

# Executive Summary

## Introduction and aims of the project

This report sets out the overall findings of the 2020 Vision Project, commissioned by ConstructionSkills from Experian Business Strategies and SAMI Consulting Limited, to:

- identify key issues and changes which the UK construction industry may encounter over the long-term;
- assess their potential implications for industry employment, skill and training requirements.

The ConstructionSkills 2020 Project is essentially scenario based.

The report provides an overview of construction specific trends and issues which may have a significant bearing on future UK construction activity and labour productivity, and hence on future construction industry skill and training requirements.

Drawing on this and the Foresight Futures Vision 2020 scenarios which were developed for the Department of Trade & Industry by SPRU-Science and Technology Policy Research, University of Sussex, the report develops four alternative scenarios of the UK construction industry in 2020.

Based on assumptions consistent with each of the scenarios, the ConstructionSkills Employment Forecasting Model, extended in time to 2020, is then used to explore the consequences of each of these four scenarios for the industry's long-term skill requirements. These results are also compared with a simple extrapolation to 2020 of the model's existing assumptions, the "Base Case".

## Trends and issues in construction

The main underlying issues reviewed are:

- **Speed of innovation within the sector:**  
Historically, innovation in the construction sector has not been rapid. Greater internationalism, greater competition, and greater integration in the supply chain could improve this. Such changes are plausible in some scenarios of the future.
- **Demographics:**  
The UK's ageing demographic profile suggests that special measures will be needed to maintain sufficient numbers of new recruits into the industry. The provision of training at all levels in the industry will be needed to meet future skills requirements.
- **Health and Safety:**  
It is probable that the drive to improve health and safety in construction will continue to a degree in all the scenarios being considered. Additional training will be required to

maintain safety attitudes and meet new demands on safety skills in more innovative scenarios.

- **Information and Communication Technology (ICT):**

The current trends towards greater use of integrated information systems seem likely to continue, but much more quickly in scenarios that are innovative and dynamic.

The implications are greatest for the professionals in the construction industry, as they will need a wider skill base in ICT to integrate design, construction, logistics and manufacturing. Training will be needed at all levels, but in some scenarios will need to be focused particularly on professionals already in the industry who will need to upgrade their skills. There will also be a tendency in some scenarios for a merging of construction professions.

- **Modern Methods of Construction (MMC):**

MMC is a generic term for a variety of construction methods that are generally new, and often have a significant off-site component. The main implications of an increase in MMC for training appear to be training for new skills on-site, more mechanical handling on-site, a reduction in demand for certain trades on-site, but a compensating increase in parallel trades off-site in factory environments, and higher levels of computer aided design (CAD). MMC is unlikely to have a great impact on trades involved in repair and maintenance (R&M), but appears likely to make inroads into new-build work for a variety of reasons. The extensive use of robotics in construction processes on-site by 2020 appears unlikely.

- **New materials:**

There is a wide range of actual and potential new construction materials, but most of these remain within the scope of existing methods of application or installation. The implications for training and skills are therefore generally, but not entirely, secondary. In the event of a significant increase in the use of new materials, tradespeople will need to be able to read, understand and implement the instructions on the packaging. This may require changes in the basic construction training given to them. Changes in materials will be significant for both new-build and R&M. In R&M they will need to be used in conjunction with traditional skills.

- **CO2 emission reduction and energy conservation in buildings:**

Most views of the future suggest continued pressure to reduce the energy consumption of buildings. The implications for future skills requirements could be significant. Very small imperfections in construction can have substantial implications in meeting the high levels of energy standards anticipated. There may need to be considerable changes in attitude to new construction techniques, accompanied by an understanding of the impact of actions and inactions by an individual on the final energy certificate. There is likely to be considerable scope for expansion of the skills required for assessment of energy efficiency of buildings.

Retro-fit to improve energy conservation in existing buildings will require an understanding of the impact of new materials/systems on old buildings, and combining traditional skills with the installation instructions on the new materials.

In some scenarios, some trades will see a reduction in demand, such as new-build wet

heating systems, as zero carbon homes obviate the need for any significant heating. The overall effects on other trades are not so clear cut.

The development of low carbon sources of energy will require enormous investment in energy infrastructure, albeit some will be replacement.

