents (returns on infrastructure investments), but rather building rents (returns on building investments), and as a result the density of the development rose, and its quality fell (Clarke 1992 Part II).*

The Speculative System

The most important feature of this system - which may be called the *professional system* - was the general contractor undertaking work conceived by others, and subject to independent control. For the first time, a project actor emerged to whom the client could effectively transfer some of the risks inherent in the construction process. During the same period in the early 19th century many of the institutions that later served to give the system its enormous momentum were founded - the Institution of Civil Engineers in 1818; the (Royal) Institute of British Architects in 1834; and the (Royal) Institution of Chartered Surveyors in 1868. By the 1860's the general contracting system was fully established with price-based competitive tendering for works in response to full bills of quantities which relied upon fully detailed drawings for their production widespread (Summerson 1973). Encouraged by Ruskin, architects increasingly defined themselves around a distinctive competence based on creativity; as artists rather than intimate participants in the construction process (Saint 1983 chap 8).

▲ **The Millwall Docks**

*The way in which the charter system worked is well illustrated by the construction of the Millwall Docks, currently the site of the Canary Wharf development. The story is complex, but the basic details of interest here are that the docks were promoted by a loose consortium of a railway engineer, and two civil engineering contractors. Once the act of parliament had been obtained in 1864, the new company pressed ahead with a public subscription for capital. This was underwritten by the English branch of Crédit Mobilier. Immediately upon conclusion of the financment in March 1866, the*



*construction contract was signed with the two promoting contractors, who included in their contract sum the costs of providing cover for the shareholders loans for the first two years of the project. However, this was already well in excess of the company's approved borrowing power. Lack of confidence in the management, generated by some rather dubious dealings led to many shareholders not meeting the second call for funds, and loan capital had to be sought.*

*The financial collapse in May 1866 meant that while a further act of parliament raised the capitalisation ceiling, there was no chance of raising further funds. The sponsoring contractors therefore provided the working capital themselves. However, the crisis also hit shipbuilding on the Thames very severely, and meant that the original market for the dock was now in question. Further capital had to be raised to fund investments in warehousing and other transport dock installations. The docks opened for business in March 1868 following much acrimony between the contractors and the company which completed the works using direct labour. The ensuing court case was dropped in favour of a negotiated settlement in which the promoting contractors were paid the outstanding sums they were owed in equity (Guillery 1990).*

The Charter System

In civil engineering the trend had a different trajectory, but a similar outcome in the adoption of the professional system during the second half of the 19th century. The building of the infrastructure of the first industrial nation - turnpikes, canals, and railways was undertaken on the basis of private promotion. These promoters were sometimes landowners or other interested parties, but particularly with the advent of the railways, they were themselves engineers such as the Stephensons and the Brunels. Initially, the actual works were divided into small lots and let to local contractors who were closely supervised by the engineers. During the 1830s, Joseph Locke on the Grand Junction Railway developed the role of the general contractor to take over all a broader responsibility for the works in partnership with the engineer (Joby 1983). As the momentum of railway building grew, contractors such as Thomas Brassey increasingly took over the promotion task, and between 1844 and 1866, half the lines were promoted by contractors, often working in partnership with engineers<sup>3</sup>. In 1845, Peto began the practice of accepting payment in the shares of the line being built (Joby 1983). The 1850s saw the emergence of project finance companies such as Crédit Mobilier working in close collaboration with the great contractors (Middlemas 1963), and the railway contractors were increasingly vertically integrated operations, providing rolling stock as well as the tracks. The logic of action in what may be called the *charter system* is illustrated by the building of the Millwall Docks.

The financial crash of 1866 took away much of the competitive advantage of the promoter-contractors, and banks increasingly preferred to lend to governments and established firms rather than to finance projects directly. Clients were increasingly public authorities such as the Metropolitan Board of Works, and during the last quarter of the century competitive tendering for civil engineering contracts became universal (Middlemas 1963). The railway companies increasingly developed their own engineering expertise. The consulting engineer became more important, earning Brunel's jibe that the consulting engineer was a man who was prepared to sell his name but nothing more (Rolt 1974 p 239), while the enterprise increasingly took the form of the civil engineering contractor of today. It is notable that while some of today's names such as McAlpine and Mowlem stem from this period, none stem from the earlier period of contractor-promoters. The main difference from the contracting system in building was that no equivalent of the quantity surveyor emerged - surveying remained a sub-discipline within engineering, and the engineer retained a strong control role in addition to the conception role.

While the crash of 1866 is undoubtedly the proximate cause of this shift to a professional system in civil engineering, it can also be located within a more general shift after 1860 from a society dominated by the entrepreneurial ideal and regulated by Smith's hidden hand,

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<sup>3</sup> This shift suggests that the greatest risks lay with the construction process rather than the engineering design, and that the actor who could most effectively bear the greatest risks had the best chance of raising the capital required.

towards the beginnings of a society dominated by the professional ideal in which the role of the state was to regulate the free market in the interests of the wider community. This

*"implied a major change in attitude towards the entrepreneur, from the assumption that he could, unless proved otherwise, be trusted to pursue the common good by pursuing his own self-interest to the assumption that, unless the temptation to exploit the weak and the community at large were removed, he would pursue his own self-interest to the detriment of the common good" (Perkin, 1969 p 439).*

The manifestation of this more general societal development within the contracting system was the insulation of the activities facing the highest uncertainty in the design stages from market forces altogether through the development of the professionally organised consultant engineer reimbursed on a fee basis, and the evolution of control actors responsible for regulating those activities that remained subject to market forces - principally construction - on behalf of the client and the wider community<sup>4</sup>.

As the public sector became a client of greater and greater importance in the market, it opted for the professional system, seeking reassurance from appointed architects, quantity surveyors, and consulting engineers for conception and control, and relying on competitive tendering for construction on fully detailed designs. This generated generally high standards in the built product and met public concern for transparency and accountability in the system, but led to relatively high costs and a deskilling of those responsible for construction.

A number of themes can be identified in these developments. Firstly, the changes are, to a very important extent, associated with changes in the nature of the client and its needs. The principal client, if that is not too much of an anachronism, for the craft system was the church, and to a lesser extent the crown (Knoop and Jones 1949 chap 2). The emergence of the architect/surveyor and the trade system is associated with the rise of rich merchants, and an educated aristocracy influenced by the ideals of the renaissance (Goldthwaite 1980). As Summerson put it, "taste in architecture arrived in London about 1615: taste, that is, in the exclusive, snobbish sense of the recognition of certain fixed values by certain people" (1991 p 15). The emergence of the professional system in the UK is associated with the emergence of new types of clients needing new types of buildings associated with the industrial revolution, but particularly with the large-scale building programmes mounted by the crown during the French wars (Cooney 1955).

Secondly these developments are associated with important changes in the organisation of labour. The medieval mason was a wage labourer, outside the traditional guild system of the towns (Knoop and Jones 1949 chap 6), but he was not a free labourer as impressment was a common form of recruitment to projects. As the trade system developed, the guild became more important in the supply of labour, but this was a different guild from the medieval one. Increasingly, guilds became hierarchical rather than egalitarian organisations (Clarke 1981; Leeson 1980), ensuring apprenticeship standards and restricting the supply of labour. The rise of the professional system coincided with the birth of the first trade unions. The Operative Builders Union was founded in 1832, and mounted a series of strikes against general contractors (Postgate 1923). Although it did itself not last long, the OBU was the forerunner of the building trade unions which emerged during the latter part of the 19th century.

