Appendix 2: UK Experience with Timber Frame

A.2.1 This section summarises the drivers for change in the UK house-building industry and the current position of timber frame housing. The UK situation is summarised as the timber frame industry is expanding and the evolution of timber framing in the UK is particularly informative for the Irish construction environment. The TFHC’s view is that the domestic market for timber frame in Ireland is not as well developed as that in the UK and the TFHC believe that valuable lessons can be learned from the UK experience.

A.2.2 Drivers for change in the UK house building sector
Masonry home construction accounts for the majority of housing starts in England, Wales and Northern Ireland. Scotland is the exception where timber frame housing starts account for 60% of the total Scottish housing market. England, Wales and Northern Ireland are experiencing a sustained shift away from masonry cavity wall construction in favour of timber frame systems and, to a lesser extent, other systems such as steel frame.

The key reasons for masonry construction facing increased competition from other construction techniques can be summarised as follows:

- **Skills shortages** - Demand for labour in the south east of England is especially acute although a skills shortage exists nationwide. The combination of skills shortage and high demand for labour has had a detrimental effect on build quality.

- **Labour shortages** - The demand for labour has forced the price of skilled workers to an extent that developers are reluctant to pay. Furthermore, labour frequently moves from site to site attracted by competitive rates of pay. As a result, a developer’s construction programme will be affected by losing labour to other sites where rates of pay are higher.

- **Weather factors** - The construction of masonry homes involves a wet trade during the critical path of the construction programme, which is also affected by unpredictable weather; this is especially acute in the winter months.

- **Speed** - Block construction is estimated to take 15%-30% longer than timber frame.

- **The influence of government policy** - One of the most significant factors influencing change in the construction industry is the desire of successive governments to encourage improvement and the adoption of new technologies within the industry. The need for radical change in the business culture engrained in the industry was identified in the Latham report titled ‘Constructing the Team’ and published in 1994. The UK construction industry has been dominated by the adversarial relationships between the client, designers, contractors, sub-contractors and the supply chain. The Latham report called for root and
branch reform in management styles and adoption of commercial (partnering) with the client, contractors and supply chain.

The report also recognised the chronic shortage of skilled workers within the industry and identified that there was also a lack of training and education. These factors combined with adoption of more technologically advanced building products or systems have begun to drive the recommendations raised by Latham.

In 1998, a further report titled ‘Rethinking Construction’ otherwise known as the Egan report, was published by the Construction Task Force (CTF). This report emphasised the role greater prefabrication, commercial partnering and benchmarking could play in driving improvement in the industry. The report identified a number of key performance indicators (KPIs) and set targets for improvement and recommended that the partly government-funded social housing programme could be the industry’s pathfinder. The government, through the Housing Corporation, is exerting pressure on registered social landlords (RSLs) to lead change in the industry and to ensure that social housing projects are ‘Egan compliant’. ‘Egan compliant’ schemes receive preferential funding from the Housing Corporation.

In May 2000, following the findings of both the Latham and Egan reports, the Housing Corporation developed a new initiative to fund the greater use of off-site manufacturing (OSM) techniques in new housing projects developed by registered social landlords as a driver for encouraging innovation. This initiative was called the ‘kick start’ programme.

OSM techniques have been identified by the CTF as an opportunity for achieving improvements in cost, time and build quality. However, it was also highlighted that OSM techniques require long term commitments from developers and also confidence to invest in the necessary production facilities.

‘Kick start’ provides preferential access to funding. RSLs submitting their bids must demonstrate their commitment to the implementation across their construction programmes of the principles laid down by the CTF with the aim of:

- Enhancing build quality
- Improving supply chain relationships
- Reducing component delivery times
- Reducing construction times
- Increasing predictability in the construction programme

There are a number of ‘house manufacturers’ i.e. steel frame manufacturers and timber frame manufacturers who supply dwellings to developers who have secured ‘kick start’ developments.

‘Kick Start’ - the Amphion Consortium
Torwood Ltd. has developed the advanced Fee-U-Tec timber frame product in response to the specification drawn up by a group of Registered Social Landlords (RSLs) known as the Amphion...
Consortium and is warranted by NHBC, Zurich and HAPM. The relationship between Torwood Ltd. and the Amphion Consortium exemplifies the development of long term commercial partnering between the frame manufacturer and the RSL.