- **Other sustainability issues:**  
Increased government and cost pressures to reduce water usage and waste would generate the need for some new activities and skills.
- **General training issues:**  
Any increase in MMC will lead to greater specialism in off-site activities. On-site MMC would lead to a need for highly trained generalists capable of assembling complex components, and also possibly highly specialised employees of manufacturers installing their own products. Demand for multi-skilling would arise from the need to install more complex pieces of equipment, requiring the skills of different trades. In any innovative or progressive scenario, there would appear to be a strong case for the claim that there is a need to raise continually the standards of most people entering the industry. There is a fairly consistent view that there will remain a difference between new skill requirements in new-build and those in R&M which will continue to require traditional skills to deal with traditional buildings.

## Scenarios for construction

The economic and political backdrop for each of the four construction scenarios, together with the key implications for construction, can be summarised as follows:

### Scenario One – World Markets

World Markets is a world driven by aspirations of personal independence, wealth and mobility, a belief in the efficacy of integrated global markets and internationally co-ordinated policy, and a philosophy of “limited government”. Construction is characterised by:

- Rapid innovation and domination of major projects by international contractors
- Increasing use of off-site construction with more ICT-intensive buildings
- Emphasis on self-regulation, with relaxed planning controls
- Strong new housing demand, particularly private sector, but affordability issues
- Even more buoyant commercial & infrastructure construction

### Scenario Two – National Enterprise

Under National Enterprise, people aspire to personal independence and material wealth, embracing liberalised markets as an effective means by which they can achieve these goals within a nationally-rooted cultural identity and with a high degree of national self-reliance and security in a more fragmented and regionally unstable world. Construction sees:

- Weak investment in other new infrastructure and public new building

- Little growth in new housing investment which remains predominantly private sector
- Limited further “internationalisation” of major contractors & projects
- Slower uptake of best practice, new technologies and off-site construction
- Proportionately stronger repair, maintenance and refurbishment than new-build

### Scenario Three – Global Responsibility

In a world of Global Responsibility, people aspire to high levels of welfare with shared values, more equal distribution of opportunities and a sound environment. There is active public policy and public service provision, and international co-operation within the EU and at a global level. Competition is fostered within a regulated framework. Reconciling growth and sustainability, in a co-ordinated global context, is key under this scenario. Features of construction include:

- Heavy investment in renewable energy/resource efficiency, recycling and in new eco-efficient/low carbon and high-tech business opportunities
- Rapid innovation, with international contractors dominating major projects
- Stronger regulation and planning controls, with much greater emphasis on whole-life thinking and design
- Relatively strong public sector building and infrastructure
- Major public and private investment in both new housing and refurbishment of existing stock
- Substantial investment in new eco-efficient construction

**This scenario, which reflects rapid construction growth and innovation, coupled with a robust response to climate change and other sustainability issues, is the one that leads to the greatest level of change in the industry.**

### Scenario Four – Local Stewardship

Under Local Stewardship, individuals seek sustainable levels of welfare within federal and networked communities. Social and other regulation ensures more equally distributed opportunities within a high quality local environment. Public policy and low economic growth combine to produce small-scale regionally based economic activity rather than large-scale business and advanced technologies.

- Construction remains fragmented, with small businesses and slow innovation
- New-build construction is relatively weak
- There is heavy emphasis on refurbishing, repairing and improving the existing residential and non-residential stock, where possible improving its eco-efficiency

## Model results and the implication for skills requirements

### Overall construction output growth

In recent years construction output growth has generally underperformed GDP growth and this trend continues under three of the four construction scenarios and also under the Base Case. The exception is Global Responsibility, where construction output is assumed to grow on average 0.5% a year faster than GDP.

**Figure 1: Key assumptions**

Assumed growth to 2020	GDP Growth % p.a.	Construction Growth % p.a.	New % of total	R&M % of total
World Markets	3.00	2.75	57.0	43.0
National Enterprise	2.00	1.50	47.5	52.5
Global Responsibility	2.50	3.00	55.0	45.0
Local Stewardship	1.25	1.00	45.0	55.0
Base Case	2.50	2.20	59.0	41.0

**Source: Foresight Futures, Experian, SAMI Consulting**

### Sector variations

Not only is total real construction output assumed to increase at different percentage rates under the different scenarios, growth rates also vary across individual sectors. In particular:

