

'No more softly, softly': Review of women in the construction workforce



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Introduction

For hundreds of years the proportion of women in construction occupations has remained at levels so low that - except in times of acute manpower shortages - parity with men seems to forever hover just out of view on the horizon. At the same time, paradoxically, the statistical record reveals their continuous presence, forcing constant examinations of the structure of the industry in order to understand and identify possible mechanisms of exclusion and seek ways of improving the imbalance.

This focus on the industry itself is justified given the consistently higher numbers of women undertaking full-time construction education and training in colleges and universities in Britain and in other European countries than are found in construction employment, indicating that many women do want to work in the industry but fail to obtain entry. The obstacles to their integration have in various research studies been shown to include inappropriate and poor working and employment conditions, especially long working hours, discriminatory recruitment practices based on word of mouth rather than qualifications, the persistence of a macho culture, and short-term concerns with output. As indicated in a recent historical overview, the lack of state regulation and of employer responsibility, as well as the very nature of the labour market and of training available, has also played important roles (Clarke and Wall, 2014).

Achieving gender equity will transform the industry, not just through reform of existing employment norms but also through expanding its priorities and objectives, from being concerned primarily with profit to encompassing a wider set of ethical considerations, including sustainable construction, stable employment, training and apprenticeships.

These considerations are already contributing to changing the industry and it is important that greater female participation in construction is integral to this. Forces for change include, for instance, imperatives for low-energy construction, which requires greater educational input to achieve thermal literacy, broader qualification profiles to overcome interfaces between the activities of different professionals and occupations, and integrated team working and communication given the complex work processes involved. This implies a transformation of the construction process, affecting all occupations and opening up the possibility to include more women, especially considering their generally higher educational achievements and greater presence in environmentally oriented subject courses.

Greater reliance on recruiting graduates and those - given the decline in apprenticeships - who have undertaken full-time vocational courses, means that those entering the industry depend on placements and internships to obtain work experience. As a result, employers - as already happens in countries such as the Netherlands - increasingly need to recruit directly from vocational colleges and universities, where generally higher proportions of women are found than in the labour market, and to take responsibility for providing this work experience. The employment relation itself has also been undergoing transformation, including through the use of agencies, so that the old boys' network, on which much recruitment has depended up to now, is weakening. The use of more formal recruitment practices, which give greater recognition to qualifications achieved and are more favourable to women, is also increasing. Finally, European Union and social partner (employer and trade union) policy give an added impetus to increasing the participation of women in construction, including the gender dimension of the 2020 Strategy and the European Trade Union Confederation policy for gender equality.

1. Gender participation in construction

The number of women studying STEM subjects in the UK has increased over recent years (Botcherby and Buckner 2012), but this has been slow to translate into improved employment participation, a picture reflected across the European Union (EU). Looking at the most recent figures (April-June 2014), of the 2,225,000 working in the construction industry only 12% are women (ONS 2014). Low female participation in construction remains stable: in 2012 there were 11 percent of women; and around 11 percent between 1990 and 2003 (Briscoe 2005; TCI 2012), hitting a 'peak' of 14 per cent in 2006 (Fernando et al. 2014). Low representation of women is more pronounced in manual trades (around 1% female representation) and in on-site roles (Lingard and Francis 2004).

The UK compares unfavourably with other European countries in terms of women's participation in STEM professions. Engineering UK (2011) and the Association of German Engineers (2010) reported that, while a few East European countries have around 20% women in STEM¹, the West European percentage is lower (17%) and the UK (9%) is close to the bottom of the league table. Kirkup *et al.* for the UKRC (2010: 74) reported that: '...only 5.3 % of all working women were employed in any SET occupation, compared with 31.3% of all working men'. Table A gives an overview of the most recent data on women's representation on professional bodies, indicating a reduction in the number of women. In 2012, women comprised: 20% of RIBA members; 15% of RICS members; and 5% of CIOB members (TCI, 2012). In 2014 these figures stood at: 3.1% of CIOB members; 7.8% of CIBSE members; 8.6% of ICE members; 8.0 % of CICES; 7.0% of IMechE; and 16.0% of RIBA members (data collected by report authors). This very low level of representation is mirrored in the UK Engineering Council membership data which shows women's representation at 3.3 per cent in 2008 (Barnard *et al.* 2012). In 2012, eight out of ten top construction companies had women board members (TCI 2012). This low representation is mirrored again at professional level, as shown in Table B, representing the results of the 2011 Census for construction-related profession managers and professionals. Here women represent only 10% of managers and professionals, with the lowest category being 'Electric Engineers' where they represent only 2.7% and 'Mechanical Engineers' (4.7%), followed by 'Design and development engineers' (6.7%), 'Construction project managers & related professionals' (6.9%) and 'Civil engineers' (7.2%). The Technical occupations, in which the proportion of women is 24% overall, fare much better, especially 'Quality assurance technicians' (38.5%) and Architectural and town planning technicians (28.8%), whilst only 8.9% of 'Engineering technicians' are female.

Table A: Women's representation in professional bodies (%)

	1995	1998	2012	2014
Chartered Institute of Building	0.7	0.9	5.0	3.1 [^]
Chartered Institution of Building Service Engineers	0.6	0.2	na	7.8
Institution of Structural Engineers	0.8	1.2	na	na
Institution of Civil Engineers	1.3	1.9	na	8.6 [*]
Chartered Institution of Civil Engineering Surveyors	na	0.1	na	8.0
Institution of Mechanical Engineers	0.7	0.3	na	7.0
Royal Institute of British Architects	7.2	8.5	20.0	16.0 [^]
Royal Institution of Chartered Surveyors	3.9 (BS)/ 2.6 (QS)	4.8 (BS)/ 3.4 (QS)	15.0	na

Sources: 1995 & 1998 from Fielden *et al.* (2000); 2012 (TCI 2012); 2014 data collected by report authors. ^{*}This figure is for the UK only, excluding student members; [^] UK chartered members

¹ STEM work force are '...those for whom their scientific knowledge, training, and skills are necessary for the work that they do. This includes scientists, technologists, engineers and medical practitioners...' (The Royal Society, <http://royalsociety.org/policy/projects/leading-way-diversity/>).

Recent figures on women's representation in the manual trades are hard to find and so the UK census 2011 provides the best update of the gender balance in construction-related professions and trades. The overview in Table B confirms the considerable divide between operative and professional levels, with women's presence at operative level below 3%, compared with 10% for the professions – still way below average for the workforce as a whole (51% according to census 2011). These data confirm those presented by the CITB (2004) and reveal that the proportion of women in construction trades remains similar to nineteenth century levels (Clarke and Wall 2014). Comparing the different operative occupations, higher proportions of women are evident - perhaps surprisingly in 'Welding' (4.9%), followed by 'Painting and decorating' (4.8%), and 'Electrical trades' (4.3%), whilst for 'Bricklayers and masons' (1.5%), 'Carpenters and joiners' (1.4%) and plasterers (1.4%) the proportions are very much lower, though not nearly as low as for 'Pipefitters' (1%). Relatively high proportions of women are found at supervisory level, especially 'Skilled metal, electrical & electronic trades supervisors' (11%), many of whom may not be in the construction sector.

OCCUPATION (SOC 2010)	ALL	FEMALE	MALE	% FEMALE
Total Managers and professionals	1,036,798	106,836	929,962	10.3
Production managers & directors in construction	218,016	25,522	192,494	11.7
Civil engineers	92,144	6,658	85,486	7.2
Mechanical engineers	119,968	5,641	114,327	4.7
Electrical engineers	42,152	1,155	40,997	2.7
Electronics engineers	36,736	2,062	34,674	5.6
Design and development engineers	69,474	4,663	64,811	6.7
Production and process engineers	41,957	4,383	37,574	10.4
Engineering professionals nec	109,345	13,826	95,519	12.6
Architects	63,009	13,671	49,338	21.7
Town planning officers	12,508	4,674	7,834	37.4
Quantity surveyors	40,786	3,821	36,965	9.4
Chartered surveyors	89,623	9,533	80,090	10.6
Chartered architectural technologists	3,541	361	3,180	10.2
Construction project managers & related professionals	63,885	4,427	59,458	6.9
Quality control and planning engineers	33,654	6,439	27,215	19.1
Total Technical occupations	307,107	74,666	232,441	24.3
Engineering technicians	49,513	4,400	45,113	8.9
Building and civil engineering technicians	12,221	2,228	9,993	18.2
Quality assurance technicians	23,431	9,026	14,405	38.5
Planning, process and production technicians	25,156	6,419	18,737	25.5
Science, engineering & production technicians nec	114,521	30,739	83,782	26.8
Architectural and town planning technicians	21,481	6,191	15,290	28.8
Draughtspersons	60,784	15,663	45,121	25.8