The Amphion Consortium comprises approximately 20 housing associations which have pooled their development programme to provide sufficient volume for the factory production of timber dwellings. The programmes have been designed around Egan principles and to meet planned Building Regulation changes up to the year 2010.

The fall and rise of timber frame building in the UK
System built timber frame housing was gradually introduced into the United Kingdom from the 1920s. Their occurrence increased significantly following the Second World War. By the early 1980s timber frame housing accounted for approximately 20% of housing starts in the UK. Following adverse media attention in the Granada Television documentary 'World in Action', broadcast in 1983, the timber frame market in the UK virtually collapsed because of undermined customer confidence in timber frame construction. Speculative house-builders in Scotland, England and Wales had no choice but to abandon timber frame systems. The documentary focused on poor site practice that was endemic throughout the house-building sector. The documentary predicted that a large number of building failures would occur following this poor practice. In fact, serial failure of timber frame systems did not occur.

This has been largely borne out by the conclusions drawn by the Building Research Establishment (BRE) in an investigation of the various timber frame construction techniques used in the UK. BRE also reported on the condition of these buildings. The research included a detailed structural inspection of over 120 dwellings, representing over 40 timber frame systems covering a wide range of site exposure throughout the UK. The average age of the dwellings was approximately 30 years. The BRE research concluded that where ‘worst case’ situations were encountered they were the exception rather than the norm. The incidence of fungal decay found in timber dwellings built from 1930 to 1975 was slight and attributed to particular parts of the construction and/or inadequate maintenance. Usually fungal decay was localised and relatively easy to remedy. The BRE investigations concluded that the design and construction principles used in modern timber framed houses gave satisfactory long term performance.

Timber frame construction in the UK is rapidly increasing in popularity as confidence within the construction industry is increasing. However, adverse media attention could easily undermine this rebuilt confidence and, consequently, the timber frame industry in the UK has continued efforts to minimise and eradicate poor site practice and to continually improve standards.

There was also a belief throughout the industry that timber frame houses incurred greater maintenance costs and were less able than masonry built dwellings to perform well in social housing and that tenant satisfaction levels were low. A report detailing a maintenance performance study of timber frame houses published by the Timber

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and Brick Information Council in 1994 concluded that any concerns about the long term performance of timber frame dwellings and levels of occupier satisfaction were without foundation.

Timber frame systems accounted for about 13.5% of housing starts in the UK in 1994. This figure may be further broken down as follows. Approximately 60% of housing starts in Scotland comprised timber frame whereas it accounted for only 10% in England, Wales and Northern Ireland. It is estimated that timber frame will account for approximately 28% of housing starts by 2005/6.

A.2.3 Timber frame construction in Scotland

Timber frame construction is well established in Scotland and accounts for approximately 60% of housing starts rising to 90% for self building starts. It is difficult to identify one sole reason for the strong position of timber frame construction in Scotland but the views within the manufacturing industry identify the following factors.

A.2.3.1 The Influence of Building Regulations in Scotland

Scottish Technical Standards regarding construction have, historically, been more onerous than their counterparts in England and Wales and have formed the basis of the NHBC’s guidelines for timber frame construction in their Construction Standards. Discretionary testing was introduced in Scotland with reference to Part E (acoustic performance). However, local authorities around the metropolitan area of Edinburgh introduced mandatory testing for dwellings of lightweight construction. The precise reason for the introduction of this testing is not known but opinion from within the industry points to local authorities receiving a disproportionate number of complaints from tenants occupying lightweight framed buildings. The timber frame industry saw this as a driver for improving the performance of their product, specifically as a means of improving clarity in technical drawings and providing after sales customer care to ensure that compartment floors were built in accordance with the design. Developers, although initially resistant to the introduction of mandatory testing in and around Edinburgh saw this as an opportunity to improve the skills of their work force. Failure to react to the introduction of mandatory acoustic testing would have excluded timber frame manufacturers from a significant part of the Scottish market for social housing.

The effects of mandatory testing on the rate of failure of compartment floors were monitored on sites in both Edinburgh and Glasgow. Within a short space of time, following the introduction of testing, failure rates plummeted.

There are still differences in the Building Regulations for Scotland and those for England and Wales. The Building Standards (Scotland) Regulations 2001, which differ from the Building Regulations (England/Wales) 2000 and are pertinent to timber frame buildings, are detailed below.