Thirdly, while these succeeding systems replaced each other as the dominant model, the earlier ones survived to meet particular client needs. Particularly in the vernacular tradition, the craft system survived, and has a place today in the repair and maintenance sector as well as its more pervasive legacy of the division of labour on site. The trades system survived well into the 20th century in Scotland and elsewhere in Europe, and left its profound

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<sup>4</sup> How far this had come by the last quarter of the century is indicated by the Tay Bridge disaster of 1879, when a newly completed bridge across the Firth of Tay collapsed in a storm while a passenger train was upon it. Although there were clear failures in quality control, particularly in the foundry, by the contractor during construction, the railway company failed to comply with speed restrictions on the bridge imposed by the Railway Inspectorate, and the engineer acted on Railway Inspectorate advice regarding wind loadings on structures of this kind, it was the consulting engineer, Thomas Bouch, who took the blame for the disaster. The Board of Trade enquiry concluded that "the bridge was badly designed, badly constructed and badly maintained" and Bouch was ultimately responsible for overseeing the construction and supervising the maintenance as well as the engineering design (Thomas 1972).

legacy of the architectural role. The history is more one of successive layering than elimination. Self-build, too, remained very important throughout the period, which today is characterised by do-it-yourself.

Fourthly, alongside these systems, at least from the 17th century on, was a *speculative system* whose logic of action was aimed at the valorisation of land through building housing, rather than the meeting of a specific client need. Much of London's housing was built in this manner, and it remains a major element in the organisation of the British construction industry today. In terms of its labour organisation, at least, it relies heavily on an adaptation of the craft system in which quasi-firms consisting of small subcontractors and labour-only gangs are mobilised directly by the developer "client". It was not until the implementation of the Housing and Town Planning Act of 1919 that a significant proportion of house-building came within the professional system, and even at its peak such social housing accounted for only about one half of all output.

Fifthly, the method of establishing the price for the work changed in important ways with profound consequences for the motivation of project actors within each system. The medieval mason was paid on a time basis. These rates were subject to market forces, and the periodic attempts to regulate wages by law generally failed. However, there was little motivation to improve productivity or change methods, and the client had no way of passing risk onto others. A more sophisticated system of measure and value became associated with the trade system, where each master tradesman was paid a sum in proportion to the amount of work completed related to the cost of inputs plus a mark-up for profit. While the award of the contract by competition did provide some incentive to reduce input costs, risks associated with the works remained with the client. Competitive tendering on a lump sum basis was first associated with the contracts for military works during the Napoleonic wars (Cooney 1955), and rapidly became the norm. This in turn, stimulated further developments in the surveying role and led to the emergence of the quantity surveyor. Competitive tendering for general contracts intensified competition, and many risks associated with budget and programme, particularly the latter, could now be more effectively transferred.

Each of the three systems, in their ideal-typical forms, have their own way of solving the problems of conception, construction and control. The craft system, combines all three roles, in the activities of the mason, while the trade system witnesses the separate definition of separate actors for conception and control on the one hand, and construction on the other. One of the professional system's most distinctive features is the separation of the conception and control functions, together with a reinforcement of the construction function with development of the general contractor. The next section will explore the professional system in more detail.

## **THE PROFESSIONAL SYSTEM**

The professional system in the UK construction industry became firmly established during the first half of the 19th century. By the eighteen sixties the competitive tendering system was the norm, and "no reputable builder would tender unless quantities were supplied by a recognized quantity surveyor [and] the taking out of quantities required very full working drawings and specifications from the architect" (Summerson 1973 p 13). Architects, engineers, and quantity surveyors had established their professional bodies, while labour was organising itself into craft-based trade unions. Contracts were let on a lump sum basis by competitive tender to master builders who employed many of the trades directly, while sub-contracting for the more specialist ones. Although some general contractors such as Myers (Spencer-Silver 1993) worked closely with particular architects - particularly Pugin - and did not have to tender for all their contracts, this was the exception.

Over the subsequent period the system was reinforced - the surveyors acquired their charter in 1881 as the Surveyors Institution, and became the Royal Institution in 1946. Although the accuracy of the bill of quantities method had been proven with the rebuilding of the Palace of Westminster after the fire of 1834, it was not until 1922 that a Standard Method of Measurement was finally agreed, although the Scottish surveyors in Edinburgh had had one since 1773 (Thompson 1968). The IBA received its charter in 1837, and in 1931, "architect" became a protected title. The first standard form of construction contract was issued by the RIBA in 1903. Eventually the task of developing such standard forms was taken over by the

Joint Contracts Tribunal (JCT) after its foundation in 1931, and the professional system became firmly institutionalised in its series of standard forms.

The main changes over the next century or so were associated with the increasing role of the state, particularly as a client, and technological changes. The state grew in importance as a client in three ways. Firstly, the role of the municipalities in the governance of the country grew in importance, creating a demand for town halls and other civic buildings. Secondly, the state provided more and more services directly - in education, increasingly in health, and especially in housing. Thirdly, the state took over from private promoters the development of infrastructure and thereby became the dominant client for civil engineering works. The general effect of these developments was to reinforce the features of the professional system, ensuring that the position of the professionalised actors was protected, and that competitive tendering on price was the predominant way to select a contractor.

Technological changes led to a proliferation of both professions and crafts. As the buildings became more complex, their structural design presented challenges beyond the skills of the architect, and the Institution of Structural Engineers was formed in 1922, receiving its Royal Charter in 1934. Further changes in the post-war period towards much more highly serviced buildings led to the growth of the services engineering profession, and the old Institution of Heating and Ventilating Engineers received a similar status as the Chartered Institute of Building Services Engineers in 1978. As late as the 1930s, an architect in a small practice such as Grenfell-Baines, the founder of BDP, would typically calculate the structure and the size the services. This would be very unusual today.

Technological changes also affected the general contractor, leading to a much greater reliance upon subcontracting (Cooney 1993). New types of structure meant that the role of the traditional structural trades - bricklayers and masons - became less important, while new materials reduced the role of the carpenter. Plumbing had always been subcontracted, and new services such as electricity, climatisation, and, more recently network cabling, have all encouraged general contractors to rely upon trade contractors for growing proportions of their contract values. Perhaps inspired by these trends, general contractors increasingly turned to subcontracting for their traditional trades. Now few, if any general contractors directly employ labour preferring to rely upon specialist trade or labour-only subcontractors instead.

However, these changes did little to change the organisation of labour which remained reminiscent of the craft system. New skills simply meant new crafts, rather than reorganisation of the work process. The principal challenge to the craft-based division of labour on site - the industrialised building of the nineteen sixties - failed to be established. Thus technological innovation also reinforced the developing features of the professional system. It spawned new professions and new crafts and encouraged subcontracting. Innovation had to adapt to the system, rather than the system adapting to innovation. Indeed, as Bowley (1966) and Thompson (1968) argue, the system did much to stifle innovation. For instance, steel structures took a long time to diffuse due to the aesthetic prejudices of architects; the separation of architects and civil engineers, the choice of architect by appointment rather than competition; and the inability of contractors to take the lead in innovation due to the level of detail provided by architects; and the role of quantity surveyors.

The shift to general contracting led to new forms of work organisation as workers became employees rather than artisans. Few followed Cubitt's example of vertical integration by establishing a permanently employed workforce backed by large workshops producing materials and components, preferring to employ labour casually as required. Until the 1870s payment was usually by the day, and the major struggles revolved around the battle for the nine-hour day (Price 1980). As economic pressures mounted during the recession of the 1880s, the general contractors increasingly shifted towards labour-only subcontracting outside the scope of agreements with the unions. This trend was very much in the opposite direction from those industries which were abandoning internal contracting during the period, but in the absence of technological change, the general contractors sought to intensify work rather than reorganise. The continuing organisation of work on a craft basis facilitated this shift, and the period between 1890 and 1914 saw a considerable expansion of this form of labour organisation.

Various institutions of regulation were established during the latter quarter of the century, but the full panoply of institutionalised collective bargaining was not put in place until the post-war settlement after 1918. The trade unions organised on the basis of the individual crafts, although they were all members of an industry federation formed in 1918 (Postgate 1923). This new form of regulation succeeded in largely removing LOSC from general contracting, but it revived again during the boom of the 1960s, and is now a permanent feature of the UK construction labour market. From the 1950s on the institutions of labour regulation in the industry became increasingly irrelevant to the setting of terms and conditions of employment; there is now no effective regulation of the construction labour market by the social partners and the annual bargaining round is merely formal.