Total Skilled trade occupations	2,148,809	63,791	2,085,018	3.0
Welding trades	99,048	4,877	94,171	4.9
Pipe fitters	18,709	188	18,521	1.0
Air-conditioning and refrigeration engineers	15,500	279	15,221	1.8
Electricians and electrical fitters	298,392	6,947	291,445	2.3
Electrical and electronic trades nec	94,719	4,055	90,664	4.3
Skilled metal, electrical & electronic trades supervisors	71,380	7,874	63,506	11.0
Steel erectors	14,410	206	14,204	1.4
Bricklayers and masons	120,699	1,868	118,831	1.5
Roofers, roof tilers and slaters	65,994	1,281	64,713	1.9
Plumbers and heating and ventilating engineers	208,734	3,762	204,972	1.8
Carpenters and joiners	335,436	4,630	330,806	1.4
Glaziers, window fabricators and fitters	53,722	1,955	51,767	3.6
Construction and building trades nec	347,939	10,216	337,723	2.9
Plasterers	72,745	986	71,759	1.4
Floorers and wall tilers	50,839	1,330	49,509	2.6
Painters and decorators	220,000	10,604	209,396	4.8
Construction and building trades supervisors	60,543	2,733	57,810	4.5
Total Construction Operatives	740,827	20,631	720,196	2.8
Scaffolders, staggers and riggers	42,103	541	41,562	1.3
Road construction operatives	34,091	752	33,339	2.2
Construction operatives nec	162,818	4,714	158,104	2.9
Crane drivers	21,484	606	20,878	2.8
Fork-lift truck drivers	106,233	2,838	103,395	2.7
Mobile machine drivers and operatives nec	78,171	2,577	75,594	3.3
Elementary construction occupations	295,927	8,603	287,324	2.9
Overall Total	4,233,541	265,924	3,967,617	6.3

Source: ONS, 2011 and TTT 2014

* total female workers and percentage in the organisation

2. The context:

Whilst female participation is currently low, the construction industry itself is in the process of considerable change, both in terms of skill requirements and the nature of output, opening up possibilities for greater inclusivity. Above all, there is a political and organisational will to change and to open up the industry to women.

2.1. Major infrastructure projects and people resourcing

The current and forecasted scale of investment in infrastructure construction and renewal is such that the skill requirements are likely to grow over the next few years. Currently around 10% of those employed in construction work within the SIC07 2-digit code (42) of 'Civil Engineering' (UKCES 2012). Although this may seem modest relative to the overall c£100bn construction sector output (which includes SIC 41 (Construction of Buildings), SIC 43 (specialist Construction Activities) and SIC 71 (Architects)), the division between these industry classifications is fairly blurred, with both professionals and operatives likely to move

between these sub-sectors. In addition, the period 2014 – 2018 will see unprecedented demand for infrastructure skills according to the most recent skills forecasts (CITB 2014). Over this period, infrastructure construction is expected to grow by 3.6% per annum, surpassing every other construction sub-sector with the exception of private house building, whilst infrastructure repair and maintenance is also expected to grow, in contrast to most of the other construction sub-sectors. A particular concern is that many major projects will reach peak production including Cross-Rail and London Bridge Railway Station in the capital, as well as several major provincial transport projects. Activity in the energy sector is also forecast to grow significantly, with new nuclear power stations to commence construction at Hinkley Point, Wylfa and Sizewell.

A salient feature of infrastructure projects concerns their size and longevity, aspects which can have distorting effects within local labour markets and industry sub-sectors. As infrastructure construction relative to other sectors is more capital- than labour-intensive (and so will not affect overall skill requirements to a significant extent), projects do have particular consequences for regional and skills-specific labour markets (CITB 2012).

Forbes and Hastings (2014) recently examined the impact of major projects on the UK labour market. There are an unprecedented number of such projects currently under construction or consideration that are categorised as having a value in excess of £1bn and/or an annual expenditure of over £200m. Based on their analysis, there are 73 major projects that fulfil this definition that are either under construction or will commence construction between 2014 and 2018. They forecast that the value of these projects will account for around 10% of the output of the sector as a whole (around £56bn). The labour demand for these projects is significant, with the peak demand requirement for major projects predicted to reach 286,000 towards the end of 2016. Forbes and Hastings' analysis suggests that infrastructure projects will account for around 40% of this demand. Given that the peak of these programmes is likely to be in the period 2018-2020, a 'skills pinch point' could be created at this time. Such demands should also be set within the context of an increasingly constrained labour market as the industry recovers from the global financial crisis. A survey recently commissioned by CITB reveals that the tightening of the labour market is already being felt, with some 13% of firms experiencing skills shortages in the last year and 4% suggesting that this had constrained their output (CITB/BMG 2014).

Major projects, or mega-projects as they are often termed, are characterised by their large deployment of resources, human, social and environmental impacts and complexity (Li and Guo 2011; Kardes *et al.* 2013). According to Fiori and Kovaka (2005), they typically exhibit certain characteristics that differentiate them from standard project endeavours. These are: magnified costs, complexity, increased risk, heightened ideals and high levels of visibility. Although there is no formally accepted definition of a mega-project (Fiori and Kovaka 2005; Zhai *et al.* 2009), they are typically defined as those with a value greater than \$1bn. Such large and often long-lived endeavours may be managed as a complex 'system of systems' or array type projects, where success is predicated on effective meta systems integration in terms of the careful management of a series of loosely coupled sub-systems (Davies and Mackenzie 2014). As a result, they often prove very hard to deliver effectively, particularly in terms of timely delivery and performance. This sets up what has been termed the 'performance paradox', whereby the numbers of mega-projects have expanded despite a history of poor performance, and, rather than becoming vehicles *for* growth, they effectively act as obstacles to growth (Flyvberg *et al.* 2003).

2.2. Mega projects as arenas for inclusion

The size, complexity and nature of major infrastructure projects mean that they are often highly regulated and subject to scrutiny, opening up the possibility for a more inclusive employment policy, as well as a change in the composition of teams. The still on-going massive Trans-Alpine Link Tunnel project (www.alptransit.ch), for instance, which includes the 57km long Gotthard tunnel, whilst not explicitly seeking to build in equity provisions, does show the importance of achieving consensus and agreement with all parties. There has been a focus on working with clients, employers, authorities and trade unions in order to secure and safeguard particular employment conditions and provide for continuous dialogue (Baumann 2001). This has been achieved through a European Agreement covering all contractors, subcontractors, placement agencies and temporary employment undertakings operating on the project. In fulfilment of this, a site committee has been set up, similar to the project site committees established under the National Agreement for the Engineering Construction Industry (NAECI) in Britain, to discuss and agree matters such as working hours and initial and continuing training. Similarly, an all-embracing Common Framework Agreement has recently been agreed between EDF Energy and the trade unions concerned at Hinkley Point Nuclear Power Station, which places great emphasis on establishing integrated teams and new working practices, structured to optimise opportunities to bring new people into the workforce (EDF Energy 2013).

2.3. Specific equality measures on mega projects

Mega projects also open up the possibility of developing initiatives to tackle the gender balance of the workforce and for this lessons can be drawn from application elsewhere. Such projects have the advantage of highlighting practical as well as policy steps that can be taken to increase gender inclusivity, including those that may not necessarily have been very successful. In the following pages, we include several examples of good practice in large projects for benchmarking: *Vancouver Highway*; *US projects such as Century Freeway Project Los Angeles, Portland Main Bridge Project, and the New York Times Building* and *UK projects such as Terminal 5; Olympics and Crossrail*. In most of the projects cited, the emphasis has been on the operative rather than the professional workforce, with the exception of Crossrail.

Taken together, these projects all set out to use their size, capacity and profile to make a difference and set ambitious targets and aspirations as a prerequisite for action. They indicate particular factors critical to the achievement of securing greater inclusivity, and hence a higher proportion of women, including:

- the roles of public procurement (Wright 2013);
- the significance of Major Project Agreements (or Project Labor or Community Workforce Agreements) (Moir 2014);
- collective agreements (Baumann 2001; Calvert and Redlin 2003);
- the significance of local labour agreements (GLA 2007);
- involvement of the workforce;
- systematic and controlled recruitment (National Women's Law Centre 2014);
- childcare provision (Moir *et al.* 2011);
- systematic and close monitoring (Moir *et al.* 2011);
- training, also as a means of siphoning recruitment (Griffin, Cohen and Braid 2000a and b.)

In the case of the Vancouver Highway, which largely depended on a centralised system of labour requirement and training, success even extended to the project cost coming out under the estimate.

2.4. Implications of benchmarking

Each of the projects provides important lessons concerning measures that can be effective. These can be summarised as:

- a) **Securing an overriding agreement** with all stakeholders, including contractors, subcontractors, trade unions, clients, and local authorities on working conditions, direct employment and a preference for local residents. As apparent from T5 and the Olympics, the guarantee of direct employment was critical to the successful outcome of the projects, including meeting equality targets.
- b) **Contract compliance**, including an insistence on equality measures and employment goals in all tender documents, carried through by pre-job compliance meetings and continued monitoring.
- c) **Recruitment**, setting clear targets, employing a workforce reflective of the local population, proactive application of equal opportunity policies by all contractors and subcontractor, and 'blind' recruitment.
- d) **Training**, including pre-employment training (e.g. in Tunnel training facilities), special training to facilitate broader occupational profiles, formal links with colleges and universities in the vicinity, work placements and work experience, specific aspects set aside for training purposes.
- e) **Working conditions**, including structured working hours, childcare provision, inclusive maternity leave, flexible working arrangements, mentoring
- f) **Securing support**, senior level support was critical to the success of projects in meeting their objectives and monitoring, as was also securing support from women's groups and trade unions, and organising meetings and conferences.