- In absolute terms, compared with 2006, the real level of public sector new housebuilding is higher in 2020 in all scenarios except that of National Enterprise.
- New private housebuilding real output in 2020 is higher in absolute terms in all but the Local Stewardship scenario but declines in proportionate terms under all four scenarios.
- Public other new construction work grows in real terms under all scenarios but falls proportionately under the World Markets and National Enterprise scenarios.
- Private industrial new work output declines proportionately in all but the World Markets scenario and absolutely under Local Stewardship.
- Private commercial new work output increases proportionately under the World Markets scenario, but shows a noticeable proportionate decline under Global Responsibility and Local Stewardship.
- Infrastructure output grows noticeably in proportionate terms under the World Markets scenario, but falls under the National Enterprise and Local Stewardship scenarios. It also shows an absolute decline in output in real terms under Local Stewardship.
- R&M output shows real absolute growth between 2006 and 2020 under all four scenarios, albeit at varying rates. R&M under National Enterprise and Local Stewardship scenarios increases its share of total construction output in 2020 compared with 2006, but shows a relative decline under World Markets and Global Responsibility.

## Productivity changes

An important element in employment growth is the level of productivity gains assumed for each scenario. Productivity here is defined as unit sector output divided by unit labour input. It comprises improvements in output per person but also allows for a reduction in the need for certain trades in a sector, such as a decrease in the use of plasterers in a scenario with high levels of dry lining. The net result inherent in each scenario is shown below.

**Figure 2: Productivity change assumptions**

	Overall productivity growth % p.a.	New-build productivity growth % p.a.	R&M productivity growth % p.a.
World Markets	1.4%	2.0%	0.5%
National Enterprise	0.25%	0.5%	0.0%
Global Responsibility	0.7%	1.25%	0.0%
Local Stewardship	-0.3%	0.0%	-0.5%
Base Case	0.6%	1.0%	0.0%

**Source: ONS, Experian, SAMI Consulting, ConstructionSkills.**

## Employment implications

In 2006 there were 2.41 million people working in the construction industry, either employed or self-employed, as defined by SIC 45 & 74.2.

**Figure 3: Implications for employment**

	Actual 2006	Base Case 2020	World Markets 2020	National Enterprise 2020	Global Responsibility 2020	Local Stewardship 2020
Employment, millions	2.41	3.36	3.04	3.10	3.47	3.15
% increase on 2006 base		39%	26%	29%	44%	31%
Deviation from 2020 Base Case			-9%	-8%	+3%	-6%

**Source: ONS, Experian, SAMI Consulting, ConstructionSkills.**

Employment rises under all scenarios (assuming that any movement from on-site to off-site after 2006 is included under the construction banner). The table above shows the net changes for each scenario based on the construction growth assumptions in Figure 1 with an allowance made for productivity changes as shown in Figure 2.

## The implications for individual occupations

The implications for individual occupations are summarised below. The occupational breakdowns used below are based on the 25 occupational aggregates in standard usage by ConstructionSkills, which are in turn based on the Standard Occupational Classifications published by the Office for National Statistics and applied to Labour Force Survey data. The comments are based on the relative increases or decreases in employment compared to the overall growth of employment in each scenario. Thus a decrease does not necessarily signify an absolute decrease in the numbers employed in a trade or occupation but, rather, a relative decline.

**In fact, no occupations are expected to show an absolute decline under any scenario.**

Three of the four scenarios and the Base Case show significant and different variations in the balance between the different trades by 2020. However National Enterprise retains a balance very similar to the actual distribution in 2006.

- **Managerial and administrative occupations:**

Senior managers, business process managers and other office based staff all decline relatively in World Markets and Global Responsibility while they grow a little under Local Stewardship.

Other Professionals/Technical Staff and IT hold or increase their proportion a little in all scenarios.

- **Construction managers and professionals:**

The proportion of construction managers and professionals of the total employed in each scenario remains relatively constant.

- **Structural and building ‘skin’ trades:**

There is some relative growth in importance of bricklayers and building envelope specialists in World Markets and Global Responsibility.

Roofers show lower than average growth in employment under National Enterprise and Local Stewardship.

Demand for steel erectors and other structural trades shows relatively little change under the four scenarios.

- **Building services engineering trades:**

Electrical Trades and Plumbing & HVAC Trades show some relative growth in World Markets and Global Responsibility, little change in National Enterprise and a relatively substantial decline in Local Stewardship.

- **Plant related trades:**

Employment levels for plant operatives and plant mechanics and fitters appear to grow roughly in line with overall growth within each of the four scenarios.

Demand for scaffolders is predicted to grow more slowly than the average within the World Markets and Global Responsibility scenarios due to increased mechanization.