It was not until the nineteen sixties that the professional system began to change in Britain. Until 1967, only one standard form (JCT 63; the predecessor of JCT 80) was available. Innovations in tendering procedures were made, particularly a shift towards selective rather than open competitive tendering, and the first applications of a new form of procurement imported from the United States - management contracting - were made. However, it was in the 1980s that the pace of change speeded. Perhaps for the first time for over a century, change was led by private sector rather than public sector clients. In particular, the conditions of the property boom of the mid to late eighties encouraged innovation. First management contracting, and then construction management were increasingly used. Package dealing also found an expanding market. However, these innovations were largely confined to the building sector, and the organisation of civil engineering remained along traditional lines.

The so-called management forms are, in an important sense, further refinements of the professional system - indeed the principal US textbook on the topic is entitled *Professional Construction Management* (Barrie and Paulson 1993). Much of the enthusiasm from these new forms from the contractor side comes from the fact that they professionalise the role of the general contractor. They do this in two ways. Firstly, the contractor is normally appointed on a fee basis in a similar way to the traditional professions. Secondly, The general contractor, or perhaps more accurately, the principal contractor, does not undertake the work itself, but lets it in packages to trade contractors who are in contract directly with the client. It makes no profit from the site process itself. For these two reasons, many argue that the contractor is now on an equal basis with the traditional professionals - Bowley's hierarchy is no more. The traditional professionals remain in independent contract with the client, although their role is often reduced, with more design being done by the trade contractors. There is a sense in which construction management represents something of a return towards the trade system.

Bowley concluded her study by advocating package deals as the way forward for the UK industry. In recent years they have become increasingly popular with a number of clients. However, closer examination shows that the growth of what is normally known as design and build falls far short of Bowley's specification of a package deal in which "the person who puts forward a design should be responsible for carrying it out.... at a price offered with the design" (1966 p 442). Many current package deal contracts leave considerable scope for traditional architectural duties, and merely transfer site risks more clearly to the contractor, without giving the contractor the freedom to innovate to absorb those risks. The next section will discuss these issues in more detail.

## **PROCUREMENT ROUTES IN THE CONTEMPORARY SYSTEM**

The aim of this section is to present and evaluate the range of procurement routes available within the contemporary professional contracting system in the UK. A procurement route can be considered as a complex suite of relational contracts (cf Winch 1995) which charter the project coalition for a particular project. Thus it forms "the organizational structure adopted by the client for the management of the design and construction of a building project" (Masterman 1992 p 1)<sup>5</sup>. Masterman identifies three basic groupings of procurement routes -

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<sup>5</sup> Masterman uses the term "procurement system". Procurement *route* is preferred here because of the prior analysis of the different contracting systems. Thus all the procurement routes discussed in this section form options within the professional system.

separated and cooperative, integrated, and management orientated - around the mode of coordination of the design and construction tasks. This classification will

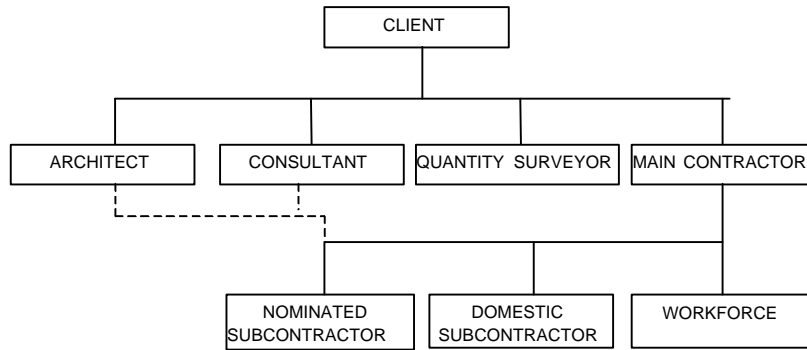


Figure 1 - The separated route: general contracting

be adopted and developed for the following discussion as the separated, integrated, and mediated routes. The reasons for these changes will become apparent as each is appraised. Each route will be presented in terms of its *structure*, as defined by the contractual relations between the members of the project coalition, and its *process* in terms of the allocation of responsibilities through the project lifecycle.

### Separated Routes

The essence of the *separated route* is that the client contracts with a design team, either jointly or severally, and a general contractor independently. The architects and engineers are typically appointed, although fee bidding is now becoming more common, while the general contractor is selected through competitive tender, normally on a bill of quantities. The quantity surveyor is the prime control actor for cost and time, while conformance quality is controlled by the designers. The separated route is what many commentators on the UK have called

the traditional system, it underlies the RIBA Plan of Work, and is most commonly deployed at present using the JCT 80 standard form of contract. A typical separated project coalition structure is illustrated in figure 1, while the project process is captured in figure 2. Masterman includes a number of "variants" within this classification, such as serial contracts and cost-reimbursable contracts. However these variants essentially refer to the manner in which the contract sum is formed, and both in principle and in practice, can be adopted within any of the procurement routes.

The principal requirement for this route to work effectively is for all design work to be completed prior to tender. If this requirement is met, then the route can offer cost certainty after tender, and good quality assurance. It also offers high transparency in the formation of the construction contract. However this requirement is also its principal disadvantage. If design work cannot be fully completed prior to tender, either due to time pressures, or uncertainties in the specification, then it can lead to serious problems in handling the inevitable variations to the contract. The route can also increase overall project cost due to the difficulty of deploying construction expertise during the design phase. This route is most

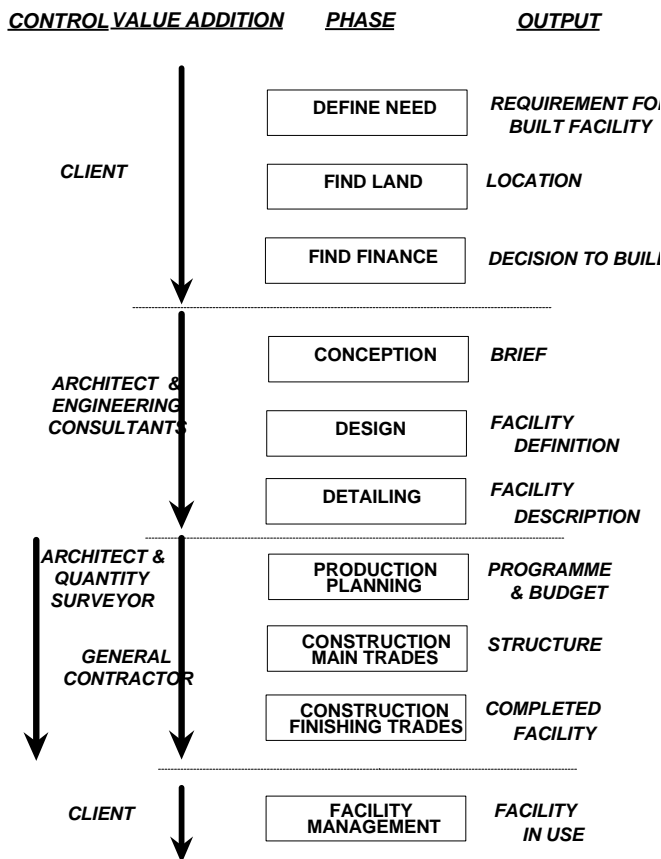


Figure 2 - The Construction Process: General Contracting

appropriate where clients are price-sensitive, desire to achieve high conceptual quality, and require high standards of public accountability, and inappropriate where there are high levels of uncertainty regarding the project mission.