All of these considerations highlight the importance of benchmarking other projects in order to understand how gender participation can be achieved and of setting objectives

Good practice case 1: UK Terminal 5



Heathrow Terminal 5 was one of Europe's largest construction projects of the time, costing £4.3 billion over five years, from 2003 to 2008, requiring about 8,000 workers at peak, and comprising 16 major projects and over 147 sub-projects (Clarke and Gribling 2008). Similar to the Vancouver Highway, the client BAA secured a contractual relationship with suppliers, and in turn subcontractors. The T5 Major Projects Agreement established that direct employment should be adopted 'wherever possible' and took a proactive position with respect to labour management issues, including consideration of diversity and equality concerns (BAA 2004). This policy was consolidated through the careful enforcement of collective agreements and health and safety regulations: unions played an important monitoring role, ensuring employee participation and maintaining good industrial relations. However, despite the significant efforts made to encourage a more diverse workforce and to employ and train local labour, in particular by BAA, only a few female electricians and one or two women in other occupations, including welding, were employed in the operative workforce. Further, of the 150 employed over the course of three years as a result of the local labour scheme, only 3% were women (Experian 2006). Nevertheless the requirements for the employment of local labour, established by the local authorities under Section 106 planning clauses, did serve to focus the client and contractors on the need to be more inclusive and sensitive to local needs (GLA 2007).

Whilst the policy of direct employment was extremely successful in showing that there is an alternative to casual employment in construction, the diversity achievements were disappointing. The local labour force became a dwindling minority and 'travellers' the majority, as many suppliers came to rely heavily on an itinerant workforce, both from outside London and - increasingly - from different nationalities and geographic regions outside the UK. In terms of training, support was given to local colleges and to set up a special training centre, but, apart from the mechanical and electrical sector, the apprentice record was poor. Few of the many hundred construction trainees in surrounding colleges, who included many women, found work on the site (Baker and Mallet 2008).

The obstacles identified by Clarke and Gribling (2008) to obtaining a more inclusive and local labour force on T5 were: lack of work experience and placements available allowing those from local colleges to gain practical skills in construction; the training actually on offer, largely confined to traditional trades and more geared to domestic construction work; the means of recruitment, including reliance on agencies that tend to target a traditional white male and migrant workforce; and the site working hours and shift patterns set up, which, coupled with long journey to work times, made the working day almost impossible for any but travellers and migrants prepared to sign the Working Time Directive opt out and work intensively. This meant the site was almost structured to suit an itinerant rather than a local workforce, an aspect that was then supported through the incentives given to 'travellers' in the pay structure. The alternative proposals made by the authors for improving such diversity included: setting up special training projects to provide the necessary work experience and broader occupational profiles given the increasingly 'multi-skilled' nature of such activities as concreting and groundworks; fixing targets for apprentice places and work placements; establishing formal links with colleges, ConstructionSkills and training providers; carefully targeted recruitment; structuring site hours and shift patterns from the project beginning to be inclusive and in conformity with Working Time Regulations; and proactively applying equal opportunities and diversity policies, including through action plans for implementation.

Good practice case 2: UK: Olympics



For the Olympic Park, instead of the equivalent of T5's centralised Major Projects Agreement, the Olympic Delivery Authority (ODA), preferred to sign a Memorandum of Agreement (MoA) in 2007 with all the relevant trade unions, though this did not cover the Athlete's Village. The MoA included: application of existing collective agreements; commitment to 'high employment standards', good employee relations, and 'the ethos' of a directly employed workforce; and encouragement to the employment and training of local people (ODA 2007; Druker and White 2013). By September 2010, 6,243 were recorded as working for contractors on the Park and 4,090 on the Village, a total of 10,333, though it is difficult to tell the proportion who were directly employed (ODA 2010). As a public body the ODA had a statutory duty to promote equal opportunities (EO) so that much emphasis was placed on increasing the diversity of those working on the Olympics sites, including through the requirement that all main contractors have EO recruitment policies and procedures in place.

The ODA's responsibilities for securing employment and training and boosting skill levels locally were based on explicit targets for women, ethnic minority groups, disabled people and local people, including the requirement to place at least 2,250 people into trainee programmes, apprenticeships and work placements. All of this required the monitoring and recording of those employed – a difficult task given that over 800 firms were contracted to do the work (Foster 2010). To fulfil the targets, the ODA worked in partnership with government, contractors, training organisations, sector skills councils, Jobcentre Plus and job brokerage networks in the five Olympic Host Boroughs (ODA 2011). In 2008 the Women in Construction (WiC) project was established, with the support of the London Development Agency (LDA) and the Construction Industry Training Board (CITB), designed to help women gain access to training and employment opportunities in trades such as electricians, bricklaying, engineers and carpenters (Wright 2014). According to London 2012 (2011), 3% of those who worked on the Olympic Park were women, though 11% was the targeted figure (ODA 2010). WiC succeeded in training 455 women, placing 87 into work placements and 255 in employment (Wright 2014).

The London Olympics was unprecedented in the targets for apprenticeships, underrepresented groups and the women in construction project, though it was unclear how these were to be achieved. By 2011 the ODA reported that its target of 350 apprenticeships on site had been exceeded, as 426 apprentices had some experience of working on the site (ODA 2011). However, the number of people actually trained on the sites appears relatively low, with only 60 apprentices altogether completing their training on the Olympic Park and the Athlete's Village, representing less than 1% of the workforce. The employment of women met with more success through the WiC programme and positive action initiatives taken by the ODA, including:

- Running taster days for local women
- Supporting prospective employees with child and health care
- Targeting local colleges for female prospective recruits;
- On the job-learning for women on site, including work placements
- The 'chicks with bricks' programme. (EHRC 2011)

As Samantha Paul, one of the apprentices described 'There's not really been many problems at all, most people accept you on site (ibid, p. 10)

Good practice case 3: UK: Crossrail



The £14.8bn 26 mile, Crossrail rail scheme has largely focussed on employing woman engineers on the project, seeking to increase their numbers, which currently stand at 10.7% of the Institute of Civil Engineer's (ICE) membership and between 6% and 13% of engineers in the construction industry – the lowest figure in Europe (Kitching 2014).

The initiative is driven in part by the business case, that the more gender balanced a team the better it performs, and that there is a rapidly increasing number of engineering vacancies. It also responds to the 2006 Equality Impact Assessment, which established an Equality Form and required, amongst other things: the development of a procurement policy to encourage local sourcing of goods services and labour; and working with schools education and training providers (Crossrail 2006). The steps taken include:

- ✓ Trained those involved in recruitment and promotion not to have any 'unconscious bias'
- ✓ Encouraged contractors to recruit a more diverse workforce by insisting they advertise all jobs externally
- ✓ Carried out 'blind' recruitment by removing names and gender from applications
- ✓ Set up a women's forum, diversity working group and mentoring programme, and creating opportunities for senior women to act as role models for junior engineers
- ✓ Worked with 100 schools to address the issue of female engineers and encourage more young people into engineering
- ✓ More inclusive maternity leave and flexible working policies to allow staff to balance work and family life
- ✓ Assisted in organising pre-employment training at the Tunnel and Underground Construction Academy
- ✓ Assisted in the organisation of a competition in 2014 with Transport for London and London Transport Museum to promote engineering to young women as part of National Women in Engineering Day
- ✓ Organised a 'women in construction' meeting in 2014 attended by 350 senior member of the supply chain to share ideas about the need to support women in engineering.

As a result of these various measures, Crossrail's statistics for the percentage of women in the organisation are: 29% of project managers; 12% of apprentices and 19% of graduates (Kitching 2014).

Good practice case 4: Vancouver Highway



The \$1.2 billion, seven year Vancouver Island Highway Project was one of the most successful infrastructure projects to include underrepresented or 'equity' groups (women, First Nations, people with disabilities, youth, and visible minorities). In Canada at that time women represented 0.3% of the operative construction workforce, and First Nations less than 1%. In one year alone (1998) these groups represented 21% (5% women) of those employed on the Project and accounted for 27% (10% for women) of hours worked, including, in particular, carpenters, labourers and operators (Griffin Cohen and Braid 2000a; Calvert and Redlin 2003).

First, this relative success was achieved through a 'Project Agreement' between the government, contractors and the building trade unions which, over and above seniority, gave preference to local residents living within 100 kilometres of the worksites. It also gave the umbrella organisation, Highway Constructors Limited (HCL), the right to ask the unions to dispatch qualified and new trained equity workers and trainees to sites prior to other workers. In effect this implied centralised recruitment of all construction labour on the project through a single employer, which in turn prioritised the recruitment of 'equity' employees (Griffin Cohen and Braid 2000a). Second, the agreement permitted HCL to train, with the assistance of the trade unions, large numbers from equity groups and local residents, who were then given the opportunity to take jobs on the highway (Griffin Cohen and Braid 2000b). A section of the highway was then constructed by trainees: training accounted for 13% of hours worked on the Project. Overall, 93% of the total payroll went to local residents, the project came in under the projected cost estimate and achieved a number of health and safety awards.