- **Other main trades:**

Wood trades & interior fit out employment grows roughly in line with, or faster than, the overall average within each scenario. In World Markets growth is significantly higher.

Painters and decorators and floorers show significant relative decline in World Markets and Global Responsibility.

Conversely, plasterers and dryliners show relative growth in World Markets and Global Responsibility.

Demand for glaziers grows slower than average in all cases.

- **Other occupations:**

Civil engineering operatives show strong relative decline in World Markets and Global Responsibility. It should be noted that this is only relative decline, due to the growth of housing and/or commercial building and is not absolute decline.

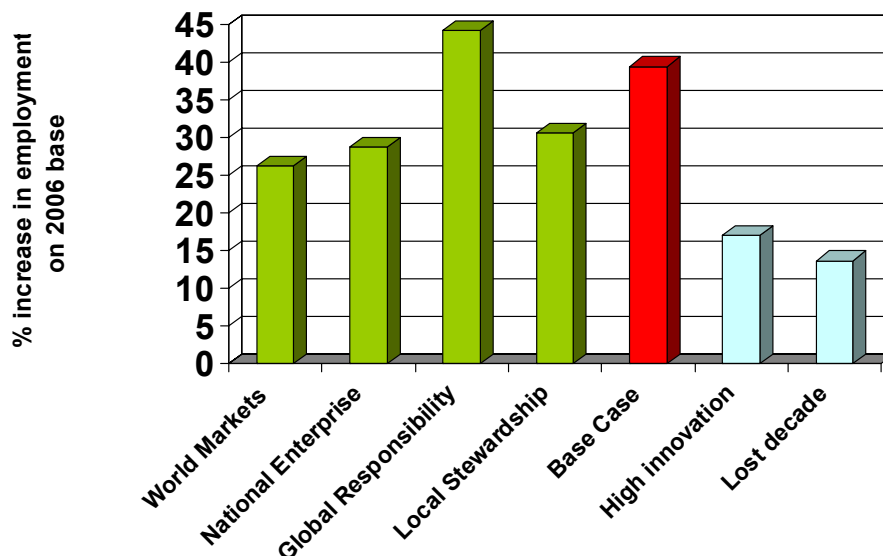
### Employment sensitivities

Analysis suggests that perhaps only two factors could result in substantially reduced levels of construction industry employment in 2020, namely:

- a very serious and prolonged economic and financial downturn and/or major structural constraint on further growth (the lost decade).
- a very marked acceleration in the growth of off-site production over and above that envisaged under the selected scenarios (a high innovation outlook).

Whilst it is possible that a combination of these two factors could work together to reduce absolute future construction industry labour force requirements, this is relatively unlikely. The effect on total employment requirements of the individual sensitivities compared with those of the four scenarios and the Base Case is shown in Figure 4.

**Figure 4: Productivity change assumptions**



Source: ONS, Experian, SAMI Consulting, ConstructionSkills.

## Conclusions

### Workforce requirements, recruitment, retention

- The scenarios point to significant employment growth over the period to 2020, possibly in conjunction with an increase in competition in global labour markets, particularly for skilled and professional workers. Inward migration to the UK could reverse in several scenarios, and there is consequently a significant risk of recruitment difficulties and skill shortages for the UK construction industry.

- There is therefore a need to improve the image of the UK construction industry and its attractiveness to potential employees.
- The industry needs to consider how innovation and MMC can be encouraged to enhance industry productivity and mitigate potential future labour shortages.

### Energy efficiency & carbon neutrality

- Energy efficiency and carbon neutrality are likely to be a significant force for change under all scenarios, even if the drivers vary between scenarios. There is a need to improve basic skills and knowledge with respect to energy conservation and efficiency of use.
- There will be increased emphasis on air-tightness and hence on quality of construction. On new-build, this may in turn encourage greater prefabrication, panellised construction, and growth of off-site production.
- In all scenarios there will be increased emphasis – albeit to a varying degree – on improving the energy efficiency of the existing building stock, as well as that of new-build.

### MMC and off-site

- The growth in use of MMC and off-site production is greatest under the World Markets and Global Responsibility scenarios.
- Obtaining critical mass and scale production is likely to be one key enabling factor for the growth of MMC, and the public sector has an important potential role here as a major client. Standardisation and greater collaboration between the various industry stakeholders are also key.
- Greater use of MMC will increase the importance of planning and logistics skills, to ensure correct timing and sequence of delivery and installation. This will increase the need for more site craneage, powered access and other mechanisation.
- Designers will increasingly need to understand how the various elements of the building inter-relate with respect to construction and performance in use. They may also have to design and engineer products that can be put together on an automated factory production line. This may be a challenge, given the historic organisation of the UK construction industry, and has implications for the individual professions.