### Integrated Routes

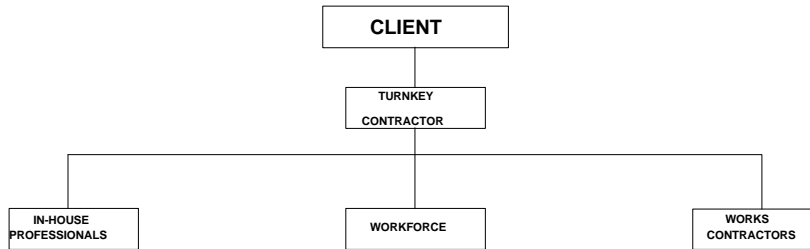


Figure 3 - The Integrated Route

The distinctive feature of the *integrated route* is that the responsibilities for the design and construction tasks rest with the same actor. Various terms exist for this type of route - design and build; package deal, turnkey contract and so on. Contracts are let either on a single stage competition on the client's statement of requirements, or more commonly on a two-stage basis in which competing contractors submit outline proposals.

The selected contractor then develops the design until it can be firmly priced, negotiations ensue, and a price for the remainder of the works is agreed. The client normally retains a cost consultant or employer's agent as a control actor to monitor the programme and budget aspects of the work, but conformance quality responsibilities rest with the contractor. The JCT 81 standard form of contract is commonly used for this procurement route. The principal advantages of this route are programme and budget, and a single point of responsibility for the entire project. Integrated projects tend to be faster and cheaper than other routes, while the integration of the designer and constructor within one contract significantly reduces the problems of dispute resolution. The issues of quality - conception, specification and conformance - have been the subject of much contention, particularly from architects. However, there is no reason, in principal, why integrated routes cannot provide high levels of quality on all dimensions except, perhaps, that of conceptual quality. The principal limitation of

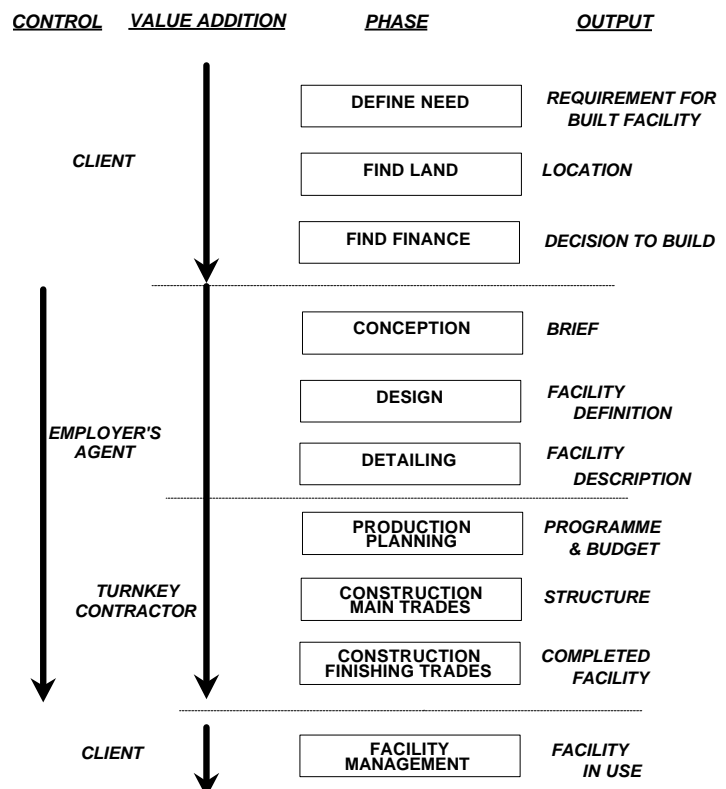


Figure 4 - The Integrated Construction Process

the integrated route is that the client must be able to specify very clearly in advance what its requirements are, and variations once the contract sum has been formed are likely to be fraught. Figure 3 provides a typical integrated project structure, while figure 4 illustrates a typical process.

The terms package deal and turnkey package are used to denote variants of the integrated route, but not always consistently. The principal additional service that can be offered is to find the site, such as is the case under volume contracts with British housing associations. Under certain circumstances, the contractor may also help to finance the project where full financment is dependent upon a fully developed project. The difference between this approach and concession contracting to be discussed later, is that the finance is more in the form of a short-term loan than a long term equity stake. Where the client is concerned for conceptual quality, or planning permission problems are anticipated, an architect may be retained to do initial conceptual work before the integrated contract is formed.

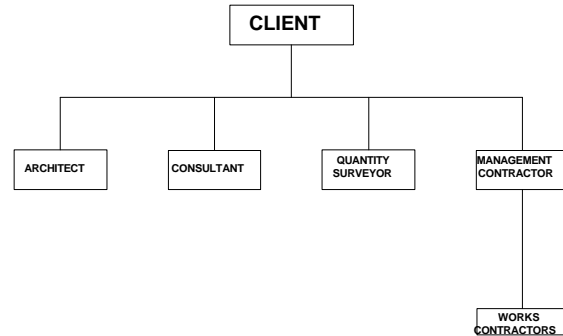


Figure 5 - Mediated Route 1: Management Contracting

Rowlinson (1987) has identified three basic types of contractor offering the integrated route - pure design and build, integrated design and build, and fragmented design and build contractors. In the former contractors offer self-contained systems to solve particular client needs. In the second, the contractor has both design and construction management expertise to meet the client's particular project needs. In the third, general contractors offer packages while sub-contracting design work to architectural and engineering practices. This last type of contractor is often associated with what has been called "hybrid" design and build in which the design is developed by architects and engineers up to complete definition of the project - typically stage D of the RIBA Plan of Work - before tender. Effectively, this approach shifts risk associated with site conditions to the contractor while allowing the client's consultants to retain design authority. It is particularly favoured by public sector bodies such as housing associations. The British case study in Winch and Campagnac (1995) represents an example of hybrid design and build. In reality this procurement route variant is more appropriately classified as a separated one, as it fails to meet the test of the integration of design and construction activities.

**Mediated Routes**

*Mediated routes* are characterised by the introduction of additional actors other than those directly responsible for the design and construction in order to provide integration to a fragmented project coalition. This actor is normally designated as the construction manager or management contractor, the main difference between the two being the contractual arrangements between the project coalition members and the client. The rise of mediated routes is an American importation, and largely associated with the rapid

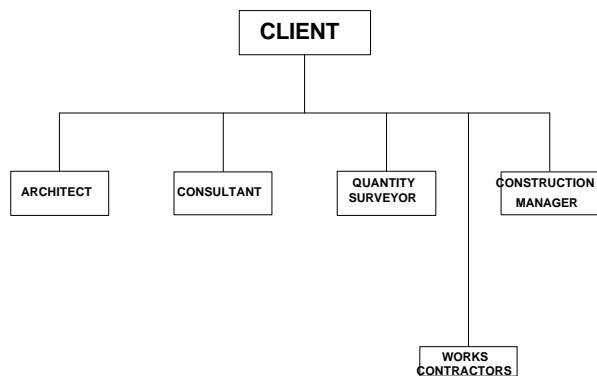


Figure 6 - Mediated Route 2: Construction Management



expansion of commercial property construction during the last decade. Their most notable feature is the separation of the responsibility for managing the process from doing it. This has allowed the "professionalisation" of the principal contractors' role. The principal contractor is normally appointed, and is reimbursed either by a fee based on the value of the works, or fixed by negotiation. Actual site work is let in packages to trade contractors, normally by competitive tendering on a lump sum basis. Under management contracting these trade contractors are in contract with the principal contractor, while under construction management, they are in contract with the client. Figures 5 and 6 illustrate these two variants, while figure 7 identifies the process.