The compulsory equity provisions, codified in the Agreement and in the structure of project management, were possible because they had support at the highest level, were monitored and supported by women's and native groups, and were tied into recruitment. The Agreement also had important implications for the tendering process by making provisions for a workforce reflective of the population where the work occurred, so challenging the traditional encouragement in such contracts for large contractors to bring in a 'travelling' workforce from all over the country, building travel and housing into tenders (Griffin Cohen and Braid 2000a).

Good practice case 5: US Schemes: Century Freeway Project Los Angeles, Portland Main Bridge Project, and New York Times Building

Systematic attempts have been made for the past thirty years in the United States, including in infrastructure projects, to systematically include women in construction. One of the first attempts was through the Century Freeway Women's Employment Program (WEP), which was able to work collaboratively with a pre-apprenticeship programme, unions and contractors to increase black, white and Latino women's share of hours of construction work on the freeway from 1% in 1986 to 8.2% by 1993 (Price 2004). WEP monitored jobs and met regularly with union officials, apprenticeship coordinators, job superintendents, foremen and contractors, as well as providing a fund for women to help with childcare, union fees, tools, and transport. It also organised a women's support group, provided guidance, and conducted targeted recruitment (Moir *et al.* 2011). This was followed by the Portland Main Bridge Project, a four-year (1994-8), \$157m bridge replacement, which increased the number of women employed to 60 through systematic daily monitoring of access and participation and through the provision of 24-hour childcare.

Building on these early initiatives, there have been attempts in New York to increase the number of women, including the New York Times Building (2004-7) which had a 15% female participation rate. The developer, Forest City Ratner Companies, is strongly committed to diversity, works in partnership with a labour organisation providing access to women seeking construction work, and makes compliance a priority through stating employment goals in tender documents, holding pre-job compliance meetings with contractors and sub-contractors, and continual on-site monitoring (Moir *et al.* 2011).

2.5. Setting strong measures, targets and contract compliance

From the case study projects, it is apparent that clear and strong measures need to be set if gender participation is to be improved, including overarching agreements, setting targets – even quotas, and contract compliance.

Increasingly, and as evident in the case studies (see boxes), attention is being paid by mega projects to procurement as a means to improve diversity and increase the number of women in construction. Most notable has been in the work of the Centre for Research in Equality and Diversity at Queen Mary, University of London, in particular through a conference held in 2012 *Promoting employment equality through public procurement* (Wright 2013a). This conference highlighted the importance of the Olympics and Heathrow T5 in the stipulation of direct employment only, rather than the use of what is known as 'bogus' self-employment so common in construction, allowing for closer monitoring of employment and providing an infrastructure for training and the enforcement of equality measures.

As an organisation committed to creating employment opportunities and to Corporate Social Responsibility, the ODA, for instance, required tier 1 contractors to meet contractual employment and apprentice targets and require their subcontractors to do likewise. In this case, there were clear requirements to roll out diversity training, to use job brokerage for local people, to help change the construction sector environment by bringing in more women, and to engage with local communities. As apparent on the Vancouver Highway too, the contractual requirement to use local (defined as within a 100 km radius) labour can be especially instrumental to success, with 93% of the payroll going to the local residents, as it was too – though much lower and with a far more restricted radius – for the Olympics and T5 (see for instance GLA 2007).

Key to ensuring that contract compliance is effective is close monitoring, as also highlighted in the recommendations given by the Greater London Authority in *The Construction Industry in London and Diversity Performance* (2007) in relation to Section 106 agreements. These included developers appointing 'a project officer with an accountability and enforcement remit' (p. 91) and working with target equality groups.

3. Improving gender participation in construction

The examples of mega projects provide an indication of practical measures needed at all levels to secure less exclusive employment. In this section we turn to the various reasons given both for the lack of women in construction and for improving gender participation.

3.1. Reasons for lack of women in construction employment

The reasons for the poor representation of women in construction have been attributed to structural and cultural obstacles: the fragmented nature of construction; the lack of knowledge and poor image of the sector; inappropriate selection criteria; male dominated training courses; lack of formalised recruitment practices and procedures; fragmentation of employment; traditional stereotypes and sexist attitudes; a male dominated culture, networking and environment; lack of work-life balance possibilities (Fielden *et al.* 2000; Sang and Powell 2013). The persistence of traditional career patterns and trajectories reinforce gendered assumptions, penalising non-full-time work patterns, or career breaks, when promotion decisions are being made (Lako and Daher 2009; Hart and Roberts 2011; European Commission 2013).

Research on the architecture profession, for instance, has found working practices that include long working hours, homosocial behaviour, questioning of female technical expertise and creative control held at senior (and therefore male) levels (Sang *et al.* 2014). Further, in a survey exploring health and well-being, it has been found that female architects are at greater risk of occupational stress than males: 'female architects appear to experience lower job satisfaction, poorer physical health, higher work-life conflict and higher turnover intentions' (Sang *et al.* 2007: 1314).

The academic literature on diversity in construction has mainly focussed on female professionals. At operative level, research that has been conducted has, however, shown similar barriers to those at professional level in terms of recruitment and retention. Obstacles to integration include: inappropriate and poor working and employment conditions, long working hours; discriminatory recruitment practices, the persistence of a macho culture, and short-term concerns with output (Clarke *et al.* 1999 and 2004; Wall and Clarke 1996 Michielsens *et al.* 2001; Clarke and Gribbling 2008).

In summary, the cultural and structural barriers to gender diversity in construction are linked to:

- The training and education context
- Employment policies and practices – working and employment conditions (fragmented nature of sector and procurement; working hours; lack of flexible working)
- HR practices such as recruitment and selection; retention policies; lack of networking, mentoring, role models
- 'Macho' environment.

These areas are discussed in further detail in the sections below. Before doing so, it is important to consider the rationale for firms to adopt such policies in order to increase the numbers of women they employ, often termed the 'business case'.

3.2. 'Business case' for women in construction and the law

The suggestion of a business case for increasing equality in organisations was first put forward in the early 1990s (Ross and Schneider 1992; Kandola and Fullerton 1998). Since then, the literature confirms widespread belief in the business case, though evidence on the positive impact of diversity management on performance remains mixed (Dickens 1999; Kochan *et al.* 2003; Ozbilgin and Tatli 2011). It is also argued that, as the industry's approach focuses on the business case instead of an ethical argument (linked to inclusion and justice), only minimal change in terms of inclusion of non-traditional workers has been noticed (Sang and Powell 2013).

Cox and Blake's early review of the business case literature (1991) proposes six main business benefits of a diverse workforce:

1. *Cost*: the cost of doing a poor job in integrating workers is increasing, so those who manage diversity will gain a cost advantage.
2. *Resource-acquisition*: adopting a diversity-management approach will develop favourable reputations for the organisation as prospective employers for women and ethnic minorities, so these organisations will attract the best personnel.
3. *Marketing*: multi-national corporations (MNCs) will obtain insight and cultural sensitivity from having members with roots in other countries, and this will improve marketing.
4. *Creativity*: the presence of diverse perspectives, and less emphasis on conformity to past norms, should improve creativity.
5. *Problem-solving*: heterogeneity in groups potentially produces better decisions and problem-solving through a wider range of perspectives.
6. *System flexibility*: the system becomes less standardised, and therefore more fluid, which creates greater flexibility to react to environmental changes.

This framework was updated in 2013 by Urwin *et al.* (2013). Their adopted classification of business benefits into either 'External' or 'Internal' provides a useful framework to analyse the business case for gender diversity:

3.2.1 'External' benefits

External benefits relate to the context of the organisation, such as: recruitment of best talent; compliance with legislation; employer branding ('employer of choice') etc. External benefits may also relate to new market opportunities and innovation: a workforce from varying backgrounds may provide competitive advantages and enhance organisational adaptability to changing marketplaces (Noon 2007; Dickens 1999; Zanoni *et al.* 2010; Ely & Thomas 2001; Kochan *et al.* 2003; Kossek *et al.* 2011). Cox and Blake (1991) and Dickens (1999) have implied that these benefits relate more to industry than to the service sector.

Compliance with legislation is an important driver of gender diversity considerations, as confirmed by two surveys on diversity carried out by the Chartered Institute of Personnel and Development (CIPD) (2006, 2007), which show that companies identify 'legal pressures' followed by labour market considerations ('recruitment and retention' and/or 'being an employer of choice') as the most important aspects of the business case, so supporting the importance of the 'external drivers'. Legal issues could be at the fore due to the potentially negative impact of bad publicity if the circumstances of a discrimination case are reported in the press, causing damage to the corporate image and brand. 'Improving products' and

'creativity and innovation' were comparatively low down the list of benefits cited by respondents.

The legal context has changed considerably over the last decade in the UK, and the policy framework for the advancement of Equal Opportunities and Diversity is complex. In 1999, constitutional reform in the UK took the form of devolution and this has allowed the constituent nations of Great Britain to take differing approaches to Equality and Diversity policies (Bagilhole 2009); UK and devolved governments of Northern Ireland, Scotland and Wales implement interrelated policies within national contexts. However, the compliance regarding gender diversity is mostly related to the Equality Act, which came into force on 1 October 2010 in the UK. The Equality Act brought together over 116 separate pieces of legislation into a single Act. Combined, they provide a legal framework to protect the rights of individuals and advance equality of opportunity for all, across gender, race, disability, sexual orientation, religious belief and age. The Act protects individuals from unfair treatment and promotes a fair and more equal society. It covers employment, equal pay and services, public functions and associations and outlines nine protected characteristics, which cannot be used as a reason to treat people unfairly: Age; Disability; Ethnicity; Gender; Gender reassignment; Marriage and civil partnership; Pregnancy and maternity leave; Religion or belief; Sexual orientation. The Act also sets out the different ways in which it is unlawful to treat someone, such as through direct and indirect discrimination.