Part D: Fire Precaution

1. D5.7: Separating walls that are not non-combustible cannot contain pipes, wires or other services. (England/Wales: timber frame party walls can contain pipes, wires or other services).
2. D6.2: Maximum distance between cavity barriers is not more than 10 m where the cavity has surfaces that are medium, high or very high risk. (England/Wales: only requires the above in Purpose Group 2-7 i.e. care homes, student accommodation, hotels).

Part H: Resistance to transmission of sound
1. H1.4: Walls separating a dwelling from a common access corridor or stair, or waste chute, must also provide adequate sound insulation. (England/Wales: is only now proposing this in Part E consultation document).

2. Specified construction: Junction for wall type 4 (separating wall): Carry the complete construction through to the underside of the roof. (England/Wales: does not require absorbent curtain in roof space party wall of uninhabited roof spaces).

Part J: Conservation of fuel and power
1. J3.2: Individual building elements of a building in Purpose Group 1 (Dwellings) must have U-value in accordance with those in Table 1; external walls U-value 0.30 (England/Wales 0.35).

A.2.3.2 The Influence of Building Control Officers and Local Authority Legislation

One factor that has helped to maintain a good, consistent standard of quality in Scotland has been the introduction of acoustic testing. Poor workmanship leading to non-compliance with acoustic performance requirements will be detected during acoustic testing, particularly in the floor zone.

Acoustic testing ensures that there is a strong ‘right first time’ approach to constructing party floors in Scotland. Another benefit of good acoustic detailing and high standards of building is that the main contractor has greater confidence in the fire resistance of the structure, particularly in the floor zone.

Acoustic testing has yet to be introduced in England and Wales but sources within the industry believe that it is only a matter of time before it is introduced. The issue of acoustic testing has been raised in a consultation document and is viewed as contentious throughout the industry. It is generally believed that while timber frame manufacturers would welcome acoustic testing, builders would be resistant to its introduction.

Even in the Lowlands of Scotland where 70% of the population are located, there are fewer pressures on land resources, therefore self building is an attractive option. In terms of logistics, timber frame construction offers the self builder or small regional builder an easier solution to building, especially where the development is sited a significant distance away from the nearest builders, merchant. Accessibility is also a factor. Where the sites are relatively inaccessible, timber frame has advantages in that there is less of a requirement for heavy side materials to be transported to site.

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A.2.3.3 End user confidence

The self builder market is very strong in Scotland and self builders are keen to understand all aspects of their project. Because of this, they have a greater understanding of timber frame systems, more so than the home-buying customer who may be easily influenced by adverse media attention. It is partly for this reason that, although media hype in the early 1980s damaged the timber frame industry in Scotland over the short term, the market quickly recovered because of previous end user confidence and a well established, mature market.

Following adverse media attention, the market share for timber frame housing fell from approximately 47% in 1983 to a low of 31% in 1987 based on NHBC house-building statistics. It should be noted that many timber frame houses are built privately and are, therefore, not registered with the NHBC. In percentage terms this was a similar drop in market share to that experienced throughout the UK. However, even a 30% market share still indicated strong end user confidence and it was this factor that enabled the timber frame manufacturing industry to recover its market share in a short space of time. Current NHBC statistics (2001) show that timber frame accounts for approximately 50% of NHBC registered housing starts in Scotland.

A.2.3.4 Best value

Because the self-build market is strong in Scotland, homeowners not only look at the initial build cost of their dwelling but also the life costs. The Scottish climate is more severe than that experienced in the southeast of the UK. In Scotland, it is accepted that timber frame buildings are warmer and more cost effective in terms of central heating costs. In addition, the climate also influences the type of construction. Timber frame construction techniques are accepted as providing a weathertight shell far quicker than masonry construction. Self-build units are mostly detached houses, so issues that arise with party walls or compartment floors do not occur.

A.2.3.5 Summary

There is no single factor to identify why timber frame construction retains a strong share of the market in Scotland. It is a combination of the above factors and also, the evolution of the industry in the post war years. Not only have the levels of manufacture and building evolved to a high standard, but also the knowledge of Scottish Building Control Officers and NHBC, or other, inspectors has evolved. It is these factors that have maintained a strong market for timber frame construction and high levels of confidence. It is for these reasons that adverse media attention focusing on timber frame construction only had a short term effect on the Scottish market.