The main advantage of mediated routes is their ability to cope with uncertainty in project objectives. They are particularly favoured by clients whose main concern is the project programme, and who are willing to pay more for a shorter elapsed time. Such additional costs are outweighed by the reductions in the cost of capital over the shorter period. Mediated routes also allow the client to change its objectives during the project in response to uncertainties in the nature of the project or changing market conditions for the services provided by the built facility. These benefits are achieved in two ways, Firstly, the design and

construction phases of the programme are overlapped to achieve reductions in overall time, a process known as "fast-tracking", which is illustrated in figure 8. This is normally achieved by subdividing the project into a series of works packages which can be designed, tendered, and let independently. Secondly, by delaying the letting of the later packages adjustment can be made to both programme and specification should the need arise. Reintegration of the works packages is assured through the principal contractor.

It is the separation of the relatively low cost project coordination tasks from the relatively high cost site execution tasks that give the mediated route its flexibility. Construction expertise can be obtained by the client at relatively low cost early in the programme, while the benefits of competitive tendering for the execution of packages on a lump sum basis can be retained as and when requirements become fixed. This expertise is, in addition, available for contributing to the design process. Such a contribution may be limited to offering suggestions as to more effective details - known as buildability - or may be more extensive. The development of design and manage, in which construction management is extended to the design phases of the project extends this logic further. Such construction management services may be offered by architects or other consultants, but more commonly, such services are offered contractors.

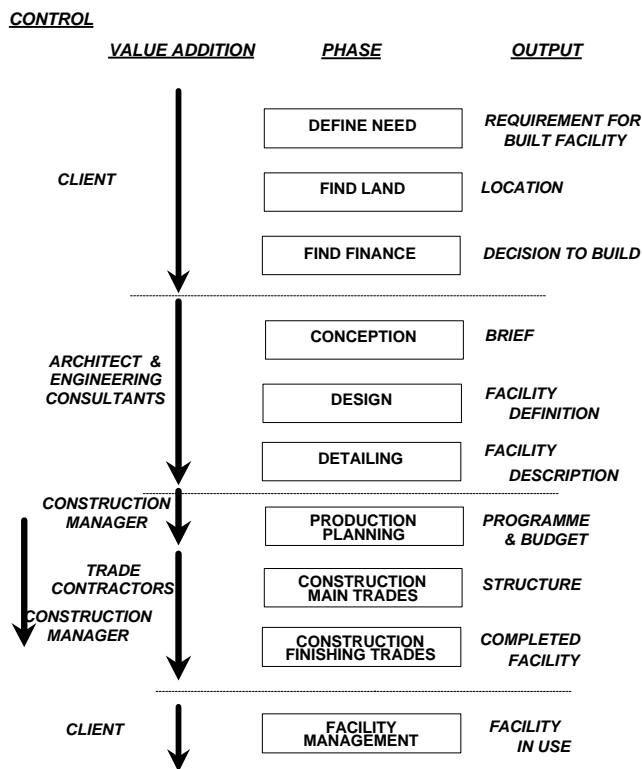


Figure 7 - The Construction Management Process

The principal disadvantages of the route are budgetary control, and the burdens placed upon the client. Because the tendering of works packages is left until relatively late, the total costs of the works are not known until the last package is let. This can cause problems for price-sensitive clients, particularly in the public sector. One solution is for the principal contractor to offer a guaranteed maximum price. Secondly, the additional fee of the principal contractor is

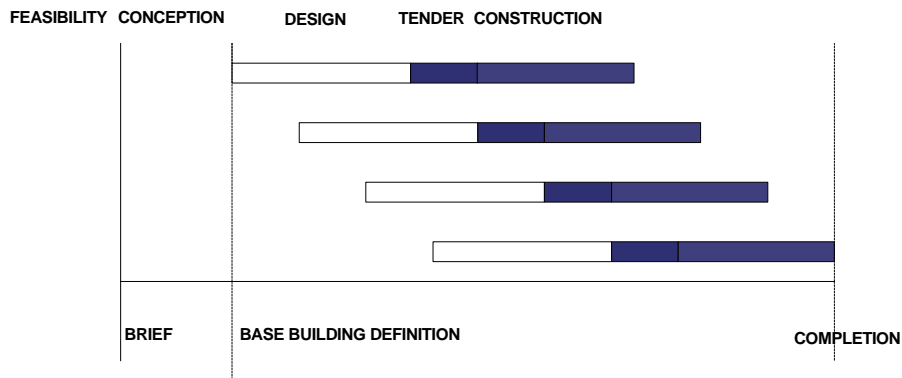
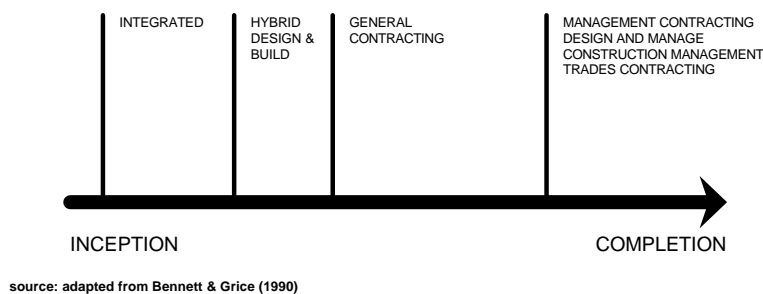


Figure 8 - Fast Track Construction

an overhead, but this can be outweighed by the benefits of contractor involvement in the design process. Particularly under the construction management form, the client has additional project management burdens due to the far larger number of contracts into which it enters. The mediated routes are only suitable for experienced clients, and provide the greatest benefit on complex projects, or those where it is expected there will be a necessity to change project objectives during the programme. A particular problem with management contracting, as opposed to the other variants, is that it has become associated with highly opportunistic behaviour by management contractors - especially by delaying payments to trade contractors.

### The Routes Compared

Starting during the sixties, there has been a secular trend away from separated systems. They have been characterised as slow, conflict-prone, and inflexible. They are slow because of the necessity to develop a full description of the project prior to tender; they are conflict prone because of the separation of the two phases of design and construction, and also because the architect or engineer has a conflict of



source: adapted from Bennett & Grice (1990)

Figure 9 - The Formation of Firm Contract

interest between its role as a designer, and its role as a control actor for quality during construction; and they are inflexible because of the difficulties in making variations after tender and drawing on contractor expertise during design. Both of the other routes have grown in importance, being favoured under different circumstances. Where clients know their requirements are not going to change, integrated routes are preferred. They do much to eliminate conflict due to the single point of responsibility, and tend to be faster. Where clients need flexibility to cope with project uncertainties, then the mediated routes are preferred. Many proponents have suggested that they are less conflict-prone as well, but the evidence on this point is mixed (Masterman chap 5).

The three routes can be compared on five criteria - risk allocation, flexibility, programme performance, budget performance, and quality performance. The differences in risk allocation between the client and the principal contractor are illustrated figure 9. Risk allocation is according to the criterion of who accepts liability when unforeseen circumstances occur - a typical example would be unfavourable ground conditions, and risk transfer takes place at the formation of firm contract. As can be seen the integrated route is most favourable for the client, while the mediated routes are least favourable, on this criterion. Flexibility is assessed on the criteria of how easy is it to negotiate variations to the contract should client requirements change, and how late in the project programme fixed price contracts are formed. This is illustrated in figure 10. Again, it can be seen that the most flexible are the mediated routes, while the least flexible is the integrated.

Clearly, there is a trade-off in procurement route choice between flexibility and liability for risks.

