NBS Specification Survey 2013

"Specification writing has often been viewed as a necessary chore... We will increasingly see specifications becoming central to BIM: the information at the heart of BIM, from the start of a project, right through to a building in use."

Introduction
Richard Waterhouse
Chief Executive, RIBA Enterprises

Some years ago, we asked whether people agreed with the statement 'Specifications are the dullest part of my job'. We were a little disappointed, but not surprised, to find that a majority did. Specification writing has often been viewed as a necessary chore – producing an important legal document that needs to be right. Any subsequent dispute will often turn on one or more specification clauses. Incomplete, inaccurate or out-of-date specifications hugely increase professional risk. Too often, specifications are written quickly, under pressure, and only during the Technical Design stage of a project.

There is another view of specifications that we explore and develop in this report. Building Information Modelling (BIM) is fast becoming the industry standard for developing, delivering and maintaining project documentation. At the heart of this (as with so many current innovations) is the way we can now collect, manipulate and get value from data and information. We will always need the geometric data contained in drawings, but drawings by themselves are never enough for a true information model. We will increasingly see specifications becoming central to BIM: the information at the heart of BIM, from the start of a project, right through to a building in use.

At NBS, we have already developed a BIM-ready specification tool: NBS Create. It gives users the tools to produce light outline specifications at the Concept Design stage which will develop into performance, proprietary and descriptive specifications as the project progresses. Specifications can link to drawings through software plugins, so that they cross-refer and remain co-ordinated. COBie outputs are available, at the touch of a button, to allow full BIM integration. We are providing the tools that will allow the Government's BIM strategy to be realised.

This is a start. Specification creation will begin increasingly early on in a project's life. Briefing tools can be developed to allow a brief to be the foundation for an outline specification. Specifications will also be used much later on. Accurate specifications of a building, delivered in the Handover and Close Out stage, can be re-purposed as Operations and Maintenance manuals for facilities management, helping the soft landings process. Specifications will become a means of better and more efficiently delivering client requirements.

This survey shows that we are on the start of this exciting journey. Already 37% start the specification process during the concept design stage, and two-thirds agree that the brief is the first stage in writing a specification. More than three-quarters agree that updating a specification through the life of a building (from inception to use) 'benefits everyone'. Eighty-six per cent see that in the future specifications will integrate across all disciplines and specialisms. As an industry, we can see the direction we need to take and we welcome it.

But problems remain. A majority have difficulties with 'drawings and specifications contradicting each other', and 39% see a lack of collaboration as a problem. Nearly half cite inaccurate or incomplete technical data as an issue. There can be information ownership issues with cross-discipline working. These are problems that are easily solved with the tools already mentioned. The industry can improve through having the correct information and through clear allocation of roles and responsibilities.

Effective information management, with specifications at the core of a building's information, will help bring greater efficiency to the industry. This can translate to improvements in meeting clients' needs and expectations with increased profitability for all. We hope this report helps understanding of current specification practice, and helps light the path we take in the coming years.

Specification: Building the Information Model

Andrew M. Jobling
Technical Manager / Architect / CDM Co-ordinator, Levitt Bernstein

The Specification Process

Choices: Who, What, When?

Introduction

The creative process of architecture involves taking a client's needs / desires and responding to them within the confines of a wide range of constraints, e.g. site topography, regulation, cost, environment, health & safety, etc. with a solution that attempts to satisfy all of these (often conflicting) requirements. The built solution is an assembly of materials, products and systems put together in a way that provides the form, spaces and functions indicated in the design intent.

It is a misconception that the architect specifies everything. Choosing materials, products and systems is a complex process that spans the whole project timeline and involves multiple parties. Below, we look at how information is gathered from a number of sources throughout the project timescale and how this is stored, communicated and used at various stages of the project. It is important to understand how materials and products are selected, who is involved in the choices and at what stage these decisions are made. In doing this we will consider whether the current processes can be improved.

Geometric information giving the size, shape and position of components has always been shown on drawings and in models – physical and digital. We have traditionally viewed other project information as a series of distinct documents, chronologically produced and issued. The principal documents in current use are as follows:

Brief
: Client's needs / desires communicated to architect / designer

Outline Specification
: Architect's / designer's concepts communicated to client / design team

Full or Performance Specification (for Tender & Construction)
: Architect's / designer's design intent communicated to contractor

Schedule of Works
: Architect's / designer's design intent communicated to contractor (schedule of construction activities necessary to achieve design intent – usually for refurbishment)

Employer's Requirements
: Client's / design team's design intent communicated to contractor

Contractor's Proposals
: Contractor's intended works communicated to client (pre-construction)

Operating and Maintenance Manual
: Contractor's record of project as built and instructions for its operation and ongoing care communicated to client (post-construction)

Health & Safety File
: Contractor / design team communicate residual risks to client

In general, each of these builds on the information in the previous document, which leads us to the inevitable conclusion that they should be iterations of a single document – the information model.

The brief can morph into an outline specification or a performance specification with the addition of regulatory and other known constraints and / or targets, morph again into Employer's Requirements or a full specification for tender with named products, be adapted to become the Contractor's Proposal, and finally be updated with information from the procurement team to record what was built, and how it is to be operated and maintained throughout the life of the building.

"It is a misconception that the architect specifies everything. Choosing materials, products and systems is a complex process that spans the whole project timeline and involves multiple parties."

Relevant survey statistics →
Most of those involved in the briefing process understand the link between the briefing document and the specification, with 78% agreeing that 'the specification develops out of the briefing document'.

"The new ability to take this elemental or systems approach throughout the specification process is a giant leap forward and ensures that this early stage work can be taken through to the detailed design stage."

Brief

At the commencement of the project, the requirements are determined from a variety of sources. The client's need to accommodate activities may be documented through notes of informal meetings, or more formally using Room Data Sheets. But this is not the only source of briefing information.

Clients who procure buildings on a regular basis, such as Housing Associations, often develop their own specific set of technical requirements – usually borne out of experience (good and bad). Some go as far as having an approved list of suppliers. We know that funders also set down requirements that form part of the briefing process.

For some sectors of work such as healthcare and defence, there are published design guides that set down space standards and that even, in the case of the NHS, list the furniture and equipment that is needed for a particular activity. In addition to these design guides, there are published technical guides that set down the performance criteria for certain elements of the building. For example, the Health Technical Memorandum (HTM) for Ceilings sets six categories of ceilings based on their performance in relation to surface, humidity, fire and cleaning. The guide then states which type of ceiling is to be used in each of the designated activity spaces.

At the end of the construction process, clients need to insure their buildings – for example, in the case of industrial buildings, it may be Factory Mutual (FM). Prospective purchasers may also be looking for warranties such as those provided by NHBC. All of these organisations have gained their own experience of construction through successes and failures and will be particularly keen to avoid the cost of future failures. They each have particular technical requirements that designers must adhere to set down in manuals. Where these requirements are relevant to the project, they need to be incorporated into the project documentation. This is information that could go directly into an Outline or Performance Specification.

Sitting alongside these are other constraints on the project – Regulations, Site Conditions, Codes of Practice, Standards, Local Planning Documents, etc. There are also aspirational targets such as BREEAM and CfSH. These documents set performance requirements that will ultimately form part of the project specification.

In the survey, we observe that most of those involved in the briefing process understand the link between the briefing document and the specification, with 78% agreeing that the specification develops out of the briefing document and 67% agreeing that the brief is the first stage in writing a specification.

Design stage specification

How do we get from concept to finished building? As the design develops, conceptual ideas get firmed up, designers will research materials and systems and offer choices to the client. Decisions are reached by the project team based on a range of criteria, aesthetics, cost, durability, environmental and other performance characteristics as appropriate.

Designers are often influenced by their previous experience of products or systems, or may call upon the wider experience of their practice. In NBS Building, we are used to a tool that allows us to collate all of this practice experience and place it in front of the designers at the point of specification using the 'User Guidance Notes' facility.