A.2.4 Overview of Quality Control on Construction Sites

A.2.4.1 The approach taken to quality control on construction sites in the UK is similar to that currently in place in Ireland.
A.2.4.2 Small private developments and self-builders

A.2.4.2.1 The builder, site manager, project manager or self-builder is responsible for quality control. In particular they need to ensure that their work or the work that they are responsible for meets the requirements of the warrantor.

A.2.4.2.2 In practice Building Control Officers (BCOs) and inspectors from the warranty provider are prepared to provide some advice where they can. However, it is not their primary role. The quality of workmanship found in these sectors can be very variable and perhaps unsurprisingly the quality produced by some self-builders far exceeds that achieved by many professional builders.

A.2.4.2.3 Quality control inspections by project managers tend to take place on sites where the contractor is not the client. On sites where the contractor is the client then the builder or their site manager, if such a position exists, is responsible for the quality control. On self-build sites the if the self-builder has employed an independent project manager then they will be responsible for quality control. In many cases the self-builder will be the project manager.

A.2.4.3 Large private developments – Sites where main contractor is client

A.2.4.3.1 On large private developments/sites – where the main contractor is the client, the contractor/developer will often have a project manager and site manager, and on larger sites assistant site managers who have responsibility for quality control.

A.2.4.3.2 In practice BCOs and inspectors from the warranty provider are prepared to provide some advice where they can. However, it is not their primary role. Often, the emphasis on sites of this nature is on getting the work done as quickly as possible to the minimum standard required to satisfy the BCOs and warranty provider. This emphasis has developed as a result of commercial pressures on time and finance and the lack of skilled tradesmen.

A.2.4.3.3 However, in our opinion, some of the more progressive house-builders are now recognising and actively promoting the benefits, in terms of improved quality and reduced numbers of call-backs of ‘right first time’ construction.

A.2.4.4 Large private developments - Sites where main contractor is not client

A.2.4.4.1 These sites are often being developed for use as apartment buildings or commercial space and cover most work done under most of the common contractual forms in the UK (e.g. JCT, Design & Build, Construction Management).

A.2.4.4.2 On these sites the project manager and site manager for the contractor have to satisfy the client or their agents that the work done meets the standard required. The standard required will have
been agreed as part of the original contract and specification. The client may employ their own clerk of works, architect, engineers (discipline as appropriate) to check the work of the contractor, their professional advisors and any sub-contractors.

A.2.4.4.3 In our opinion, this system of quality control has worked well in the past. However, it has become less effective as the use of Design and Build contracts increased. Typically, contracts of this type give the contractor much more freedom over choice of materials and detailed design and this can have an impact on construction quality.

A.2.4.4.4 Many developers now recognise and actively promote the benefits, in terms of improved quality and reduced numbers of call-backs of ‘right first time’ construction.

A.2.4.5 Social Housing

A.2.4.5.1 These sites are those being developed for use as social housing. The client in most cases is a housing association and so in many ways they operate on a similar basis to the large private developments – sites where main contractor is not the client, described above.

A.2.4.5.2 On these sites the project manager and the site manager for the contractor have to satisfy the client or their agents that the work done meets the standard required. The standard required will have been agreed as part of the original contract and specification. The client may employ their own clerk of works, architect, engineers (discipline as appropriate) to check the work of the contractor, their professional advisers and any sub-contractors.

A.2.4.5.3 Many housing associations in the UK argue that this system of quality control has worked well in the past. However, it has become less effective in recent years due to the use of contracts similar in form to those used for Design and Build work and increasing pressure on resources has led to a decline in the number and therefore the effectiveness of clerks of works. Housing associations are beginning to use new forms of contract which have a stronger partnering element to them and are based around long term agreements covering several sites, pre-defined call-off rates of new houses and open-book pricing methods. However, it is too early to determine whether these contracts bring with them an improvement in building quality and therefore, quality control.

A.2.4.5.4 Almost all housing associations now recognise and actively promote the benefits, in terms of improved quality and reduced numbers of call-backs of ‘right first time’ construction. This is a direct result of the report ‘Rethinking Construction’ prepared by Sir John Egan and the UK government’s commitment to the contents of this report.

- Designers - The scope of design services provided ranges from panel production drawings and schedules to a complete constructional design service including structural engineering. The scheme is concerned with timber frame buildings designed in accordance with the relevant

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standards, building regulations, warrantors, requirements and good practice.