Looking specifically at the construction and engineering sectors, the business case argument for a better gender balance is mainly linked to external benefits: promoting the commercial benefits of employing women (see for example, Bagilhole 1997; Barnard *et al.* 2010; Dainty *et al.* 2004; Hewlett *et al.* 2008; Phipps 2008). The advantages of a diverse workforce are purported to include: tackling industry skills shortages; increased profitability and inward investment; increased effectiveness and customer satisfaction; reduced likelihood of litigation; reduced staff turnover and recruitment/training costs; reduced loss of corporate knowledge/intellectual capital; more motivated, committed and productive workforce; and, reduced absenteeism (UKRC 2005).

3.2.2. Internal benefits

So-called 'internal' business benefits are identified as resulting from improved operations within the firm. The suggestion is that diverse teams embrace a greater range of perspectives and that this can improve creativity and problem-solving, leading to improved business outcomes. Evidence for the latter is nevertheless contradictory:

Some researchers (e.g. Østergaard *et al.* 2011; Stahl *et al.* 2009; Watson *et al.* 1993; Cox *et al.* 1991) argue that innovation can result from diversity; others dispute this (e.g. Jehn *et al.*, 1999; Hamdani and Buckley 2011). While increased team diversity might lead to conflict and decreased social integration, there could also be process gains through increased creativity and satisfaction. However, in some settings diversity is shown to impact negatively on performance, perhaps arising from problems with communication and co-operation (Homan *et al.* 2007).

Gratton *et al.* (2007) provide evidence to support the suggestion that mixed gender teams can aid innovation and increased feelings of 'psychological security'. They report certain negative 'minority effects' when there is an uneven gender balance. Whether or not diversity within teams leads to better outcomes, it can be affected by a myriad of factors, including the way it is defined and managed, organisational settings and managerial style, as well as the social and institutional forces driving it in a particular organisation (e.g. Hamdani and Buckley 2011).

3.2.3. Evidence for the 'business case'

Looking at the development of research, despite arguments that the 'business case' is beset with both conceptual and practical weaknesses, a number of studies have sought to show the links between diversity and improved performance. Diversity is seen to enhance organisational flexibility, recruitment, retention and financial sustainability (Drago and Hyatt 2003; Allen *et al.* 2007) and to improve employment issues around attendance and engagement (Glynn *et al.* 2002; Ollier-Mallatere 2010; Atkinson and Hall 2011).

Overall, evidence of gender diversity's positive impact on performance remains mixed, possibly because it is context specific (Ozbilgin and Tatli 2011; Kochan *et al.* 2003). With notable exceptions (e.g. Herring 2009), much of the evidence on workplace diversity and business performance is qualitative and/or case-study in nature (Monks 2007; Shen *et al.* 2009). The context-specific nature of the linkages between diversity and performance shown by these workplace studies therefore provides conflicting evidence of the systematic impact of diversity on business (Kochan *et al.* 2003), and indeed of any causality. The findings of Hamdani and Buckley (2011), for instance, suggest that the success of firms might lead to diversity, rather than vice versa.

Nevertheless, recruiting the best talent and skills shortages are seen as key drivers of the business case for gender diversity, especially in industries such as construction. Within the context of major infrastructure projects that have a significant impact on the labour market and people resourcing in terms of size and establishment of practices, this becomes even more significant, and is discussed next. The case study examples discussed above show that real change can be established if an open and continuous dialogue exists, coupled with policies that ensure positive employment and working conditions.

3.3. Good practice strategies

The literature evidencing good practice and policies or initiatives that have increased gender participation shows that a more fundamental approach is needed than simply trying to attract more women into the construction professions. Lee and Faulkner (2010), for instance, highlight the culture change required to have an impact on gender inequality. Indeed, only holistic approaches show success in combatting segregation - those which tackle barriers at a strategic level with broad aims and a long term vision - as opposed to discrete and one-off initiatives. Examples of holistic approaches include, for instance: involving both senior management and employees in initiatives; incorporating diversity policies as part of an organisation's strategic plan and performance indicators; and monitoring equality and diversity and equality impact assessments, including of subcontractors (e.g. Dobbs 1998; Miller and Tucker 2013; Stein 2013; Sang and Powell 2013).

In order to tackle the structural and cultural determinants underlying gender segregation, research indicates that diversity strategies should focus on the umbrella of issues listed in Figure 1 below, as a holistic strategy. However, it is apparent that, while strategies and initiatives towards the top of the list are increasingly part of diversity practices in UK companies – also in construction, the strategies towards the bottom of the list are not (yet) incorporated (Wright *et al.* 2014):

FIGURE 1: ASPECTS OF DIVERSITY POLICY AND PRACTICE – THE ‘VISIBLE’, ‘EMERGING’ AND ‘HIDDEN’

	DIVERSITY UNDERSTANDING; FOCUS IN ORGANISATIONS	DIVERSITY POLICIES IN ORGANISATIONS	DIVERSITY PRACTICE WHO IS TARGETTED IN ORGANISATIONS	DIVERSITY PRACTICE; WHAT IS DONE? IN ORGANISATIONS
ABOVE SURFACE	DIVERSITY OF IDEAS INCLUSION (INTER)NATIONALITY OF WORKFORCE	GENDER DISABILITY ETHNICITY	GENDER	<ul style="list-style-type: none"> • POSITIVE ACTION RECRUITMENT • FLEXIBLE WORKING • MIRRORING DIVERSITY OF CLIENTS • TALENT (RECRUITS) • SERVICES/PRODUCTS • LEGAL AND CONTRACT COMPLIANCE
BELOW SURFACE ‘EMERGING’	CITIZENSHIP MIGRATION	AGE	DISABILITY ETHNICITY AGE	<ul style="list-style-type: none"> • INTERNAL AWARENESS RAISING • DIVERSITY TRAINING • MENTORING • NETWORKING • DIVERSITY AS GOOD PRACTICE • BRANDING ‘EMPLOYER OF CHOICE’
UNDER SURFACE HIDDEN SILENT	EQUAL OPPORTUNITIES EQUAL TREATMENT	SOCIAL CLASS	SOCIAL CLASS	<ul style="list-style-type: none"> • SPONSORING for CAREER PROGRESSION • TRANSPARANCY EMPLOYMENT/CAREER DEVELOPMENT • MONITORING AND EVALUATING DIVERSITY • DIVERSITY PERFORMANCE INDICATORS • POSITIVE ACTION IN TRAINING

(Adapted from Wright *et al.* 2012)

4. Addressing obstacles to gender diversity

The distinctive context of the construction sector – its poor apprenticeship record, fragmented employment, extensive sub-contracting, working time inflexibility, and specific work locality, especially on-site work in a ‘macho’ context – makes for a number of challenges to increasing gender diversity. These are present at every stage: education/training before entry; at entry, and during employment (retention).

4.1. Education and training context

4.1.1. Entering construction: professionals

Throughout the nineteenth century, the engineering professions and unions adhered to a policy of deliberately excluding women (Drake 1984). Although there has been a steady increase in the number of women entering the industry in professional positions since the Second World War (Garner and McRandal 1995), women are unlikely to be attracted in significant numbers until construction careers are perceived as offering them fair and equitable career possibilities.

Higher education clearly forms the interface between career choice and working in the construction industry, but, as Srivastava (1996) found, a tension often exists between the equal opportunity policies set out by the higher education institutions, and how these are translated in practice by lecturers. In effect, women studying the built environment can be severely disadvantaged through a ‘hidden curriculum’ of rituals, which leads to an isolating atmosphere. This may explain why in a survey with Danish engineering education students, it was found that women are significantly more influenced by mentors in the college system than men (Kolmos *et al.*, 2013). Women studying on male dominated engineering courses have also been shown not to achieve as well as where numbers of men and women are equal (Daniels 1993). Thus, higher education can be seen to act as a ‘gate keeper’ to a male-dominated industry.

4.1.2. Vocational education and training in the construction trades

Critical to achieving success with respect to gender participation and equality is to ensure that initiatives with respect to education are not just confined to professional occupations but cover all vocational education and training (VET) for the entire workforce involved, whether employed by the Project, contractors or subcontractors.