Designers' awareness of other projects through the architectural press may also influence the choice of materials. In many projects, the choice of external materials is strongly influenced by town planning considerations. Where detailed negotiations have taken place between the designer and the case office, it is often difficult to determine whether it was the designer or the planner that made the final specification choice.

At the design stage the specifier will identify the different types of wall, roof, floor, etc. that they have on the project. This is done on an elemental or 'systems' basis. Elements that are important to the overall aesthetics of the scheme may get specified to a high level of detail, even for inclusion in an Employer's Requirement document, whereas less critical elements may be left for the contractor to select.

This elemental approach does not sit well with the later CAWS-based approach to full specification. The new ability to take this elemental or systems approach throughout the specification process is a giant leap forward and ensures that this early stage work can be taken through to the detailed design stage.

The Room Data Sheet developed in the briefing process holds the information about the requirements of a particular room or activity. NHS Trusts refer to them as 'Activity Data Sheets'. Usually this is generic information and does not refer to specific products or manufacturers. For example, only generic finishes are indicated, e.g. carpet or lino, and special requirements such as anti-static or slip-resistant. This level of detail is suitable for the Employer's Requirement document but would be expanded to include specific materials and suppliers in a full specification.

As a point of note, where public money is involved in a project, there is a requirement to avoid naming particular products or suppliers in the tender documents. The performance requirements need to be tightly tied down to ensure that any products / materials / systems offered can be properly assessed as equivalent.

Employer's requirements / full specification for tender

The Employer's Requirements document is often seen as a 'Brief+'. So, we ask ourselves, if the Brief has been presented in an appropriate format, can this form the basis of the Employer's Requirements without the need for it to be rewritten? This would also ensure that information was not lost in the transcription.

In the survey we note that for the majority, writing and modifying a specification currently takes place during the developed design and technical design stages of the project (74%

and 91% respectively). There is a concentrated effort during the Production Information Preparation Period to document the decisions that have been made throughout the project and, in the case of a full specification, to make decisions on a myriad of minor products and systems so that the project can be accurately priced and constructed.

This process, that has the specification as a static document produced at a point in time for use as part of the tender / construction information, is now in the past. The present and future is a Specification Model (database) that grows with the project and has multiple uses for the multiple parties involved in the brief, design, regulation, construction and facilities management of the building(s).

In a traditional contract, where the architect is contract administrator, variations and instructions during the construction phase will be picked up as revisions on drawings and in the specification, and updated documents will be issued for construction. This is less likely to happen in a Design and Build scenario.

Contractor's proposals / construction issue

In Design and Build / Private Finance Initiative procurement, Contractor's Proposals are the contractor's response to the Employer's Requirements based on their own experience and choices – normally based on price and past relationship with suppliers. The contractor may have established supply chains and framework agreements with subcontractors and suppliers. A key factor is often whether the same firm can supply and install.

It is not unusual for the contractor to use their own knowledge and experience to offer a solution that differs significantly to the original design intent, based on alternative construction methods and materials. Whilst the employer could decline these, often the consequential cost and / or time savings prove irresistible to the clients. In these instances the specification documents are rarely updated and the information only appears in the operating and maintenance manuals at handover.

Works package specifications

The procurement of specialist subcontractors and suppliers requires a sub-set of the project documentation which relates only to the scope of works applicable to the particular subcontractor or supplier. This was traditionally achieved by the contractor's procurement teams photocopying selected pages of the specification and a selection of drawings and schedules. The opportunities to miss vital parts of the package are manifold and such omissions are costly to reintroduce at a later date.

A more robust approach requires the design teams to assemble tender package information for each of the works packages – a timely and costly exercise that involves much duplication of effort.

Being able to extract relevant information that is tagged within the digital information model would be a much more efficient way of producing the necessary data for the works package contractors to price.

It is not unusual for detailed design and specification of specialist packages to be carried out by the subcontractors / suppliers. This may be a development of outline proposals from the design team. At present the detailed project information produced by these specialists is only captured in the operating and maintenance manuals issued at Handover. This would be more useful to the Facilities Management teams if it was added to the project information model where it could be interrogated.

As-built information / operating and maintenance manuals / health & safety file / facilities management

At Handover the building owner / occupier needs to know what materials, components and systems have been used. More importantly, they need to know how to manage and operate the systems in the building, including maintenance regimes for their continued satisfactory performance, not forgetting cleaning, repair and replacement in the future. The current trend is for soft landings where those who installed the systems help run them for a period of time, until the client gains competence and confidence in their use.

In the survey we note that for the majority, writing and modifying a specification takes place during the developed design (74%) and technical design (91%) stages of the project. Only 5% do this during the Handover and Close-out and 2% whilst the building is in use, therefore the information at Handover is unlikely to be current. This disconnect is a missed opportunity as the FM information is almost a by-product of the

"The present and future is a Specification Model (database) that grows with the project and has multiple uses for the multiple parties involved in the brief, design, regulation, construction and facilities management of the building(s)."

design and procurement process, but unless there is a method for its collection and collation, there is a likelihood that vital information will not get passed on.

It is not appropriate or desirable to load the geometric model with detailed product data, operating, maintenance and safety information. This is best stored in a linked information model / database that can be accessed directly from the geometric model.

Conclusion

We have looked at how project information is accumulated over the project timeline from a variety of sources and how the level of detail increases as final choices are made. We have also seen that this is a continuous process. Much of the information in each document is taken forward and expanded on in the next.

The most important consideration is how to retain this information efficiently so there is no duplication of effort and no loss of information as the project moves forward. Also to allow all parties to input their information and to extract the information they need at any particular point in the project.

NBS has long appreciated the benefits of databases and has used these to advantage in their specification tools. The power of the database lies in the ability to input data in a variety of ways unrelated to output. This can then be sorted and filtered to suit multiple end uses. NBS Create builds on this tradition, recognising the benefit of allowing many parties to input data in a variety of ways and then allowing each to extract this in a format to suit his / her needs. From the survey, we see that specifiers are clear that in the future specifications will be distributed digitally (94%), and will integrate across all disciplines (86%).

In 2013 we saw the introduction of the new RIBA Plan of Work, updated to reflect the complex nature of the construction process and to reflect the differing procurement routes that are now commonly in use. It recognises the need for Project Outputs at various stages of the project timeline. In NBS Create we finally have a tool to build the information model, accessible to the whole project team throughout the whole project timeline. NBS has provided the tool; it is up to the industry to realise its potential.

Andrew M. Jobling
BA(Hons), DipArch, RIBA, RMaPS

Andrew is an Architect of 30 years' post-registration experience. His experience covers various building types including transport, commercial, industrial, neurological and mental health; and most recently – affordable housing, theatres and arts projects. He also has experience of a range of construction methods and materials and procurement strategies.

Andrew holds a Technical Manager role within the practice providing designated technical support, advice and assistance to the whole architectural staff. He also manages the Quality Management System and training needs of the practice, requiring him to keep up-to-date with current legislation, regulations, products, materials and construction practice. Responsibility for dissemination of feedback within the practice, and development of office master specifications further reinforces his knowledge of construction best practice.

Since 1998 Andrew has been a Planning Supervisor, now CDM Co-ordinator, working on projects ranging from £55k to £33m. This was initially where Levitt Bernstein were appointed as designers, but now also includes projects for other architectural practices. Current projects include schools, concert venues, housing and retail.

He also acts as an expert architect on litigation cases involving other practices.

Andrew's external roles include current Chair of Technical Forum (Wren), Member and Former Secretary DIOHAS (Designers' Initiative on Health and Safety), Former Member NBS Advisory Panel (2008-2011), and BSI Committee Member.

Specification Survey: Summary of findings

Jenny Dobson
Market Research
Co-ordinator, NBS

Introduction

In October and November 2013, NBS carried out a research project looking at how the construction industry creates and uses specifications. The research follows previous work carried out in 2011 (the 2011 report is available online[1]) and 2012. We wanted to understand whether specifications have changed, and how people see them developing in the future.

Those who responded came from a range of disciplines, companies, organisation sizes and ages, and were not just those who use NBS specification tools; providing a good sample base. As ever we are grateful to those who took the time to complete the questionnaire and would like to thank them for their time.