Client objectives for the project can be categorised into three types - quality of conception, specification, and realisation. The quality of realisation has two aspects, the level of service offered in terms of programme, budget, and conformance quality, and the capability to keep to that offer (Usmani and Winch 1993). So far as quality of conception is concerned, separated routes are most favoured, because they allow the time and autonomy that leading designers

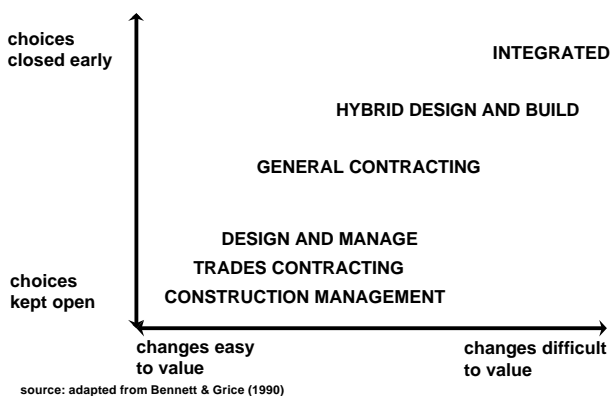


Figure 10 - Procurement Route Flexibility

require to develop their ideas while also offering the means to ensure that what is built rigorously conforms to that conception, but the mediated routes are not necessarily inimical to this. Integrated routes tend to perform poorly here due to the problems of designing to a cost, and retaining top level designers within an integrated organisation. So far as quality of specification is concerned, this is largely a technical matter, and should not be degraded by procurement route, however, the ability to value engineer within the integrated and mediated routes favours these from this point of view. So far as quality of realisation is concerned, the integrated and mediated routes offer shorter programmes over the project life cycle, while the integrated route offers lower budgets. The apparent advantages of the separated routes here, tends to be due to a tendency for the existing research to focus upon contract sum rather than total project cost. Mediated routes can also offer low budgets if value engineering is practised. There is no difference in principal between the routes in the levels of conformance quality attainable. So far as control against these objectives is concerned, separated routes have a poor reputation due to their diffused risk allocation, while integrated routes offer the best performance overall. The mediated routes are intended to be much more flexible, and so it would not be expected that they would offer the same level of performance. However, their record on programme performance has been impressive.

Integrated routes have been criticised for their low conformance quality due to the lack of independent quality control, although there is little systematic evidence on this point.

Despite their considerable variation, these three routes share common features of the professional system. In an important sense, the mediated systems represent the apotheosis of the professional system. They attempt to place the principal contractor and its employees in the same status-group as the other professions by placing them in an independent advisory role to the client. This tendency is reinforced by the growth of the Chartered Institute of Building, which received its charter in 1980. Lump sum competitive tendering is then confined to the works packages. This may appear superficially similar to the trades system, but the crucial difference lies in the risk-transfer that lump sum tenders allow compared to after-measurement. Mediated systems can also be seen as a way of coping with the growing fragmentation engendered by attempts to adapt the separated system to the growing complexity and more demanding quality of realisation criteria of contemporary construction through greater coordination. This coordination takes place externally to the actual value-adding processes of design and construction through the emergence of actors specialising in such mediation. The value adding processes themselves are not re-integrated.

Bowley (1966 chap 16) advocated integrated routes as her solution to the problems of the British system generated by the reliance on separate responsibility for design and construction. Considerable movement has occurred in this direction. Many firms offer complete building systems to meet particular industrial requirements, while a number of integrated design and build firms compete successfully to meet more demanding client requirements. Predictions of future developments suggest a bright future for such routes. However, it is not clear from the aggregate data how much of this shift is towards the hybrid type which was considered above be more of a separated route<sup>6</sup>. Many of the competitors in the market are what Rowlinson called the fragmented type. What is clear at present, is that few now believe that integrated routes of themselves can solve the main problems of the industry because of the problems they have in coping with the inherent uncertainties of the construction process.

## THE REFORM OF THE SYSTEM

Despite considerable innovation in procurement routes during the last two decades, growing concern regarding the performance of the industry led to increasing demands for reform. Coupled with other long-term trends in developed economies, these have meant that the British construction industry is now at something of a cusp. The long term trends are the growing internationalisation of the construction industry within and between developed nations (Linder 1994 chap 12), and the fiscal crisis of the state throughout the western economies. The increasing internationalisation is occurring at the level of both clients and project actors. Clients are increasingly international corporations - they have the opportunity to compare the performance of the national construction industries of different countries. This has had the result of the commissioning of a number of specific comparative studies which will be discussed below. Project actors are both increasingly operating in other developed nations both in consortia for large projects and by establishing or acquiring operations. The period around 1992 saw a flurry of cross-border merger and acquisitions amongst construction corporations, and professional practices setting up European networks. Through such activities, project actors are increasingly aware of their relative strengths and weaknesses.

The fiscal crisis of the state became dramatically apparent following the crisis of 1973 as the unprecedented growth of the *Wirtschaftswunder*, *trente glorieuses*, and "never had it so good", came to an end. Mounting budget deficits in the USA generated by the financing of the Vietnam war and the Great Society programme by borrowing meant that the oil crisis sent shock waves through already ailing economies. The first response after 1973 was to cut back dramatically on public sector investment in built facilities. In Britain, at least, the crisis also generated a spectacular property crash. Over the next 20 years, the ability of the state to provide adequate amounts of capital to fund the investment needs to public built facilities,

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<sup>6</sup> One leading UK integrated design and build firm recently reported that 45% of its workload was of the hybrid type.

as a trend, deteriorated. Most recently, this trend has been particularly pronounced within the European Union as member states struggle to meet the Maastricht criteria on state debt. The inevitability of this trend has led to a shift towards concession contracting, a shift now known within the UK as the Private Finance Initiative.

The internationalisation of the construction industry also grew rapidly after 1973. As well as the internationalisation of clients, the boom in work in the Middle East, a direct result of the 1973 crisis, led many firms and individuals to work with actors and professionals from other nations. In particular, many of the Middle Eastern projects adopted US-style procurement routes and practices, and the rapidly growing economies of Asia-Pacific are currently providing similar opportunities for British firms. This new exposure led to growing levels of awareness of two features of the British system - the relatively poor performance in the production of built facilities in the UK, and the "adversarial" nature of relationships within the professional system. Earlier attempts at reform of the British system had taken a solely national focus<sup>7</sup>, the later two<sup>8</sup> were both informed by an international perspective, and were focused more on the increasingly important private sector client. These impressions were supported by an increasingly sophisticated research base.

A number of multilateral studies focused on cost comparisons, the earlier of which are reviewed by Meikle (1990). Summarisation is difficult, but as a general trend, it can be suggested that only France and Germany display consistently higher costs than the UK for standardised industrial and office buildings. During the same period covered by the international studies reported by Meikle, a number of bilateral studies of construction project performance with the United States were also undertaken. These were clearer in demonstrating poorer British performance. Nahapiet and Nahapiet (1985) and Flanagan and his colleagues (1986) provided two of the more influential studies which compared a small number of "matched" projects in the two countries. A number of complex issues were covered in these studies which defy simple review, but perhaps the main conclusions may be summarised thus. Buildings were clearly built faster in the USA, and tended to be cheaper. This was due to the greater use of standardised and pre-fabricated components; the greater involvement of the client in the process; and the greater capabilities of trade contractors. Procurement routes were also clearer in their allocation of responsibilities to project actors. They either more clearly and sharply separated the responsibilities of designers and contractors, or they adopted more flexible mediated forms. Quantity surveyors were not used - designers provide their own cost estimates, while bidders take off their own quantities. Such publicly available studies were reinforced by the internal studies conducted by many of the leading clients in the UK - the most influential being that for BAA completed in 1993 and widely reported in the construction press.

More recently, attention has turned more towards Japan. The report by Bennett and his colleagues (1987) created a considerable impression, while later publications in the US (Hasegawa 1988; Levy 1990) reinforced the picture of a highly competitive industry that was going to conquer world markets. The Reading report examined the role of construction in the Japanese economy and the organisation of the construction process. Hasegawa and his colleagues from the Shimizu corporation placed the emphasis upon strategic management issues. Levy provides much greater detail on the construction process in Japan, but is mainly focused upon the strategic issues of countering competition from the Japanese in international markets. More recent attention in Britain has focused upon the relatively high levels of spending on research and development of the Japanese construction corporations which Reading, Hasegawa and Levy all identified. A report sponsored by the Chartered Institute of Building (1995) showed how the percentage of turnover spent by Japanese construction corporations was much higher than any counterparts in the UK, and that government played a relatively minor role in funding research. The report laid considerable

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<sup>7</sup> The first of these was the Simon Report of 1944, which concerned itself with the shift from wartime building focused on defence installations and repairing bomb damage to peacetime building focused mainly on housing. The Emmerson Report of 1962 and the Banwell Report of 1964 were more concerned with problems of managing the rapidly rising output of the industry, while the Wood Report of 1975 was a response to the sharp falling away in workload of the previous two years. All were public policy orientated, and focused on the role of the state and its agencies as clients.