- **Manufacturers** – The scheme covers the organisational and technical requirements for the manufacture of the components of a timber frame structure, e.g. wall panels, floor components and roof structure. The aim is to ensure that all components are manufactured in accordance with the relevant standards, building regulations, warrantors, requirements and good practice.

- **Erectors** - The scheme covers the requirements for the site erection of components of timber frame structure i.e. sole plates, wall panels, floor components, roof structure and complementary structural elements and supplementary fixtures and fittings. The aim is to ensure that all timber frame and related components are erected in accordance with the relevant standards, building regulations, warrantors requirements and good practice.

A.2.4.5.5 Since its launch uptake of the scheme has been slow and so far only 2 companies have completed the initial assessment process. Several others are preparing for the initial assessment and both BM TRADA Certification and the UKTFA anticipate that by the end of the year most manufacturing members i.e. approximately 40 companies will have achieved registration. By 15 December 2003, companies with ISO 9001: 1994 quality assurance schemes in place must transfer to ISO 9001: 2000 based schemes. This change has been partially responsible for the low rate of take up of the Q-Mark scheme as most companies have been slow to make the transfer.

A.2.4.5.6 In both cases the developer pays fees to the warrantor who then inspects the development at various stages of construction. Each warranty body has its own technical standards to which the developer must conform. Their requirements are intended to reduce further the risk of defects occurring in completed buildings and as a result are more cautious than the approach adopted in the guidance documents that accompany the building regulations.

A.2.4.6 **National House Building Council (NHBC)**

A.2.4.6.1 The NHBC was established in the 1930s and is the world’s largest warranty and insurance provider for new homes. 80%-85% of all new homes built in the UK each year are registered with the NHBC. NHBC do not treat timber frame buildings any differently from other forms of construction and have no plans to introduce further technical requirements for the timber frame construction above those detailed in Chapter 6.2 of their technical standards, which have not changed significantly since the mid 1980s.

A.2.4.6.2 NHBC Buildmark Cover provides insurance for homebuyers against major structural problems. It is available to builders and developers registered with the NHBC. They have separate schemes for the social housing sector and self builders. Buildmark Cover provides insurance for the homebuyer against:

- Insolvency, of the house-builder or developer, leading to a home not being completed
- Damage to the home due to a failure, by the house builder or developer, to meet NHBC standards (Years 1 and 2 only)
- Damage caused by a defect to certain parts of the structure of the home (Years 3-10).

A.2.4.6.3 The NHBC provides warranties for approximately 150,000 homes per annum. Internal monitoring has demonstrated that there is not a disproportionate amount of claims for timber frame housing and it is on this basis that timber frame housing does not attract closer scrutiny from them. The NHBC inspection service takes a proactive risk management approach to visiting sites under their control and they maintain that the inspections should be regarded as check to ensure that their standards are being adhered to. The number of inspections and depth of scrutiny is commensurate with the levels of risk they perceive. They as a matter of course do not require additional inspections for timber frame buildings.

A.2.4.6.4 NHBC recognise that the problems associated with low skills and an ever decreasing labour pool are endemic throughout the UK construction industry. They would support and encourage training programmes throughout the industry and, indeed, have their own training department, which provides training at site manager level. They have recently launched a one-day timber frame training course for site managers which aims to highlight critical points in the timber frame construction pathway.

A.2.4.6.5 With specific reference to timber frame construction, NHBC would welcome better training for timber frame erection crews and has participated in the development of a proposal for such a scheme. Currently, NHBC does not support the approach that house-builders seeking NHBC warranties could use only registered timber frame manufacturers and erection crews and see no reason to introduce specific requirements which would penalise timber frame construction. NHBC Standards require that the external envelope of a building must have a durability of 60 years. To meet NHBC Standards a new product or system must be fit for purpose and comply with the relevant British Standard/Code of Practice, if one is applicable, or, be supported by a certificate issued by an independent approval body. By adopting this stance the NHBC hope to show that it is supportive of innovative building products and systems as well as being protective of the homeowner. To further this stance, the NHBC provides warranties for buildings constructed as part of innovative demonstration projects providing their own, assessment of the product or system being demonstrated is favourable.

A.2.4.6.6 NHBC recognise that, in percentage terms at least, the current market share for timber frame housing in England and Wales is less than that for Scotland. Overall, NHBC see no reason why resistance from the homebuyer should restrict the anticipated growth in timber frame construction.