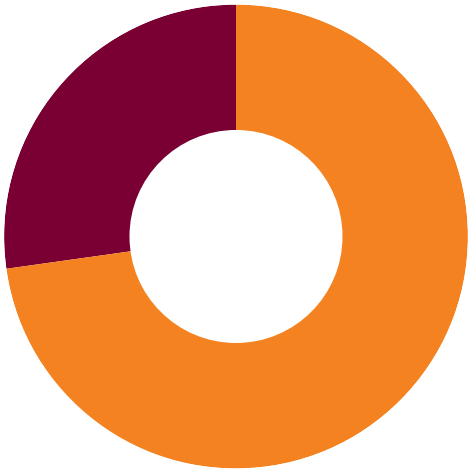
Since the survey has been running, whilst we have added new questions to reflect the changing nature of the construction industry, we have kept a set of core questions that we have asked each year. This allows us to track changes and trends in the industry which we will look at within this report. We hope you enjoy reading it.

RIBA Plan of Work

Awareness of the RIBA Plan of Work is high: 82% are now aware of it, compared to 67% in 2012. Last year we saw changes made to the RIBA Plan of Work[2], leading to the implementation of a new 2013 version. These changes may have led to this increase in awareness. It is worth noting though that this increase is not just within architectural practices; rather it is across the built environment sector as a whole.

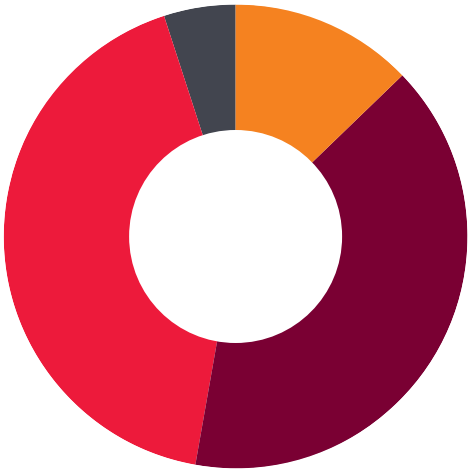
It was important to us not just to explore awareness of the RIBA Plan of Work, but also its use within the industry as a tool to help manage project work across various disciplines. Positively, nearly three-quarters of those who are aware of the RIBA Plan of Work use it to organise their projects.

The RIBA Plan of Work is in a period of transition. Usage of the two versions differs greatly, with around one in ten respondents using only the 2013 RIBA Plan of Work, compared to 42% using only the 2007 version. However, a further 40% are using both versions. Over time, we expect use of the 2013 version of the RIBA Plan of Work to increase. As older projects are completed and familiarity with the new version increases, we also expect to see clients stipulating that the 2013 version should be used. This too will increase its use. We intend to track this in the future.



Do you use the RIBA Plan of Work to organise your work?

Yes	73%
No	27%



Which version of the RIBA Plan of Work do you use?

RIBA Plan of Work 2013	13%
RIBA Plan of Work 2013 **and** Plan of Work 2007	40%
RIBA Plan of Work 2007	42%
Don't know	5%

As we have seen, the RIBA Plan of Work is an important resource for many when organising their project work. But how do those who don't use the RIBA Plan of Work structure their project timeline? Some tell us that they use 'Microsoft Project', whilst others use an in-house system (sometimes loosely based on the Plan of Work), or base it on previous experience of working on other projects. However, some admitted that they don't structure their work. Perhaps they could consider using the 2013 RIBA Plan of Work to do so.

"It was important to us not just to explore awareness of the RIBA Plan of Work, but also its use within the industry... Positively, nearly three-quarters of those who are aware of the RIBA Plan of Work use it to organise their projects."

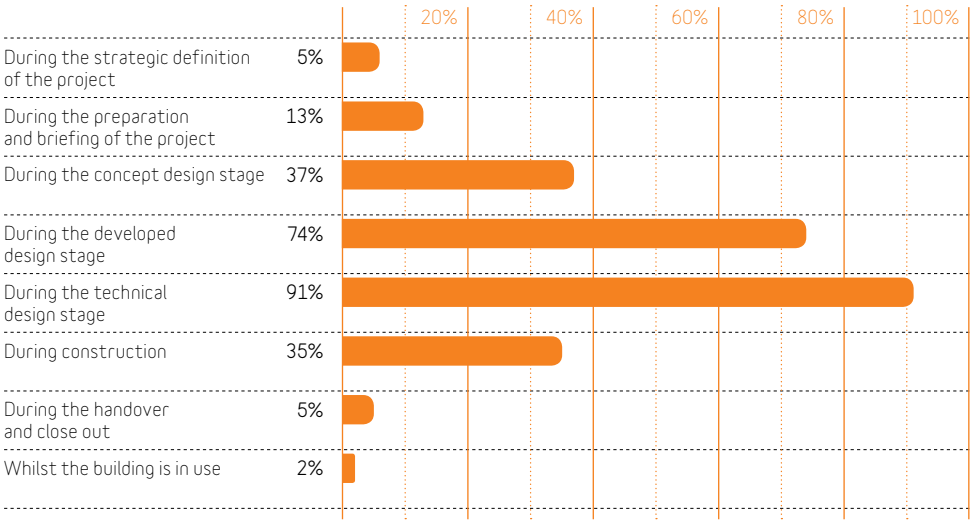
Creating and using specifications

With the increasing adoption of Building Information Modelling (BIM), the 2016 deadline for BIM in publicly funded projects (set out in the Government's Construction Strategy[3]) and the increasing interest in 'soft landings'[4], the construction industry is changing. We wanted to explore the role that specifications have now and in the future. We also looked at how people write and modify specifications throughout the project timeline, from strategic definition to building in use.

Although a minority of respondents write or modify their specifications at both early and late stages of a project, most do their specification writing at the developed and technical design stages.

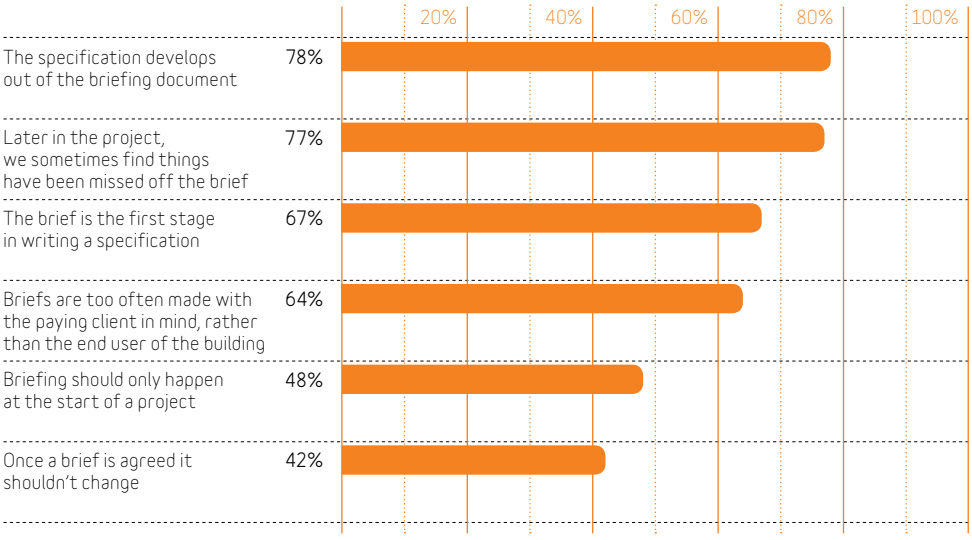
The early stages of the project timeline – the strategic definition and the preparation and briefing of the project – are important for the successful completion of a soft landings project. These stages allow the project team to achieve greater clarity regarding what the client needs and wants from the final building. But what do those engaged in briefing think?

At which of the following stages do you write and modify the specification?



"The early stages of the project timeline... are important for the successful completion of a soft landings project... But what do those engaged in briefing think?"