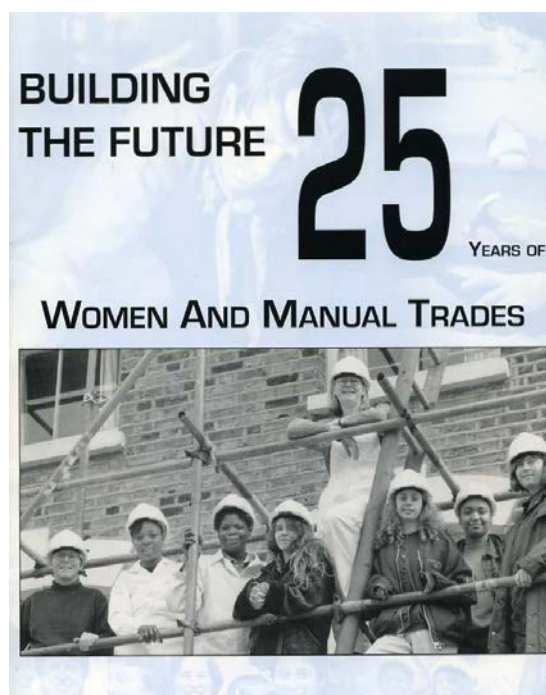
4.1.2.1. Historical precedents

Women have always maintained a presence in the building trades entering through apprenticeships, the earliest records confirming this date back to the 16th 17th and 18th centuries (Clarke 2007). Following the repeal of the Statute of Artificers, their numbers dwindled to reach less than 0.3% of the total skilled construction labour force by the end of the nineteenth century (Clarke and Wall 2009). This changed in the twentieth century: during the two World Wars when women were encouraged to take up jobs opened up by male conscription resulting in over 25,000 women working in the construction industry with a participation rate, in 1943, of 3.8% (Clarke and Wall 2011). These figures go some way to disprove the longstanding argument against women entering manual occupations based on their physical abilities: in times of labour shortage, when there are no other available sources of men, industry will actively recruit women to fill vacant positions.



Source: Imperial War Museum

However, it was not until the late twentieth century, in the 1970s and 1980s, that a combination of political change and grassroots campaigning created a set of circumstances that supported considerable numbers of women to train and work in construction. Inner London, and the local authorities it comprises, can be seen as case study revealing the success of this approach (Wall and Clarke 1996; Michielsens *et al.* 1997; WAMT 2001). After the Sex Discrimination Act (1975) became law, making it illegal to discriminate on the grounds of sex in employment or education, small numbers of women accessed training in government training centres on TOPS (Training Opportunity Programme Scheme) courses (Payne 1991). These six-month intensive government courses at Skillcentres provided industrial training in construction occupations after which successful trainees were classed as 'improvers' and required a further 18 months' work before recognition as fully skilled.



In the early 1980s, in response to increasing numbers of women failing the initial tests set at Skillcentres, women-only training workshops were set up by women who had successfully entered the trades by this route. Funded by London local authorities, they provided introductory courses in the trades before women entered the male-dominated environment of industry. Basic manual skills (NVQ Level 1), literacy and numeracy, were taught by women instructors in a supportive environment with childcare provision. Many trainees then consolidated their training through TOPS or by joining local authority building departments known as Direct Labour Organisations (DLOs) as adult trainees. For example, in the mid-1980s, Hackney DLO was running one of the largest training schemes for building workers in Britain, backed by the construction union UCATT (Union of Construction and Allied Technical Trades). Over 50% of the adult trainees were women, many of them going on to permanent jobs in construction. Local authorities committed to changing their male dominated construction workforce created a framework of support for women in the trades through the provision of: a designated women's officer; regular meetings; the placing of more than one women on any site; flexible hours of work; and a clear and transparent set of equal opportunities guidelines backed up by internal procedures to address grievances. The success of these measures can be measured by the presence of 266 women in construction manual occupations in seven Inner London DLOs in 1989.



The legacy of the systems set up in the 1980s survived, and DLOs continued to address the very low numbers of young women applying for apprenticeships by creating links with the local schools careers services (Fuller et al 2005). Recruitment prioritised the importance of positive female images in recruitment literature and advertising, a diverse range of advertising outlets and having women form part of the recruitment team. For example, of the 283 apprentices appointed by Leicester DLO between 1985 and 2002, 84 (30%) were women. In 2003, 40 (or one in 12) of the 480-strong workforce were women, employed in all the trades, as carpenters, electricians, plasterers, painters and decorators, bricklayers, heating and ventilating engineers, gasfitters and metal workers (Clarke et. al. 2006). Leicester continues this legacy today, in 2012 employing 123 women as part of its 431 strong workforce and with 18 out of 75 craft apprenticeships held by women (Craig and Oates 2014). Today too there is more support than ever for employing women, including from the CITB and the trade unions.

4.1.2.2. Discrepancies in training

The consistently higher numbers of women undertaking full-time construction training in colleges than are found in construction employment indicates that many women do want to work in the industry as skilled operatives but fail to obtain entry. By 2005, women represented 3% of construction trainees, but of these the vast majority were in Further Education (FE) Colleges, where they represented 7% of all construction trainees; in London an even higher proportion (9%) of women was to be found in construction training in FE Colleges, far higher than found in construction employment (Byrne et al 2005; Briscoe 2005).

Similar findings can be told in relation to professional women. For instance, 84% of the 4,830 first year civil engineering degree students in 2012-3 were male, with just 785 female (Wynne and Sofolarin 2014). In 2014, 71% of male graduates with engineering and technology degrees entered industry employment, whereas only 56% of women in the same cohort did so (Engineering UK 2014). Engineering UK identifies obstacles to their integration beginning in gender stereotyping of STEM subjects in school and calls for a strategy to build

girls' confidence to approach science and engineering subjects. This is echoed in the US National Women's Law Center's conclusions (2014: 11) that:

Changing longstanding patterns of occupational segregation requires prioritizing the recruitment and retention of women in non-traditional career and technical education and STEM courses.



Incredibly, such thinking is alive and well and living on a construction site near you.

Caz Westgate has been working in construction for over 20 years. In that time, she has worked all over Britain and gained a number of qualifications including City & Guilds Advanced. She has even taught construction courses.

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Awareness of one's own biases can help with recognition and the potential reduction of the impact of implicit bias (see for example, Devine *et al.*, 2012). An increasing number of employers now use 'unconscious bias' awareness training as a tool to increase diversity and inclusion because of its capacity to raise self-awareness and allow self-correction in thinking patterns and decision-making. The term originates from social psychology and seeks to describe the impact of subconscious presumptions about people's characteristics (such as being female, non-white, disabled) on recruitment and performance management. UKRC WISE (Women in Science and Engineering), for example, organises training which addresses the relationship between the implicit associations, stereotypes and individual attitudes towards apprentice recruitment.

4.1.2.3 (Lack of) managerial commitment and development: awareness training

Organisational practices (for example, a long hours culture) and line managers impede the uptake of equality and diversity policies. Research demonstrates the importance of managerial commitment for the successful implementation of diversity policies (Thompson *et al.*, 2004; Maxwell, 2005; Lapierre *et al.*, 2008). Leadership team behaviours can be strategic because of their contribution to a 'diversity mindset' (Hopkins *et al.*, 2008), which is central to increasing diversity. Policies alone, however well-designed, do not promote a work environment that encourages diversity. Den Dulk and de Ruijter (2008) found, for instance, that the values and attitudes of individual managers and supervisors have a significant impact: individual managers tended to perceive WLB policies as disruptive, though

responding favourably when aware of individual circumstances and when personal mitigating factors are involved.

Consequently, leadership development programmes in which diversity features centrally are seen as crucial. As increasing numbers of employers organise this type of awareness training, the diversity discourse in organisations has become homogenised (Farashahi *et al.*, 2005).

4.2. Recruitment and retention

Recruitment is one of the most critical HR practices that impact on changing the composition of the construction workforce, including through the use of proactive measures discussed in Section 2.5 above, such as contract compliance, quotas and targets. This is the reason for the strong emphasis on the 3Rs – recruitment, retention and respect for people – in the Rethinking Construction initiative stemming from the Egan Report of 1998 (Egan 1998; Respect for People Working Group 2002; Ness 2010). In this regard, positive action has been shown to be effective; for instance by Leicester City Council's programme for women in construction led to over 100 women becoming professionally qualified (EHRC 2011; Leicester City Council 2011). As occurred on Crossrail too (Good Practice Case 3), 'blind' recruitment, by removing names and gender from applications, is increasingly carried out.

Research has long since established the link between informal recruitment practices and homogeneity of recruitment, discussed in more recent literature as 'unconscious bias' (for instance, see Raymond, 2013; Mervis 2012; Hill *et al* 2010; McCullough 2011). Informal routes to recruitment are especially found in SMEs, including subcontractors, which is of particular relevance to construction (Clarke and Herrmann 2007). Therefore, initiatives focusing on formalising recruitment are seen as a step towards achieving greater gender diversity. Targeted advertising using positive female images has also been at the centre of the Construction Sector Skills Council's efforts to attract women into the private construction industry (CITB 2004).

4.3. Employment and working conditions

Approaches to gender equality in engineering should go beyond only looking at recruitment as the issues the industry faces include what happens once women are in industry (Faulkner 2009). Research shows that horizontal and vertical segregation remains in construction (Fernando *et al.* 2014). For instance, key issues for women professionals relate to the barriers that women face in terms of entering and progressing through their careers, including: networking, work-life balance and gendered discourses (Barnard *et al.* 2010). They also relate to working and employment conditions, and the HR approaches that aim to deal with improving diversity.