<sup>8</sup> These were the British Property Federation (BPF) proposals of 1983, and the Latham Report of 1994.

emphasis upon the learning cycles generated in the Japanese system, and the emphasis upon a *learning* rather than a *learned* culture.

However, the expansion of the single European market meant that intra-European comparisons were not ignored. The Secteur study, commissioned by the European Commission (European Commission 1994) and executed by a British firm (W.S. Atkins), carried out multilateral comparisons of construction costs. These again tended to show that Britain had relatively high construction costs, but noted that much of this may be due to differences in specification. However, it also noted that British costs in civil engineering were high, despite the very low level cost of labour inputs. More detailed and carefully controlled bilateral case study comparisons of projects for a variety of commercial building types constructed for common clients (Business Round Table 1994) told a similar story.

More subjectively, many clients came to abhor the increasing tendency of projects to culminate in litigation. The number of construction cases tried in the High Court Official Referee's Division more than doubled between 1973 and 1991 (Cooney 1993 p 79). One response has been a tendency to idealise the allegedly harmonious Japanese system. A stream of reports have advocated aspects of the Japanese system while ignoring its negative aspects. The principal amongst these is the system of *dango*, or price ringing (Kurosaki 1994; Reeves 1995) which led to the virtual implosion of the Japanese contracting system and the fall of the Liberal government. It is difficult to escape the conclusion that the main reason that the Japanese system appeared to be so harmonious was that contractual relationships were collusive, and that disputes were resolved under the table rather than openly. Such idealisation was more surprising in the absence of any evidence that the Japanese system was more efficient, and anecdotal indications that the competitive advantage of Japanese contractors internationally derived mainly from their access to relatively cheap capital rather than greater effectiveness in construction. Certainly Reeves' (1995) study of a Tokyo social housing project does not confirm the supposed superiority of the Japanese industry.

More serious attention turned towards the reform of the British system. The British Property Federation (BPF) is a trade association of UK property developers, many of whom are active internationally, and one of whom had commissioned the first international construction costs survey - Slough Estates. It set out to provide a new framework for construction procurement which became known as the BPF System (Masterman 1992 chap 6). The route assumed a separated system of the hybrid design and build type providing for the separate appointment of the both the designers and principal contractor on a competitive lump sum basis. The client itself was to take on much of the burden of coordination, although provision was made for the appointment of the client's representative, should the client prefer. Bills of quantity were to be abandoned, and contractors encouraged to make variation proposals, the benefits of which could be split between the client and the principal contractor. An adjudicator was to be appointed for all phases of the project to facilitate dispute resolution. The aim was to provide a better incentive framework for the project coalition and to allocate risks where they, as a client body, thought they ought to belong, and thereby to provide better performance from the industry. Experience of the route in practice is limited as few clients have adopted it, even amongst the members of the BPF. It would appear that the proposals were rather overtaken by the line of less resistance towards the development of mediated routes.

However, by the early 1990s, considerable momentum for change had built up. A series of reports from the National Economic Development Office (NEDO) during the eighties (notably Building EDC 1983, 1988) raised serious questions about the organisation of the separated system and were influential in the development of the integrated and mediated routes. The evidence discussed above on comparative project performance, incomplete and methodologically flawed as it was, continued to mount. However, against this somewhat gloomy background, it could be noted that the *international* competitiveness of UK firms was sustained and improved through the period on the projects reported in ENR (Soubra 1993). For architecture and engineering services, British firms were, by a long way, taking a greater share of the market than any other European country, and were second only the USA. So far as construction services were concerned, British firms tended to increase market share, at the expense, principally of the Americans, and were on a par with the other leading

European contracting nations by the end of the period. These data strongly suggest that the problems with the performance of the British system lie with not with the capabilities of the individual actors, but their *interactions* within the national contracting system, and its regulatory context.

The Latham Report (1994) marks the latest stage in this glacial process of reform of the contracting system. Initiated in July 1993, and published in its final form 12 months later, the Latham Report is, arguably, the most comprehensive attempt yet to grapple with the widely accepted problems of the British contracting system. It was funded jointly by the Department of the Environment (the UK construction ministry), the Construction Industry Council (an association of 27 professional institutions), the Construction Industry Employers Council (a grouping of the trade associations for general contractors), the National Specialist Contractors Council (representing trade contractors) and the Specialist Engineering Contractors Group (representing services engineering contractors)<sup>9</sup>. Notably, client associations such as the BPF were absent. The report is explicitly focused upon procurement and contractual arrangements, but also saw fit to comment on a number of other matters. Only the principal recommendations will be reviewed here.

The main conclusions were:

1. Clients are the key to project performance, and they should come together in a Construction Clients Forum.
2. Tendering procedures for both consultants and contractors are in need of reform, and should both be developed to include quality as well as cost criteria in tender evaluation.
3. Existing standard forms of contract are inadequate and generate adversarial relations. New forms of contract need to be established, and the New Engineering Contract was recommended as a model<sup>10</sup>. These standard forms should also be given statutory backing.
4. A target of a 30% reduction in construction costs should be set for the year 2000.

Additional recommendations paid, *inter alia*, attention to education and training, equal opportunities, research and development, and proposed project insurance on the French model.

Very much in parallel with this report, an initiative deriving from the government's review of industrial policy and, more specifically, the *Realising Our Potential* White Paper of 1993 on research policy led to the Technology Foresight programme across 15 industrial sectors. The basis of all these studies, including the one for construction (OST 1995), was a Delphi study of construction experts exploring the future role of construction in the economy, the type of technologies that were becoming the most important, and an assessment of the competitive strengths and weaknesses of the UK industry. The general argument of the report re-iterated the points made earlier regarding performance, and research and development spending, but also noted that the oil and offshore sector of the industry was highly competitive, that British architects and engineers were highly competitive internationally, and that the country possessed some of the world's leading construction research institutes. The challenges for the future were identified as sharpening international competitiveness; environmental issues; strengthening technological capability; education and training; financing the upgrading and replacement of the stock of constructed facilities; and reengineering construction business processes. The "engines for change" were argued to be the creation of learning networks; information technology; establishing a favourable fiscal regime; and fostering a culture of innovation. Also stimulated by the same white paper, is the Innovative Manufacturing Initiative, and within it the Construction as a Manufacturing Process research programme, which is funded by the Research Councils. This also places at its centre, business process reengineering.

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<sup>9</sup> These have now all come together in the Construction Industry Board, which includes the newly formed Construction Client's Forum, and is charged with implementing the Latham proposals.

<sup>10</sup> The New Engineering Contract was developed at the initiative of the ICE due to dissatisfaction with existing forms, and launched in 1993. It is founded on the principles of flexibility, clarity and simplicity, and aimed at being a tool for good project management (Perry 1995). It has been well received in both Britain and a number of other countries that use English-language construction contracts. A second edition, amended to meet the recommendations of the Latham Report, was published by the ICE in 1995 as the NEC Engineering and Construction Contract.