A.2.4.7 Zurich Insurance Building Guarantees (Zurich)

A.2.4.7.1 In order for timber frame buildings to qualify for a warranty from Zurich Insurance, the construction must adhere to the technical guidelines detailed in Zurich Insurance Building Guarantees’
A.2.4.7.2 As with NHBC, Zurich do not treat timber frame construction any differently from other forms of construction. In terms of claims, their own evidence shows that timber frame construction can perform better than other forms of construction. They believe that the principal reason for this is that timber frames are produced in a factory environment where better, more effective quality control procedures are in place.

A.2.4.7.3 One of the ways that Zurich compete with NHBC is by being pro-active in the removal of barriers to market entry of new products and systems. An example of this relevant to timber frame construction is their current close cooperation with the Canadian Mortgage and Housing Corporation (CMHC). Zurich are currently assessing the performance, under UK conditions, of houses meeting the requirements of CMHC’s Super E scheme for energy efficient homes. Currently, Zurich will offer warranties on Super E housing with minor modifications made to suit UK requirements, e.g. preservative treatment of non durable timbers in the external leaf of the frame and the inclusion of a drained and ventilated cavity of at least 19 mm.

A.2.4.7.4 As part of the warranty process, Zurich surveyors will visit a site as many times as necessary. The number of site visits made is commensurate with the level of risk attached to that site. If initial inspections identify persistent poor quality then the number of inspections will increase. With regard to timber frame no additional inspections are required over and above other forms of construction.

A.2.4.7.5 Zurich believe that there should be greater communication at an earlier stage between the timber frame manufacturer and the main contractor, particularly in achieving accuracy in laying the ground works. This is a general observation for all types of construction involving off-site manufacture.

A.2.4.7.6 Zurich recognise the increasing popularity of timber frame medium rise multiple occupancy units. When providing warranties for such developments Zurich expect a project team that has relevant and appropriate qualifications and experience.

A.2.4.8 Independent checking services

A.2.4.8.1 Two UK-based organizations, TRADA Technology and the Palmer Partnership, offer independent checking services branded frameCHECK and siteRIGHT respectively, which are designed to improve the quality of timber frame buildings.

A.2.4.8.2 Both services provide an independent third party check on Design and Build quality at all stages from the drawing board through to construction, identify any areas for concern and where possible recommend necessary corrective actions. The following services are offered:
- Design detail evaluation
- Structural engineering checks
- Assessment of timber frame manufacturer
On-site quality assessment

Training

A.2.4.8.3 frameCHECK® and siteRIGHT are provided on a building by building basis and it is important to recognize that they are ‘checking services’ not guarantee or warranty services. However, their findings can and are used to assist and advise the warrantor and other parties with an interest in the development. Independent checking services are becoming increasingly popular amongst the providers of social housing and more progressive large house builders and developers. In both cases they use the services to provide a check on building quality, but also to improve building quality and help reduce call-backs to site to correct defects.

A.2.4.9 Information

A.2.4.9.1 A variety of sources of technical information exist for those involved in the design, manufacture and construction of timber frame buildings in the UK. The principal sources of technical information for each of the disciplines involved is set out below:

Architects

- Guidance is given in the Approved Documents (England & Wales), Technical Standards (Scotland) and Technical Booklets (Northern Ireland) on how to meet the requirements of the National Building Regulations.
- The requirements of NHBC and Zurich are published in their respective technical manuals.
- The TRADA Technology publication, Timber Frame Construction, provides an unofficial ‘bible’ of standard details and advice on good practice including a site supervisor’s check list and guidance on appropriate material specifications.
- In-company standard details or standard details issued by the timber frame manufacturer.

Engineers

- Guidance is given in the Approved Documents (England & Wales), Technical Standards (Scotland) and Technical Booklets (Northern Ireland) on how to meet the requirements of the National Building Regulations.
exceeding four storeys.

- The TRADA Technology publication, Timber Frame Construction, provides an unofficial ‘bible’ of standard details and advice on good practice including a site supervisor’s check list and guidance on appropriate material specifications.