Attitudes towards the briefing process



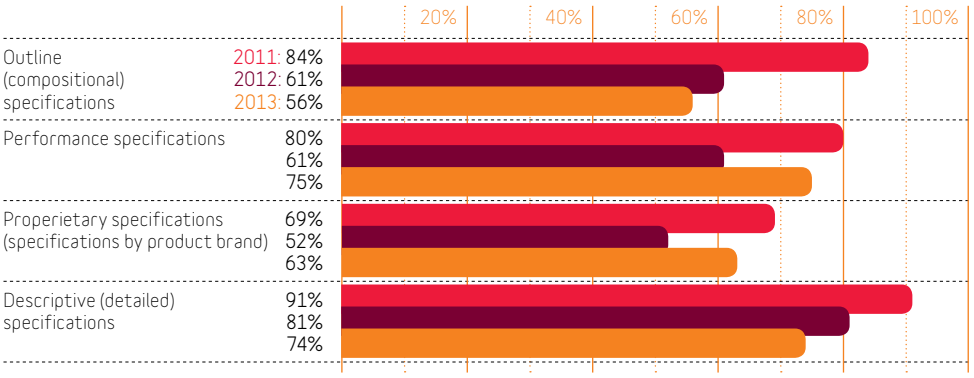
The briefing process

Most of those involved in the briefing process understand the link between the briefing document and the specification, with 78% agreeing that 'the specification develops out of the briefing document' and 67% agreeing that 'the brief is the first stage in writing a specification'. Two-thirds of respondents feel that 'briefs are too often made with the paying client in mind, rather than the end user of the building' – the very people that soft landings are meant to help. This is a concern. However, architects are less likely to put the client second. There is a clear difference in opinion here. But which is the right approach? We would suggest it needs to be a balance between meeting client and end user needs.

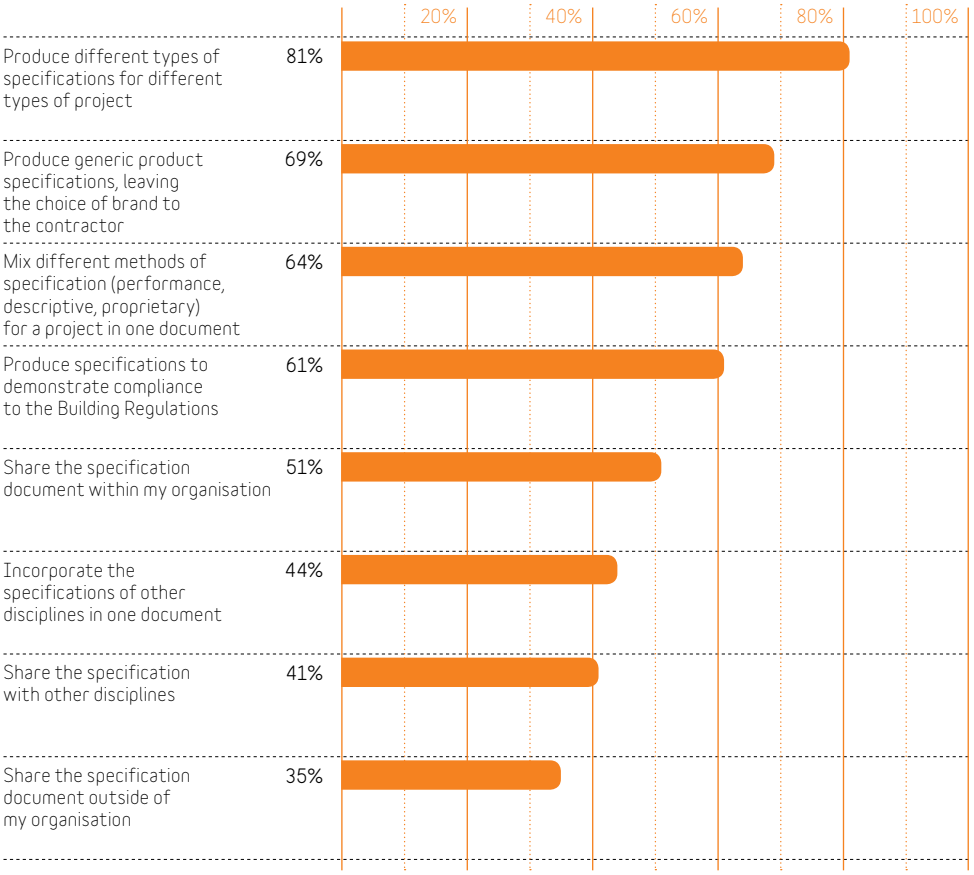
References

1. www.thenbs.com/pdfs/NBS_Specification-Survey.pdf
2. www.ribaplanofwork.com
3. www.gov.uk/government/publications/government-construction-strategy
4. www.thenbs.com/topics/bim/articles/whoisthisgovernmentsoftlandingsabout.asp

Which types of specification do you need to produce?



When producing different types of specification, I need to be able to...



Specification types and processes

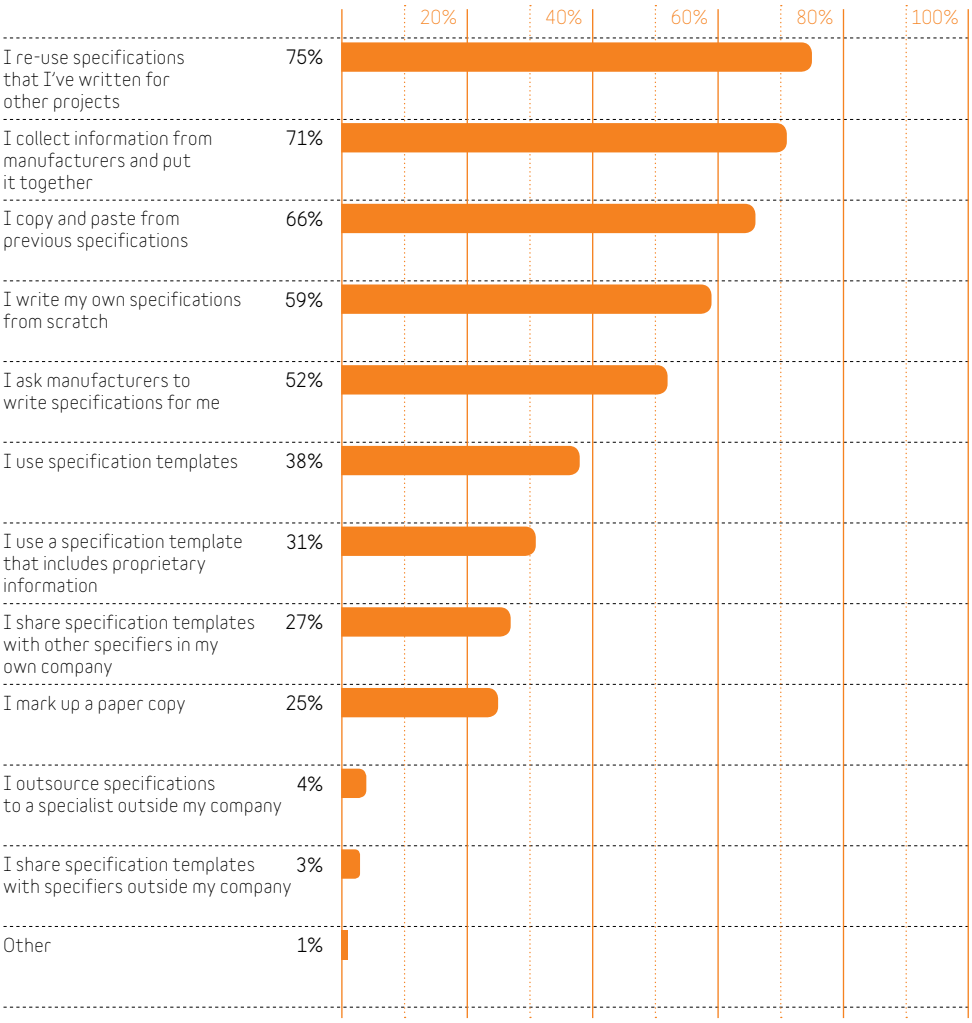
Regarding the types of specification people are producing, there is further evidence that specifiers need to be flexible. There is no one type of specification that they need to produce, with most telling us that they need to produce different types of specification depending on the project (81%). However, in a change from 2012, there has been a shift towards performance specifications, perhaps reflecting increasing interest in and a drive towards sustainability and zero carbon initiatives. There is also an increase in people needing to produce proprietary specifications (specifications by product brand).