A third recent development, not formally linked to this new attempt to orchestrate industrial and research policy to improve the competitiveness of the industry, but perhaps of more profound implication in the long run, is the growth of concession contracting. Pioneering projects such as the Channel Tunnel and the Dartford Bridge, together with a slightly later generation including the Skye and Severn Bridges, and a number of urban tramway systems on a mixed finance basis (e.g. Manchester and Sheffield), have strongly influenced the development of what is now known as the Private Finance Initiative (PFI). Launched in 1992, the PFI has taken a growing role in the governments capital investment plans. All government investment projects are now subject to scrutiny for viability under the PFI. The major projects to go ahead under the initiative to date are the modernisation of the Northern Line, awarded to GEC Alstom, and the Channel Tunnel rail link awarded to the London and Continental Railways. The PFI has also seen a number of new prisons being built and privately operated. New tramways (Birmingham, Nottingham, Croydon), the extension to the Docklands Light Railway, all new major roads<sup>11</sup> and new health facilities are presently under consideration within the PFI.

### **TOWARDS A CONCESSION SYSTEM ?**

This most recent development within the British system suggests that the professional system may be starting to decline, and that a fundamental transformation is taking place. The essence of the shift is that the producer of the built product is being increasingly asked to *finance the production process* against a return from the cash flow from its exploitation. Although this has long been the case with the speculative system, this was orientated towards the valorisation of land, and relatively little capital was involved with each unit. Increasingly, both within the UK and internationally, concession contracting is becoming an option. It has myriad forms - ranging from contracts for the supply of social housing in volume build contracts, to the types of large infrastructure projects being studied by Le Groupe. In the UK this development has been institutionalised in the Private Finance Initiative.

The concession is a radical innovation in the context of the British contracting system, and a concept unknown in English law (Marcou 1992). The railways and canals were not promoted on the basis of concessions, but charters<sup>12</sup>. Dobbin (1994) in his study of railway building uses the terms interchangeably to apply to the British situation, but they are, in fact, very different. The concession is an instrument of public policy, and the project is promoted by the state. Concessionaires are invited to finance the construction of the facility and recoup their costs through its exploitation for a determinate period of time before the facility reverts to the state. Under the charter, the promoter is private and the charter is an instrument of private interest where that interest affects the property rights of others, and the state makes no financial guarantees. While the promoter similarly recoups its costs from the exploitation of the facility, that exploitation is normally indeterminate in length. In the former, the principal asset upon which finance is secured is the concession agreement; in the latter it is the real assets generated by the project.

The promotion of infrastructure projects on the basis of pure charters became much less important after 1866, and financiers became more wary and the supply of viable projects dried up. In Ireland, the British government was obliged to provide soft loans to make the railways viable (Joby 1983), while in India the East India Company offered interest payment guarantees to encourage contractors to build the lines on the basis of a 99 year concession. This proved to be an expensive way to build railways, and after the implementation of direct imperial rule, the government built the lines itself from 1870 on. On continental Europe, the British contractors were happy to work as concessionaires - by 1855 Thomas Brassey had built three quarters of the railways in France, and became known as *il re degli intraprenditori* in Italy (Middlemas 1963), while with Peto and Betts he built the Royal Danish Railway in

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<sup>11</sup> There are, however, no plans to introduce tolls at this stage until smart technology has been adequately developed. Concessionaires will be reimbursed on a "shadow" basis by the government.

<sup>12</sup> Technically, English law recognises the concept of franchise, rather than charter. However, the term charter is retained here to avoid confusion with the modern meaning of franchise as a network of independent but commonly branded businesses.



Jutland (Joby 1983). It was only in Great Britain that the provision of vital infrastructure remained purely a private sector matter.

The Private Finance Initiative is presently being heavily promoted by the government as a way of minimising public sector debt and to move, as one government minister put it, to "the end of the BAD old days - Build and Disappear" (cited *Financial Times* 4/4/96). There is a deliberate attempt to shift the reward structure within the contracting system so that construction and exploitation risks are carried by the same concessionaire, rather than the latter being taken by the final client. However there is a paradox at the heart of concession contracting. This is between the interest of the state in ensuring the continued availability of an element of infrastructure in the public interest, and the private interest of withdrawing from a business that is not longer profitable. As the French experience shows (Marcou 1992; Martinand 1993), the inevitable outcome of such a paradox is that the state retakes responsibility for the infrastructure element to ensure its public policy objectives. This may yet be the fate of the Channel Tunnel if its present financial problems cannot be resolved. However, so far as the construction process is concerned, these are not matters of immediate concern.

Although the financing of the production process by the producer is not unknown in British construction - indeed it is at the heart of the speculative system - this new form of organisation of the construction process does represent a radical departure, and warrants a new appellation. I have chosen *concession system* because it is this type of contract which marks out the innovation. The concession system is not speculative - it is normally in response to a clear call for tenders from the client, and often the exploitation of the built facility is subject to elements of guarantee. Within the concession systems not only is the role of finance very different, but the professional autonomy of the actors is subsumed under the concession contractor, who is almost always a general contractor by background. Bowley's package deals come of age.

## **CONCLUSIONS: THE RIGIDITIES OF FLEXIBILITY**

This paper has attempted to describe the contemporary system in the British construction industry, characterising it as a professional system, showing how it has evolved out of the earlier craft and trade systems, and how it exists alongside the speculative system for the provision of private sector housing. This professional system is now on the cusp of change. There is widespread dissatisfaction with its performance from its clients, and an extensive programme of research and reform has now been implemented. Outside of this programme, the development of public policy with regard to concession contracting is also likely to lead to significant changes in the structure of the industry and the organisation of projects. However, these dynamics of changes are rooted in the existing professional system, and it is worthwhile identifying here the structure of that system so as to provide a basis for further analysis. In so doing it has taken Marx's aphorism seriously - it is simply not possible to understand the forces currently at work in the British construction industry without understanding how it has arrived at the present cusp.

The development of the professional system over the last 150 years or so has led to an industry of remarkable flexibility, a capacity reinforced over the last 20 years by the development of mediated procurement routes. The sustained, and even growing, global market share of UK construction firms - both professional and contracting - demonstrates that many of the leading firms in the industry are of a world class standard. On the rather inadequate evidence of comparative studies, the UK industry stands alongside that of the leading European nations, joint second to that of the United States, in its overall performance. The performance on programme and quality criteria of the industry is, so far as can be judged, generally good in comparison to that in other advanced countries. The principal area of weakness would appear to be that the outturn cost of construction in the UK is relatively high for similar building types. We simply do not know enough to identify the causes of this, but the evidence to date points to a combination of relatively high quality, coupled with relatively low productivity. Given that the leaders amongst the different types of actor in the system are competitive internationally, this suggests that it is their interactions *within* the professional system itself which are the root of the problem. Thus it is suggested that the dynamics of the system create a logic of action which motivates overspecification

(i.e. inappropriate levels of quality of specification and quality of conception), and fails to motivate cost saving innovation. It is this same logic of action which generates the adversarial relationships which clients find so distasteful and frustrating.

Flexibility and productivity are related through a paradox (Winch 1994). Strategies to maximise flexibility usually imply investment in general purpose machines, working in networks of consortium and subcontract, and the employment of labour on a casual basis. In essence. Flexibility is achieved in two ways - through fragmenting the production process between larger and larger numbers of different actors in networks of short-term relationships, and by avoiding capital lock-up by minimising investment in physical and human capital. The logic of action minimises longer term commitments, because it is assumed that different sets of relationships will be required for the next project than on the last. It is this emphasis upon flexibility that has led construction to become seen by many commentators as a model for the organisation of many manufacturing industries which are facing unprecedented volatility in their markets (see Winch 1993 for a review and critique). However, flexibility comes at a price, for all these choices inherently limit the possibility of innovation. Innovation can only take place within the existing logic of the system - actors either innovate within their own sphere of competence, or innovations are made by new entrants to the industry and become institutionalised through new actors, often in the shape of new professions and new crafts. Any innovation that requires the shared initiative of more than one actor is particularly difficult, because the balance of risk and reward in innovation is usually asymmetrical between actors, and hence leads to winners and losers. Potential winners find their innovative ideas stifled by potential losers. It is in this sense that the flexibility of the British construction industry is also a rigidity - the logic of action of the professional system does not favour the release a dynamic of innovation that will generate sustained cost reduction over time.