### Construction professions and management

- There is likely to be an increased focus on the whole life performance and cost of buildings and infrastructure and, as for MMC, an increasing need for the industry's professions and managers to understand how the elements of a building inter-relate and perform as a whole.
- Managers are also likely to require additional planning, logistics and commissioning skills. The need to achieve high levels of quality and performance, particularly with

respect to air-tightness, is likely to require greater levels of supervision and quality control.

### ICT and system interoperability

- The use of ICT will extend in quality and scope, although the pace of development and application varies across scenarios.
- The logical extension is for greater use of ICT on-site, integrating design with the manufacturing, delivery, construction, commissioning and operational processes – although this is likely to be truer of large sites and new-build than of small sites and R&M.
- Interoperability of systems (which is often currently lacking) will be key to the rate of development and application of ICT in the industry.
- In all scenarios, construction professionals and managers are likely to need a wider skill base in ICT operations.
- On-site operatives can be expected to make greater use of hand-held devices, particularly under the higher growth and innovation scenarios, and will not only need the skills to use the devices but also the ability to understand the information available and to use it accurately. This may require a higher calibre of recruit, as well as a more general education in construction, in addition to specific skills training.

### Repair, maintenance and improvement

- The market for R&M increases in size in real terms between 2006 and 2020 under all four scenarios.
- Although the retro-fit/R&M market may not be a strong driver of new skills, its size and prospects nevertheless mean that there is a clear need to preserve “heritage” skills.
- This need may be reinforced as a result of the expected increase in pressure to retro-fit or upgrade existing buildings to improve their energy efficiency.
- There is increasing divergence in the skill needs of the R&M and new-build workforces in the more innovative scenarios.

### Multi-skilling

- There is debate over whether there will be a trend towards more multi-skilling or towards more specialist trades. Both trends may in practice become evident, particularly in the more innovative scenarios, where new specialist and broader skills will be needed to implement MMC.
- The anticipated high levels of demand for R&M services can be expected to sustain a strong level of demand for multi-skilled tradesmen, both to ensure acceptable levels of productivity and cost, and because growth in upgrade and retro-fit work is likely to involve tasks that cross traditional trade boundaries.

### Continuous evolution of skill needs

- Change is a feature of all four scenarios, albeit at different rates and in different directions. More attention will need to be given to liaison between training organisations and industry employers to ensure that the appropriate courses are continually updated in the light of evolving site practice and methods.
- There is likely to be a greater need for retraining, re-skilling, and upskilling of those already in work, particularly as a substantial proportion of the industry's 2020 workforce is already at work in the industry.
- Training will also not just be about numbers, but also about possibly small and subtle shifts in the future skills and knowledge required by a particular trade.

### Health and safety

- It is probable that the drive to improve health and safety in construction will also continue to a degree in all the scenarios being considered, driven by clients, government and enlightened contractors. Even so, the safety content of training can be expected to be higher in the socially cohesive scenarios than in the market driven scenarios.
- Safety by design will be viewed as part of the normal design process.
- Under all scenarios, it is still likely to be the larger new-build construction-sites that will have the greatest emphasis on safety, and hence on demand for safety training.
- In the high innovation scenarios, changes in products and processes will require continual reassessment of training in site safety to meet the needs of the new processes, such as heavy lifts, working at heights, and using new equipment.

### Industry culture

- To a greater or lesser extent under all scenarios, a change in industry and employee culture and mindset will be essential to meet improved quality, accuracy and precision and avoid damage and waste during construction.
- This change in mindset will require training and understanding on the part of the workforce as to why the change is required, and clear leadership at all levels and among all participants in the industry, including clients. It may also necessitate a workforce with a higher level of educational achievement than in the past.

### Key indicators of change

- The report identifies some early warning indicators that may help to signal the precise direction of future change within the UK construction industry and the resulting skill requirements. In turn, these could assist the industry in achieving better forward planning and preparedness for change.

- It is recommended that changes in the environment within which the industry operates, and in its key practices, should be regularly monitored as an aid to long-term workforce planning and training.