Related to the types of specification needed within the industry are the processes used to create them. Three-quarters of the specifiers responding to the survey say that they 're-use specifications that they've written for other projects' – a method that is particularly prevalent amongst younger respondents (aged 18-34). Whilst many of the specifications produced by re-use may be acceptable, they do present significant risks – at NBS we would have to ask whether they are accurate, up-to-date and referencing the correct, current standards. Similar concerns could also be raised regarding the specifications produced by two out of three respondents, which are copied and pasted from previous specifications.

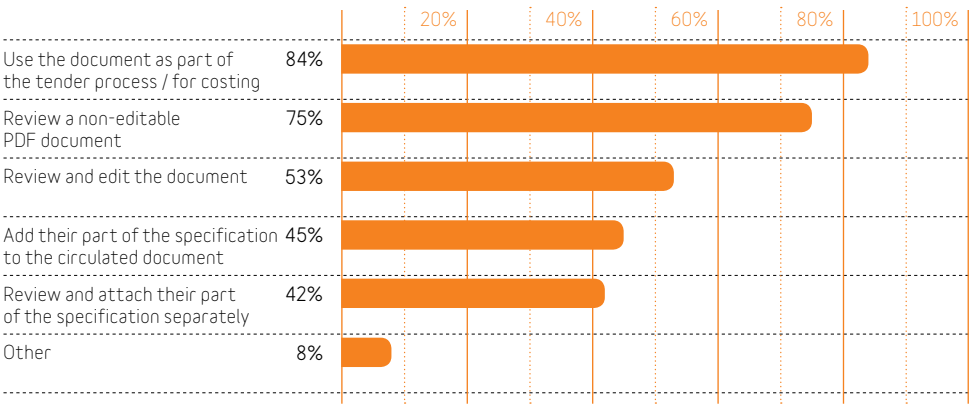
Positively though, more people are now writing their own specifications, whether by collecting information from manufacturers and putting it together (71% do so, compared to just 40% in 2012) or writing their own specifications from scratch (59% in 2013, compared to 39% in 2012).

The processes respondents use when writing specifications is affected by the type of specification that they need to produce. Those respondents needing to produce performance specifications are more likely to ask manufacturers to write specifications for them; presumably to ensure their accuracy so that once it is built, the building achieves the specified performance levels. This choice of specification process could also reflect a lack of confidence in producing specifications of this type, an issue that will be explored further in future research.

Overall, when you write specifications, which of the following processes describe how you do it?



What do you expect these people to do with the information you share?



There are also some differences in the processes used by those producing outline (compositional) specifications. These people tell us that they are more likely to 'ask manufacturers to write specifications' for them; or at least 'collect information from the manufacturers' which they then put together to form the specification. Specifiers, then, are likely to consider the information provided by manufacturers to be essential; they can later expand it into a full specification document. As might be expected, those producing proprietary specifications also rely on information provided by the manufacturer which they then collate.

Collaboration

The Government Construction Strategy includes the intention to require all central Government projects to use collaborative 3D BIM by 2016; therefore, we felt it important to understand the part collaboration plays within creating and modifying a specification. Collaboration, when initially writing a specification, remains low - especially with those outside of the specifier's own company (only 3% share specification templates with specifiers outside of their company, a decrease on 2012 results). However, as would be expected, collaboration is more prevalent when it comes to the specification document produced, with half of respondents (51%) stating they need to be able to 'share the specification document within [their] organisation'. External collaboration is lower - only a third (35%) of specifiers need to share their specification documents outside their own company. But who are they sharing them with and what do they expect them to do with the documents?

We asked respondents to tell us who they mainly share the specification outputs with. Overall, people told us they mostly tend to share the specification outputs with the contractor (57%), the client (40%) and the quantity surveyor (37%); however, there are likely to be differences between disciplines. The people receiving the specification outputs can be further understood by the expectations specifiers have about what recipients will do with the shared information. For the majority of specifiers (84%), the sharing of the information comes at the end of their specification writing process. They expect the specification document to then be used as part of the tender process / for costing.

For larger projects, particularly those involving a shared Building Information Model, collaboration will involve co-ownership and co-creation of specifications. This is a part of true collaboration. This form of true collaboration occurs less often, with less than half expected to add their parts of the specification to the shared document – either as part of the existing document or as a separate attachment.

Specification difficulties

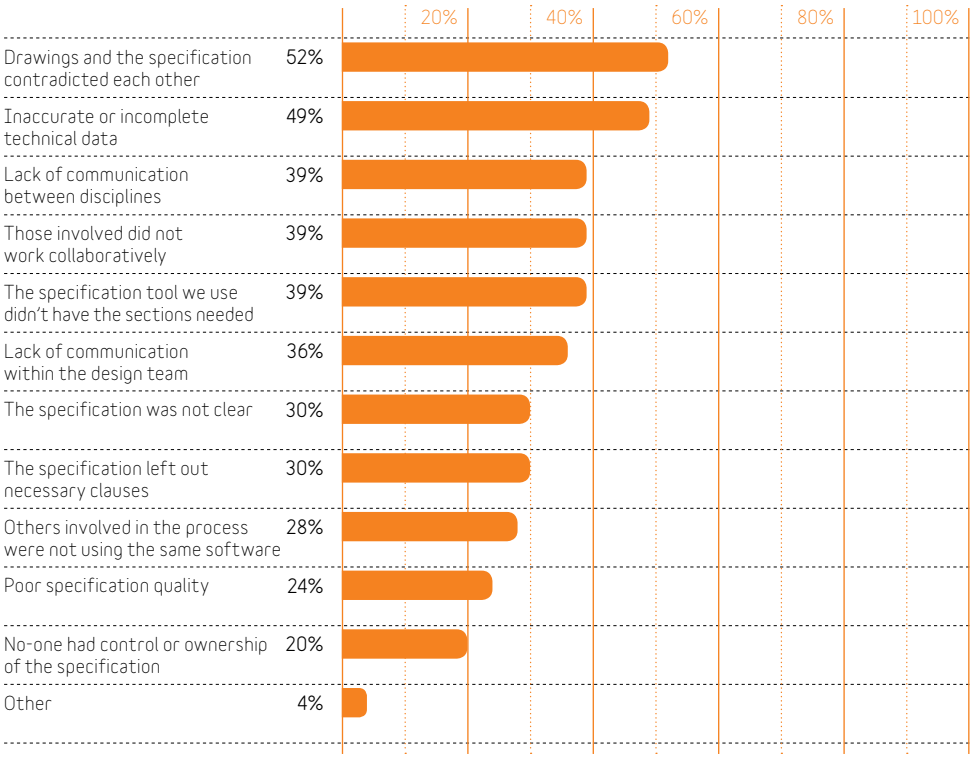
At some stage, nearly nine out of ten respondents (87%) have experienced difficulties when producing or using a specification. For many, difficulties arise later in the process when the specification is being used. More than half (52%) cited difficulties with the drawings and the specification contradicting each other; something that could be resolved by specifications digitally linking to drawings and better collaboration. Collaboration itself was an issue for 39%, along with communication difficulties – especially between disciplines. Younger people in particular tell us that 'lack of communication within the design team' causes difficulties, again suggesting that they feel they need more support when producing specifications.

Of particular concern are the difficulties that half (49%) have experienced with inaccurate or incomplete technical data, in some cases because the manufacturers' information is out-of-date. Alternatively, this could be a reflection of the processes specifiers are using when writing specifications, re-using those they have written for other projects that may contain information that has since been updated. The issue of inaccurate or incomplete technical data must be addressed before the widespread adoption of BIM can become a reality. Accurate, technically complete BIM objects are available from the NBS National BIM Library. The quality of data behind these objects is paramount.