4.3.1 Direct employment

There is extensive literature outlining the problems of self-employment in the construction sector (e.g. HM Treasury 2014; Harvey and Behling 2008) and it is apparent that much of the success in improving diversity on projects, such as the Olympics and T5, was in large measure attributable to the insistence on direct employment. As emphasised by the Greater London Authority (2007):

The prevalence of self-employment and temporary agency working (in particular of migrant workers) on short projects on sites, often under different terms and conditions even on the same site and in the same trade, hampers the development of a stable

workforce with clear paths of recruitment, retention and progression that a wider, more diverse, pool of workers can enter. (pp 93-4)

4.3.2 Women as role models and mentoring

Another important concern is the position of women as role models within the organisation, helping to convey the organisation as an equal opportunities employer and demonstrate that perceived barriers to progression are not insurmountable. A successful and structured mentoring scheme can be a way to increase the numbers of women in senior management positions where they can then become role models and also mentor other members of the team. However, a consideration to be taken into account is the unconscious bias that may be into choice of mentor. In relation to sponsorship, for instance, recent evidence presented to the House of Commons Science and Technology Select Committee Inquiry into Women in STEM careers (2014) suggests that within education senior male academics may be more likely to offer sponsorship to young male early career researchers who, unconsciously, remind them of themselves at an earlier stage in their career, while women may not as frequently be afforded the same informal support and encouragement. It is highly likely that the same behaviour is found in civil engineering and in firms with a high STEM-educated proportion of the workforce. It is interesting to note that the US in January 2014 launched a pro-active approach to female recruitment to STEM subjects in the Million Women Mentors Scheme. This aims to deliver high quality mentoring programmes that connect girls and young women with STEM professionals. This is similar to initiatives already in place in the UK and delivered by WISE.

Mentoring can be also used in innovative ways as a training tool, for example reverse or reciprocal mentoring programme has been used by the company Aviva as a means for male senior managers to gain a better understanding about gender differences and how women experience the organisation. Each group executive member was paired with a high potential woman within the organisation for twelve months. The senior women benefit from career development advice while the group executive gain valuable insights about the challenges that women often face as they move up the career ladder.

4.3.3 Working conditions in construction: long working hours

One of the key problems identified with working practices in construction is the long-hours culture and expectation of total availability and 'presenteeism'. This is one of the key issues concerning gender equality because, as Ness (2012: 668) argues: 'the exclusion of women both enables and condemns men to work long hours'. Ness makes reference to the unpaid labour of women in the domestic sphere that enables (and obliges) men to 'give their all' in the workplace. Long hours working is therefore not only an obstacle to women's participation, but the product of their historical exclusion from the world of work.

Research on major projects (including Wembley and T5) in London confirms the long hours of work. As stressed by the Greater London Authority (2007: 94):

The long, irregular working hours and travel times often required in construction act to exclude many people from working in the industry due to the difficulty of combining work with domestic and other responsibilities. These work patterns underpin the preference for engaging mobile workers...and hampers the development of a sustainable London labour market.

The GLA recommended that regional public authorities, industry lead bodies and unions should discuss:

How it may be appropriate on major projects to promote stable working hours and shorter travel times in conformity with Working Time Directive requirements, clean environment and transport policies, effective health and safety procedures and measures, and minimising disturbance to the general public.

Indeed, diversity research identifies the long-working hours' culture as one of the key impediments to the integration of women: experienced women leave the industry in order to 'escape' the long working hours, especially after having children. People in the industry work many hours more than their contract states, and 'face time' is still a core part of the working culture, with long hours seen as an indicator of commitment and therefore used as a pre-requisite for promotion (Wright *et al.* 2014).

Men feel less of an obligation to be in the office during their contracted working hours and are also more likely to believe that their workload cannot be managed within their contracted working hours.

Although these findings are inconclusive in terms of the extent to which men and women are able to reconcile their work and out of work commitments, the qualitative responses given in Section 4.3.7 below on flexible working are more revealing in terms of the improvements that respondents consider would help maintain work/life balance.

4.3.4. Flexible work practices and diversity

In order to benefit from a diverse workforce, organizations' diversity policies address work-life balance (WLB) and flexible work arrangements (FWA), which have been found to encourage equity and social inclusion (Ryan and Kossek, 2008; Barbosa and Cabral-Cardoso, 2010, Lewis *et al.*, 2007). While flexible working is seen as positive for diversity, it sits uneasily with the concept of work commitment and the ideal worker: managers may be reluctant to facilitate working patterns that lead to employee inaccessibility (such as part-time work) (Haas and Hwang, 2007; Holt and Lewis, 2011). The negative connotation of flexible working is strong, and has an impact on career development and reward. Cultural norms also make it difficult for men and women to take-up formal opportunities for family-friendly working policies (see for example, Devine, 1992; Elvitigala *et al.*, 2006; Etzkowitz *et al.*, 2000). This may be one of the main reasons why flexible-work is underutilised (Lewis, 1997; Kossek *et al.*, 2010, Kirby and Krone, 2002; den Dulk and de Ruijter, 2008; Brown, 2010).

Specifically relevant for the construction sector is Hart and Roberts' (2011) research on losses in female employment, which indicates that the UK science and engineering sectors 'lose' (ie leavers from the workforce) their female workforce at a much higher rate than other sectors. They suggest that a major contributing factor to this loss is the lack of part-time work opportunities, which is at its most extreme in the engineering sector. In 2010, only 12% of female engineering professionals worked part-time compared with 42% of all UK female employees.

The lack of flexible working as an opportunity to balance work and caring roles is a key element in explaining female retention problems. This has been highlighted by the European Commission (2013), which refers to not only the 'glass ceiling' but also the 'maternal wall' (barriers faced by mothers at work or seeking work (see Swiss and Walker 1993), hindering women's progression. That such barriers exist is not always corroborated: conflicting

evidence emerges from studies conducted in the USA (National Science Foundation/Center for Science and Engineering Statistics, 2013).

Flexible working also appears to impact negatively on reward: A study by Bilbo *et al.*, (2014) on construction workers in the US shows that being married and having children are negatively correlated with managers' salaries. However, they go on to highlight that:

The wage disparity between men and women in construction is the second lowest of any industry in the United States; for female project managers the wage penalty for mothers is lower, and most female project managers are able to return to their jobs after maternity leave, in some cases even earning higher salaries. Yet female participation in construction management remains very low (Bilbo *et al.*, 2014: 266)

Therefore, in the US at least, women are not returning to work after having children despite relatively low wage penalties for mothers.

Smithson and Stokoe (2005) and Kamenou (2008) suggest that FWA requests from potential recipients are influenced by social norms, limiting the extent to which there is uptake across the range of social groups and the degree to which WLB can be achieved: there is still a perception, for example, that men 'don't normally do flexible working', while part time working patterns do not fit with male managerial beliefs of what constitutes 'normal' working arrangements.

In conclusion, FWA are often insufficiently utilised, due to inhibiting cultural and structural barriers such as perceptions around career development and the impact of managerial control (Fleetwood, 2007; Lewis *et al.*, 2009; Brown, 2010; Holt and Lewis, 2011). Organisational support, cultural awareness and workplace practices are essential for successful policy delivery and take-up (Gregory and Milner, 2009; Sippola, 2007; Myers and Dreachslin, 2007; Leveson *et al.*, 2009).

4.4. Organisational environment

The 'masculine' nature of the work environment, especially on-site work, characterised by the dominant 'football and families' culture' with humour and sexualised banter in the workplace common, can prevent female inclusion (Faulkner 2009). In some cases successful integration is perceived as dependent on assuming 'male' behavioural norms and intensified work patterns because 'belonging' in construction workplace cultures is highly gendered' (Watts, 2012: 1). Although assimilation into masculine cultural norms might benefit the careers of individual women, it is unlikely to promote gender equality more generally (Greed 2000).

It has recently been suggested that both hard and soft skills are crucial for women to be successful in the UK construction industry (Fernando *et al.*, 2014). Language used in everyday talk and in reports etc. can reinforce stereotypes around gender and engineering (Faulkner 2006). Discourses, meanwhile, can reproduce dominant ideologies, even when apparently trying to tackle them (for example 'most jobs in construction can be done by women') (Ness 2012).

Organisational characteristics have a significant impact on gender inequality. While HR departments produce a number of initiatives to improve diversity, such as awareness training in recruitment or networking, obstacles to greater inclusion of women remain. Lee and Faulkner (2010) list a range of organisational barriers that fall within HR. A study by French and Strachan (2013), for instance, that looked at equal opportunities policies in construction in Australia found that few companies are proactive in their approach to gender equality

measures, except in relation to sexual harassment (which is a response to legislation). These authors also analysed the number of women in management and the company's equality strategies and found that there is no correlation between the two: having more advanced equality policies does not equate to greater representation of women in management positions.

In the UK, data from the Workplace Employment Relations Survey (WERS) provide evidence that fewer STEMM workplaces have formal diversity policies than in the some other parts of the economy, although it is important to acknowledge that policy statements do not necessarily reflect practice (they could be 'empty shells', as shown by Hoque and Noon (2004)).

4.4.1. Internal and external networking

Those in the minority in the construction workplace can find themselves excluded from informal networks, which are crucial to becoming accepted in the workplace. Informal networks are not only a feature of recruitment, but also play a role in gaining work experience and career progression (Loosemore *et al* 2003; Craw *et al*; 2007). The lack of supportive networks acts as a barrier to women's career success in construction (Worrall, 2012). Largely, networks are based on male interests or spheres that have traditionally excluded women, and feature unwritten rules that have been constructed by men (Singh *et al*, 2002: 77).