Timber frame designers and manufacturers

- Guidance is given in the Approved Documents (England & Wales), Technical Standards (Scotland) and Technical Booklets (Northern Ireland) on how to meet the requirements of the National Building Regulations.
- The requirements of NHBC and Zurich are published in their respective technical manuals.
- The TRADA Technology publication, Timber Frame Construction, provides an unofficial ‘bible’ of standard details and advice on good practice including a site supervisor’s check list and guidance on appropriate material specifications.
- In-company standard details.

Manufacturing Staff

- In-company documentation

Erection Crews

- In-company documentation.
- The TRADA Technology publication, Timber Frame Construction, provides an unofficial ‘bible’ of standard details and advice on good practice.

Site Managers

- In-company documentation.
- The TRADA Technology publication, Timber Frame Construction, provides an unofficial ‘bible’ of standard details and advice on good practice including a site supervisor’s check list and guidance on appropriate material specifications.
Guidance is given in the Approved Documents (England & Wales), Technical Standards (Scotland) and Technical Booklets (Northern Ireland) on how to meet the requirements of the National Building Regulations.

Clerk of Works

- In-company documentation
- The TRADA Technology publication Timber Frame Construction provides an unofficial 'bible' of standard details and advice on good practice including a site supervisors check list and guidance on appropriate material specifications.
- Guidance is given in the Approved Documents (England & Wales), Technical Standards (Scotland) and Technical Booklets (Northern Ireland) on how to meet the requirements of the National Building Regulations.

A.2.4.9.9 The above listing shows that construction professionals and particularly architects are especially well served with technical information. Information for engineers is comprehensive but actual guidance is lacking. For other disciplines, whilst information does exist in the public domain it is often not readily available. The quality of in-company information can be extremely variable. For example, one large house-builder that constructs a large number of timber buildings (500+ units in 2003) has almost no in-company technical guidance and relies solely on information produced by third parties, whilst another with a similarly large commitment has complete suites of information aimed at designers and site managers.

A.2.4.10 Training

A.2.4.10.1 Students of architecture, engineering and other construction disciplines receive very little education on the use of timber, let alone any detailed information on timber frame construction, during their degree courses. Approximately four years ago the Timber Research & Development Association distributed a set of approximately 10 lectures, complete with accompanying notes and illustrative material, on the use of timber in construction, to every School of Architecture in the UK. However, it is now evident that most of these have never been used. Some companies within the industry make an effort to reach students in local universities but resources have not been available to make any coordinated approach. This may change shortly as the promotional campaign 'wood. For good' has indicated that it is prepared to fund lectures at universities and colleges.

A.2.4.10.2 There is no formal training related to timber frame construction in place in the UK for any of the disciplines mentioned in this chapter. Proposals have been drawn up by the UKTFA for a National Vocational Qualification (NVQ) for erection crews and one college of further education advertises a course on timber frame construction but it has not had sufficient student numbers to run for some time. We understand that the intention is to use the NVQ as the basis for a personnel certification scheme for erectors. To enable contractors to recognise accredited erection crews, they will be issued with an annual identification card detailing the scope of their
competence and skill levels. Three skill levels have been defined:

- **Level 1**: Must be able to use basic tools and handle components.
- **Level 2**: A timber frame erector capable of erecting a standard structure up to three storeys in height and be able to work in a team which may contain persons of a higher or lower level of training.
- **Level 3**: The erector must have the same skill levels as a Level 2 erector but must also be able to organise and supervise operatives in more complex structures such as commercial, leisure and mid-rise buildings.

A.2.4.10.3 There is a general view within the UK industry that good erection crews with an understanding of the construction process are rare and this has been exacerbated because the market for timber frame buildings is growing. National vocational qualifications linked to a personnel certification scheme exist for a wide range of other construction disciplines in the UK. It is the consultant's firm belief that the ultimate success of any such scheme is determined not only by the degree of take-up but by the basic qualities of the scheme and in particular the frequency and rigour of the initial and follow-up assessments. If these are weak then any certification that is attached to it becomes pointless.

A.2.4.10.4 NHBC, TRADA Technology frameCHECK and the Palmer Partnership provide short training courses, typically one day, rarely more than 3 days, offered on a commercial basis covering various aspects of timber frame construction.

- Clients and developers
- Designers and specifiers
- Manufacturing staff
- Erectors
- Site managers and clerks of works

A.2.4.10.5 These courses are limited in the amount of information that they can impart in the time available. There is also no follow-up to check that the information transferred has been learnt from and competency has been improved.