Attitudes towards specifications

When we ran this survey, we wanted to understand not only people's experience of producing and using specifications, but also their attitudes towards and perceptions of them. Unsurprisingly, given the difficulties experienced as a result of drawings and specifications contradicting each other, almost all specifiers (95%) agree that there should be a direct link between specification and drawing documents. At NBS, we have developed tools that provide such a link. Over three-quarters of respondents also recognise the benefits

What caused the difficulties you have experienced when producing or using specifciations?



that a specification that is updated for the life of the building can bring to everyone.

We also looked at soft landings and the extent to which they are facilitated by specifications. Although at present specifications are rarely edited or modified in the later stages of the RIBA Plan of Work (during construction, during handover and close-out, and whilst the building is in use), the concept behind soft landings is recognised. Around two-thirds of respondents (68%) agree that a good specification accurately documents everything 'as built' at the end of the project.

Results again suggest that collaboration is not widespread in terms of producing specifications, with 57% believing that if several disciplines contribute to one document then it creates ownership issues. However, it seems that experience plays a role in this with those aged over 55, who are likely to have been working with specifications longer, seeing this as less of an issue. These negative perceptions of several disciplines contributing to one document need to change before collaboration can be achieved. In future surveys, we will see whether this change takes place.

For 40% of respondents, a standalone specification document is frustrating; virtually all of whom tell us they have experienced difficulties when producing or using specifications. To these people, a specification document that links digitally to other necessary documents (such as 3D CAD drawings) will overcome, or at least begin to address, these difficulties.

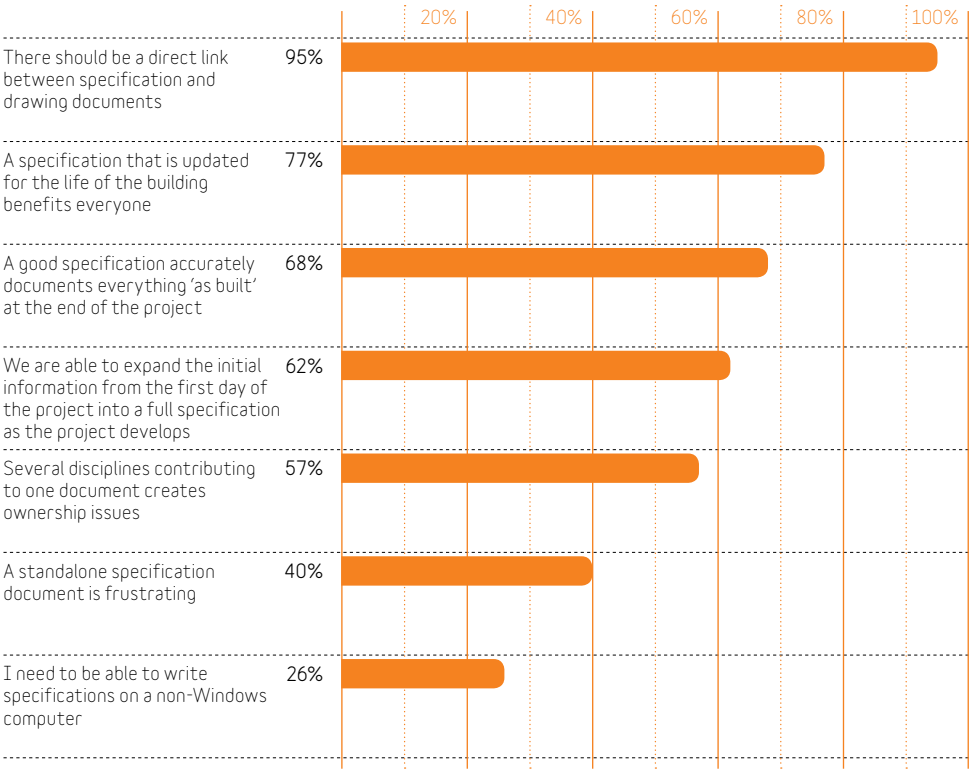
The future of specifications

As well as gaining an understanding of current perceptions of specifications, we also gauged specifiers' views on the future of specifications, and saw how these have changed over the last two years.

Specifiers are clear that in the future specifications will be distributed digitally – no-one disagreed with this statement. The continued need for, and interest in, environmental performance requirements also remains clear, with 89% believing that future specifications will include this information.

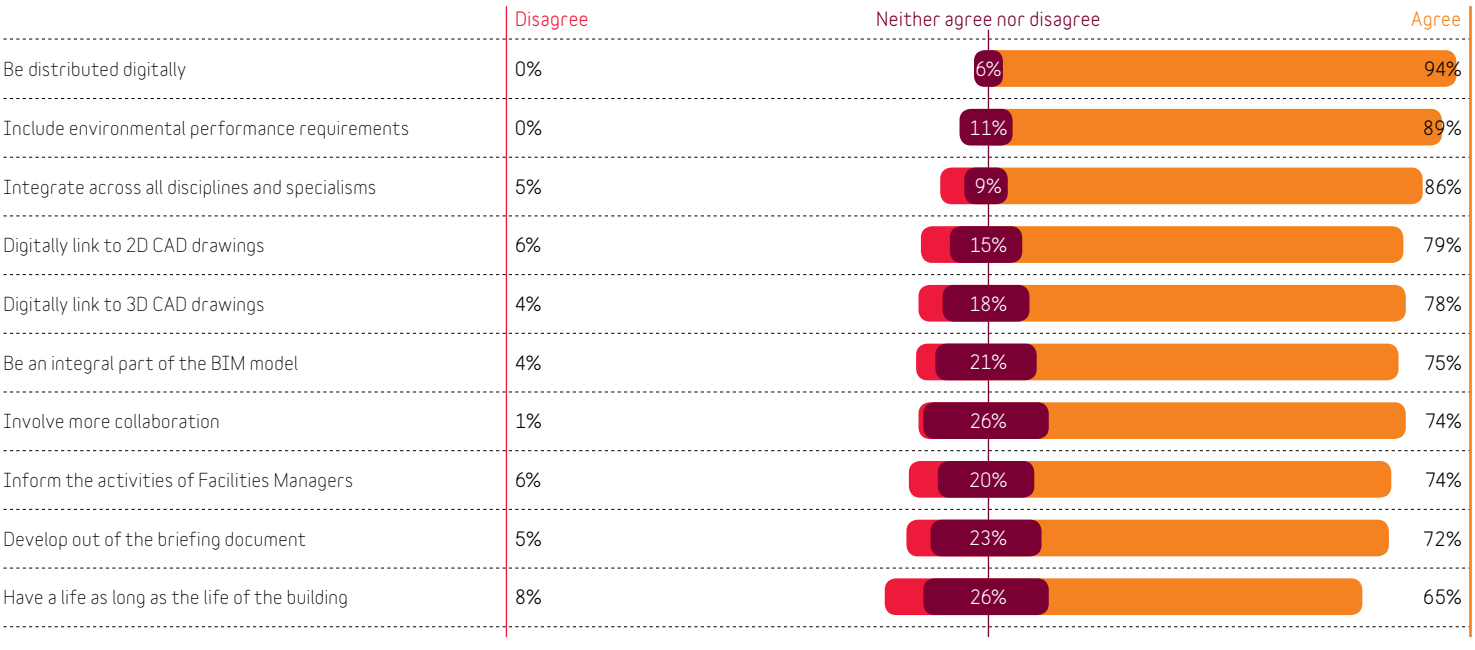
From the chart overleaf, we can see that most specifiers believe future specifications will link digitally with CAD drawings, both 2D and 3D. The proportion agreeing with both of these

Percentage of respondents who, thinking about their experience of creating and using specifications, agree that...



"Of particular concern are the difficulties that half have experienced with inaccurate or incomplete technical data... This must be addressed before the widespread adoption of BIM can become a reality."