But HR diversity initiatives, such as women's networks and mentoring programmes, do not offer the obvious solution to issues around networking as women may prefer to build reputation through hard work and 'fitting in' rather than schemes that directly address the need for networking. These female networking opportunities do not challenge existing structural obstacles such as existing power structures, or lack of access to the decision making groups, and therefore show little advantage (Sang and Powell 2013).

4.4.2. Monitoring/evaluation of implementation and impact of policies

While diversity is established as a good practice policy in most sectors in the UK, there is a gap in terms of monitoring and evaluating the impact of these on recruitment; progression of careers and performance. Useful concepts such as the 'diversity scorecard' (Hubbard, 2004) and metrics of diversity density have been developed, but there is little evidence of these concepts being used and the extent of full 'diversity auditing', as recommended by Pearn Kandola (eg 2006), is not known.

Benchmarking diversity monitoring data against other organisations is a technique used in the STEMM sector. But, overall, organisations are relatively unsophisticated in the collection and analysis of diversity data: they may capture raw data from job applicants and staff (which may be of questionable quality) but they may not do much with the data, and are certainly unlikely to compare it to measures of organisational performance (CIPD, 2007, 2006). The use of diversity measures in organisations is only extensive in those organisations that are at the forefront.

Defining and measuring diversity is also not straight-forward and prone to producing data that need to be used with care; measures of performance are clearly context-specific; and measures of individual performance are inherently unreliable for cross-organisational comparisons (Wright *et al*, 2014).

With respect to the reliance on established informal networks and the lack of transparency and accountability in relation to diversity, subcontracting and retention processes, the GLA (2007: 91) made the interesting recommendations, that regional public authorities work with the CITB, employers and unions to:

- Promote employment of dedicated managers/coordinators to work on large sites with a remit for promoting different methods of sourcing applicants and ensuring equal opportunities in recruitment and subcontracting;
- Consider ways of incorporating suppliers' track record in equal opportunities and diversity performance as part of tendering processes for contracts;
- Promote the appointment of equality representatives to be kept informed of recruitment and retention processes and to liaise with workers from target groups on issues of concern such as discrimination.

4.4.3. Employee involvement

Much research has addressed the role of trade unions in gender issues (for instance, Cockburn 1991; Dickens 2000; Kirton and Greene 2002; Wajcman 2000). Colgan and Ledwith (2002) provide an international overview of unions and the promotion and participation of women, revealing a wide range of different agendas across the globe. Research on women's groups or committees in unions confirms their role as catalysts for change, contributing to an environment where 'women can develop strengths and advance their concerns' (Foley 2003; Parker 2003).

Studies by Munro (2001) and McBride (2001) in the UK indicate that women's equality and employment issues have become part of the central agenda of unions such as Unison, which operate in areas of high female employment. The actions of trade unions to promote the participation of women and the incorporation of gender equality issues can, however, be summarized as more reactive than proactive. However, recent developments indicate the potential for change as the Union of Construction, Allied Trades Technicians (UCATT), has (2014) set up its first Women's Network Forum and also publishes *Women in Construction* Newsletter. A survey of the gender equality agenda in construction at skilled operative level addressing the European construction social partners (employers and trade unions) across Europe found that the construction industry still displays inertia and conservatism, and that the social partners corroborate rather than counter this in those policies, collective agreements and practices that play a role in women's integration. Together they express a 'discourse' of gender equality, but this does not automatically lead to equal opportunity policies or programmes, though they have the platform to make inroads and to change the industry from within (Clarke *et al* 2005).

5. Conclusions and Recommendations

Women are very poorly represented in the construction sector as a whole. The reasons for this are complex and multifaceted, but include both structural and cultural barriers such as: the poor image of the sector; a lack of formalised recruitment practices and procedures; the paucity of mentoring and role models; male dominated and oriented training programmes; the fragmentation of employment; male-oriented homo-social networking and social activities; a lack of flexible working and work-life balance possibilities; and enduring traditional stereotypes and sexist attitudes. The persistence of traditional full-time career patterns and trajectories also reinforce gendered assumptions about careers in the industry. Addressing these deeply rooted structural and cultural issues represents a significant challenge for the industry, and relatively little progress has been made over the last 30 years.

5.1 Key Recommendations

5.1.1 Overarching principles

A set of high level principles should inform specific actions

Ensuring senior management support and mainstreaming equality through management practice - Securing senior level support is critical to success in meeting objectives. This must extend beyond statements of the importance of gender equity within the organisation, to the mainstreaming of the equity agenda in all key policy areas. Reviewing policy areas for opportunities in this regard represents an important first step in embedding a culture of equality throughout the business. The success of embedding equality as normal business practice must then be regularly monitored and reviewed.

Promoting equity as integral to good HRM practice - Many initiatives proposed within this report could be described as good, gender-neutral human resource management practice. For example, direct employment, open and transparent recruitment processes, mentoring schemes and flexible working practices benefit all employees and care should be taken to ensure that the broader benefits are promoted to all employees in addition to the equity related aspects.

Extending influence – It is important that the principles of good practice established and routinized are not only propagated throughout the supply chain, but are also mandated through contract compliance

Creating a diversity working group – The employment of a dedicated equality manager and the creation of a group to champion equity initiatives are widely advocated. Such a group would need to be populated by a stratified group of employees to ensure representation from across the business. This group would act as a hub for overseeing and capturing learning from equity initiatives as they are developed and trialled. It would also enhance the visibility of the initiatives across the business.

Building on good practice and demonstrating sector-wide leadership – Initiatives trialled at the Olympics such as the Women in Construction scheme, and the range of measures developed by Cross Rail have provided exemplars that can be emulated and extended.

5.1.2 Specific actions for promoting equity

In addition to these overarching principles, a range of specific actions have emerged through the study that could yield immediate benefits.

Promoting work-life balance via flexible working practices

Healthy work-life practices benefit all employees as well as fostering gender equity and help raise the image and profile of the Project as an attractive employer. In order to encourage healthy work-life practice the project should:

- Regularly monitor the working hours of employees to ensure their well-being and the effectiveness of their wider employment policies
- Consider the introduction of core working hours to ensure availability at certain times of the week for meetings, but with flexibility at other times
- Consider taking into account the time spent working during commuting to work
- Consider the provision of childcare places near to the office
- Offer seminars explaining the policies, how they operate and how they can be exploited by all employees

- Create further opportunities for part-time and flexible hours working where appropriate
- Develop a clear policy around home-based working for all employees

Mentoring and career support

Proactively supporting employees with both informal and formal advice and mentoring helps to foster an internal culture of career support. Other career enhancing measures might include:

- The sponsorship of female students as part of a structured training programme allied to the mentoring scheme
- The provision of work placements to provide first-hand experience to potential candidates of the Project environment
- The promotion and training of administrative and non-technical staff (where there is greater representation of women) to help move them into technical roles
- Actively supporting senior women in acting as role models for less senior employees

Communicating equity policy

Intentions with regards to equity and inclusion need to be carefully communicated with the dual benefit of embedding a culture of equity, thereby helping to retain the best employees, and increasing attractiveness as a potential employer to external candidates in the future.

Consideration can be given to:

- Creating a suite of equality and diversity training interventions, which can in many instances be embedded into the normal training provided to staff. Particular provision to support gender equity can include sessions on unconscious bias, role-playing scenarios and training for potential mentors
- Targeting the communication of policies at the specific groups who they aim to benefit. This will mean tailoring the dissemination approach to account for where staff are based and to their particular needs, and should also signpost them to specific support
- Creating and encouraging informal social networks accessible to women working within, or aspiring to work in, the construction professions
- Creating and leading a sector-wide employers' 'Good Practice Forum' to showcase effective diversity training and development programmes
- Developing an annual event aimed at celebrating diversity as something that is enjoyable and fulfilling, and a way of bring the workforce together around an agenda of mutual interest and importance

Policy enforcement

Without sanctions, some initiatives developed are likely to remain rhetorical. In terms of the enforcement of policies, consideration should be given to:

- Setting robust equality targets against which progress can be monitored. These should be realistic but challenging relative to sector averages and should include regular and transparent audits of pay
- Increased monitoring of information on employment practices and career progression such as the use of fixed-term contracts, flexible working arrangements and requests, and the progression of different groups through the organisation
- The routine evaluation of gender balance of teams as part of the internal performance review process
- Introducing a 'gender audit template' for evaluating particular departments and areas of the business to provide a framework for data collection, analysis and evaluation, demonstrate the need for equality measures, and act as a management tool to try and assess impacts of actions going forward

- Employing dedicated managers/co-ordinators of the gender equity policy at strategic positions, charged with responsibility for policy enactment and accountable for performance against the targets set
- The nomination of equity champions to act as points of contact and to represent the interests of particular groups.
- Including specific equity requirements in contracts and incorporating an evaluation of suppliers' diversity track records as part of the tender evaluation process
- Where appropriate, mobilising wider institutional pressures on the equality agenda, particularly in relation to discriminatory behaviour, or breaches codes of professional conduct for which externally enforced sanctions already exist



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