In the future, specifications will...



statements continues to grow. In 2011, we made the observation that specifications will be an integral part of the Building Information Model (BIM). It seems that specifiers – especially those working in large practices – increasingly agree with us: three-quarters of respondents (75%) now believe that in the future this will be the case compared to 59% in 2012 and 60% in 2011.

Although there is little evidence of it happening at present, most specifiers (86%) tell us that they believe future specifications will 'integrate across all disciplines and specialisms'. However, perceptions of increased collaboration within specifications are levelling off – 74% agree that future specifications will involve more collaboration – the same as in 2012.

The concept of a lifetime specification is gaining acceptance. We have already seen that some specifiers are now writing and modifying their specifications at all stages of the project timeline. Furthermore, 65% now agree that in the future specifications will have a life as long as that of the building, more than in 2012. In addition to this, nearly three-quarters of respondents believe that in the future specifications will inform the activities of facilities managers (74%) and will develop out of the briefing document (72%).

"The concept of a lifetime specification is gaining acceptance. We have already seen that some specifiers are now writing and modifying their specifications at all stages of the project timeline."

Respondents

The results of this research can be used to provide a good understanding of writing and using specifications within the built environment sector. Two hundred and twenty-nine responses were received in total. Whilst the largest group of respondents described their organisation's type of business as architecture – over a third – there were also significant other types of business, including local or regional government (11%), multi-disciplinary (11%) and architectural technologists (5%). Responses were also received from, among others, architectural technicians, quantity surveyors, contractors, landscape architects, facilities managers and structural engineers.

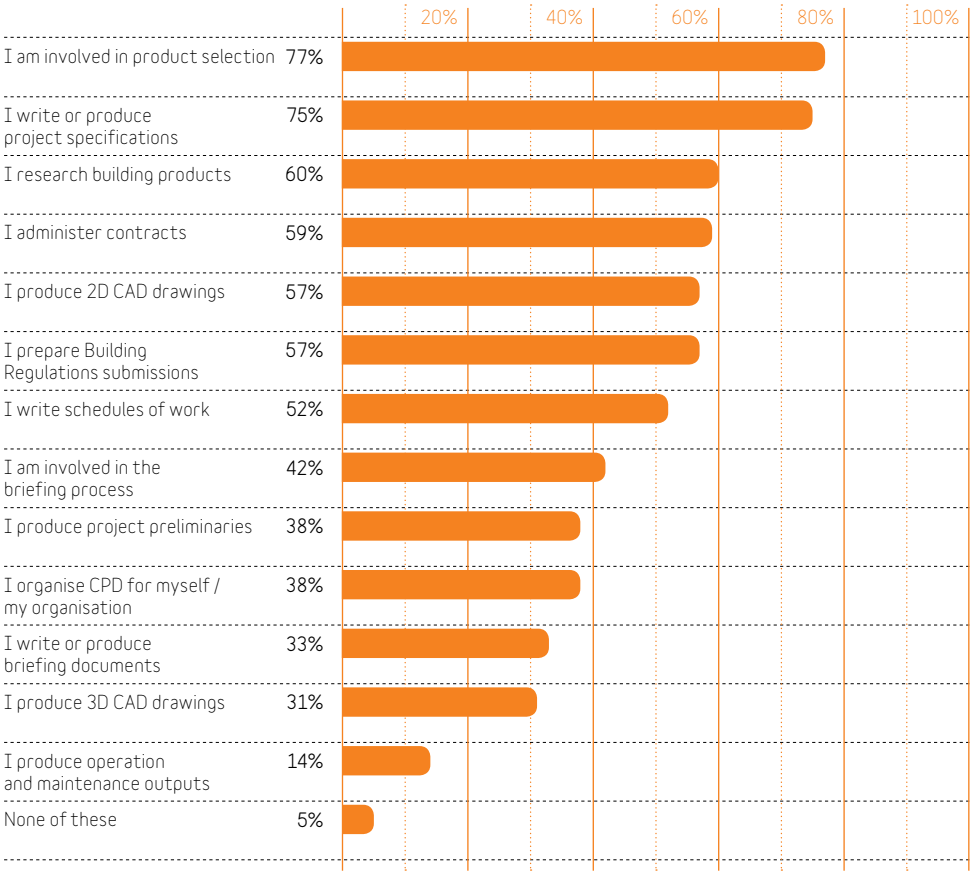
In terms of how they describe their personal role, again most classed themselves as architects (37%). However, responses were also received from, among others: architectural technologists; architectural technicians; building, quantity and chartered surveyors; building services engineers; and facilities managers.

The people who took part in the research told us about some of the tasks they carry out as part of their role. Following a difficult period within the construction industry where many organisations had to scale back their operations, more respondents now report that they are doing many different tasks, suggesting a need for multi-tasking within organisations.

Nearly half of respondents (48%) described their organisation as a small practice, employing up to 15 employees. There were also 40% working in a large practice (with over 50 employees) and 12% in a mid-size practice, as shown overleaf.

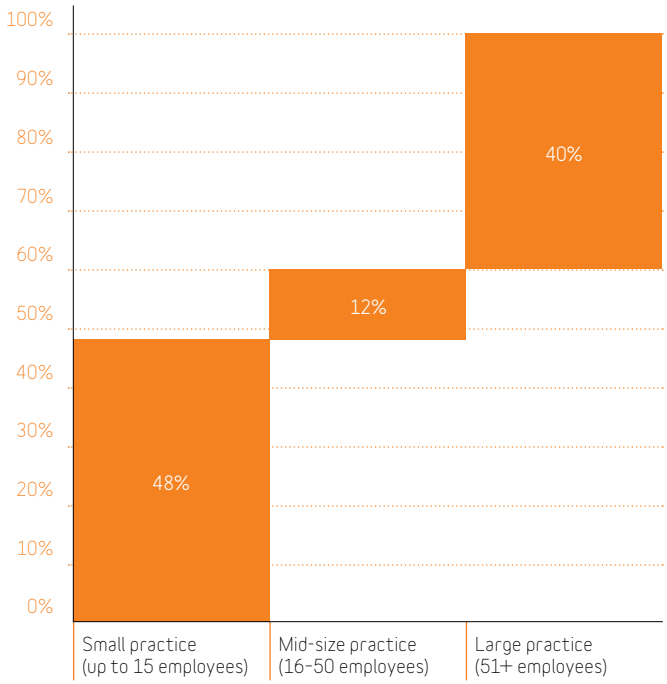
Responses were received from people of all ages.

Which, if any, of the following tasks do you carry out as part of your current role?



"Following a difficult period within the construction industry where many organisations had to scale back their operations, more respondents now report that they are doing many different tasks, suggesting a need for multi-tasking within organisations."

Including yourself, approximately how many people are employed by your organisation?



Closing remarks

The findings of this survey show that the construction industry is in a period of transition – moving from traditional ways of working and specifying to using BIM and increased collaboration. We can also see changes in the use of the RIBA Plan of Work. RIBA released the new RIBA Plan of Work in May 2013. In the six months between its release and this research taking place, 13% of the RIBA Plan of Work users adopted it as their sole Plan of Work with a further 40% using a combination of the two versions. Sole use of the 2013 version of the RIBA Plan of Work is set to increase.

The role specifications play, and the way we create them, is changing. Specifications are no longer only done during the technical design stage: we are now seeing the process begin much earlier and continue into the latter stages. Despite this, there is still a long way to go before specifications have lives as long as buildings, but there is an acceptance that this is where we are heading. Furthermore, this survey has shown that many recognise the benefits lifetime specifications can bring for everyone.

We explored the issue of collaboration when producing specifications. Collaboration means many different things: from sharing a document for someone to review, to genuine collaboration where at least two parties co-own and co-create the specification. This true form of collaboration occurs less often, but at NBS we provide the tools to enable this. As we move towards the Government's 2016 deadline for the use of collaborative BIM in publicly funded projects, we will see this true form of collaboration increase.

There are challenges though. Most people surveyed have experienced some issues when producing or using a specification. Typically these issues relate to inaccurate or incomplete technical data, lack of collaboration, and / or communication difficulties. Younger respondents in particular appear to be less confident when producing specifications, relying more on the re-use of specifications produced for other projects or copying and pasting from existing specifications. This is a practice that may be acceptable, but also presents risks if the information contained within those specifications is out-of-date, inaccurate or not compliant with current standards. This lack of confidence is something that needs to be explored further in the future.

As we saw in 2011, there is an expectation that the future of specifications will be digital. It is a future where specifications are digitally linked to 2D and 3D CAD drawings, form an integral part of the BIM model, and integrate across all disciplines. These digital links and CAD drawings are important, but the quality of data and information behind these drawings is paramount. This is a future that we at NBS are helping to create by providing tools that enable greater collaboration, digital links between drawings and specifications, and high quality BIM objects.

We have shown that while the concept of a lifetime specification is increasingly accepted, it is not yet commonplace, but this is the direction in which the industry is heading. In coming years we will therefore repeat this survey and see what progress has been made towards this digital lifetime specification.

The lifetime specification

John Gelder
Head of Content Development and Sustainability, NBS

Pre-construction specifications	RIBA Plan of Work 2013 Stage			
	0: Strategic definition	1: Preparation and brief	2: Concept design	3: Developed design
Respondents preparing briefs	33%			
Complex, Entity	Strategic brief	Initial project brief		
Activity, Space			Final project brief	
Element, System			Outline specification	Updated outline specification
Respondents preparing specifications	5%	13%	37%	74%

The 'lifetime specification' is a specification that will have a life as long as the life of a building. We have designed NBS Create to support this as we enter the future. It is encouraging that most respondents (65%) to the NBS Specification Survey 2013 agreed with the idea of lifetime specification. Digital distribution will be essential if this is to be achieved – 94% of respondents agreed that this will apply to specifications in the future – and NBS Create is also designed to support this.

It might be better if we called it the 'lifetime model'. The project specification should of course be integrated within the project geometry; 95% of respondents agreed with this idea, perhaps because 52% had experienced conflict between the drawings and the specification and 40% find standalone specifications frustrating. For the future, 78% agreed that specifications would link digitally to 2D or 3D drawings, and 75% agreed that specifications would be an integral part of the model. However, the survey focused on the specification part of the model.

Thus linkage and integration between geometry and specification will become the norm. NBS Create and the NBS National BIM Library are already designed to support this linkage and integration, so it is now up to specifiers to implement it in their projects.

This 'lifetime model' will remember every input (subject to memory capacity of course) – so it can in principle describe any point in the project's past, present, or future. In this article, we look at pre-construction and post-construction specifications in a little more detail. These are the aspects of the 'lifetime specification' that most specifiers are not as yet very familiar with.

Pre-construction specifications

Given that 73% of respondents to this year's survey use the RIBA Plan of Work to organize their projects, it is reasonable to look at the provisions of the parallel RIBA Standard Agreement 2013 Schedules. These have contributions to the Strategic Brief (RIBA Plan of Work Stage 0), the Initial Project Brief (Stage 1) and the Final Project Brief (Stage 2) as standard work stage services. At these stages, one would expect these descriptions – briefs, or early specifications – to be about high-level objects, such as the Complex and its component Entities, and their component Activities and Spaces (hence Room Data Sheets in the Schedules, under Other services). But they would not be about low-level (construction-focused) objects such as Elements, Systems and Products. However, both compositional specifications (i.e. a list of the components of an object, such as the Entities that make up a Complex) and performance specifications would be used.

Most respondents reported that their companies were involved in resolving initial client requirements (Stage 0), briefing (Stage 1), and concept design (Stage 2). Forty-two per cent said that they were personally involved in the briefing process, and one third said that they actually produced briefs.

Most agree that the specification develops out of the brief (78%). Oddly, a slightly smaller number (72%) agreed that future specifications will develop out of the brief – I hope that this will increase in the future, rather than diminish! Sixty-seven per cent agreed that the brief is actually the first stage in writing the specification, and most (62%) agreed that information available from 'day one' can be expanded into a full specification as the project develops.

But contrary to this, very few (13%) considered that they were actually writing and modifying the specification at briefing (Stage 1) and even fewer (5%) at strategic definition (Stage 0). NBS Create is designed to provide a briefing tool for these earlier stages, for example through the specification of Activities and Spaces. This tool will enable mapping or integration between the descriptions of high-level objects and mid-level objects so that briefs and specifications seamlessly flow into each other. The survey responses suggest that at present, in practice, most think that they do not.

This is reflected by their separation in the Schedules at Stage 2, in which another standard service is used for the preparation of 'outline' specifications. In other words, the Schedules formalize a discontinuity between briefs and

Relevant survey statistics →

The concept of a lifetime specification is gaining acceptance… Sixty-five per cent now agree that in the future specifications will have a life as long as that of the building.

"It might be better if we called it the 'lifetime model'. The project specification should of course be integrated within the project geometry… Thus linkage and integration between geometry and specification will become the norm."

Construction specifications	RIBA Plan of Work 2013 Stage	
	4: Technical design	5: Construction
Element, System	Construction specification	
Product		
Element, System — full proprietary		Record specification
Product — full proprietary		
Respondents preparing specifications	91%	35%

specifications. This is not helpful if we are working towards an integrated timeline BIM. This Stage 2 service is followed by the 'updating' of outline specifications in Stage 3. 'Outline' here is used to mean 'preliminary construction specifications' (whereas 'outline' in NBS Create means 'compositional specifications'). These specifications would be about mid-level (construction-focused) objects such as Elements and Systems, but not their component Products. Both compositional and performance specifications would be used.

Rather more respondents (37%) considered that they were writing and modifying the specification itself during concept design (Stage 2), and even more (74%) during design development (Stage 3). This makes sense because at these stages the written description is shifting to deal more with construction – the traditional view of the specification.

Construction specifications

These specifications (RIBA Plan of Work Stages 4 and 5) demonstrate the well understood traditional view and usage (construction) of the specification that NBS has been serving since 1973. Most respondents are specifying in these stages. The survey results can't necessarily be applied to pre-construction and post-construction specifications, because the questions were not specifically about these stages. For example, the responses to 'Which types of specification do you need to produce?' will be mostly geared to the construction specification. It might be worth teasing out this sort of thing in the next survey, within the constraints of continuity from year to year. The Schedules at Stage 4 have a work stage service for 'preparing… specifications sufficient to construct the project', and at Stage 5 a work stage service for 'on-going compilation

John Gelder

John is an architect, and has been with NBS since November 2000. He is currently Head of Content Development and Sustainability. As such he is part of a multi-disciplinary team of construction professionals working with software developers and others, on projects across the company.

John was Module Leader for the Certificate in Architectural Practice (CAP) at the University of Newcastle from 2001 to 2008. He developed Specifying Architecture: a guided learning package, for NATSPEC in 2001.

John authored two editions of Specifying Architecture, for NATSPEC, and is working on the third, for RIBA Publishing. He participated in a TSB-funded research project with Northumbria University and others, called iCIM, which automated the calculation of embodied carbon and other attributes as design decisions were made, through the two-way integration of a building project's BIM geometry and specification. He has also collaborated internationally on a number of projects for the International Construction Information Society (ICIS), most recently a report titled Definition of Specification.

John has experience of building information modelling, through the invention, prototyping and development of the content of a 'BIM-ready' national (UK) master specification system, NBS Create (launched November 2011), and an associated classification system, Uniclass2 (for Construction Project Information – CPI). Recently he contributed a chapter to 'BIM for the Terrified – A Guide for Manufacturers'.

Post-construction specifications	RIBA Plan of Work 2013 Stage	
	6: Handover and close out	7: In use
Element, System – full proprietary	Record specification	O&M specification
Product – full proprietary		
Respondents preparing specifications	5%	2%

"As BIM becomes more widely adopted, we can expect to see better integration across the construction / occupancy boundary – essential if we are going to see the 'BOOM' of 'BIM-BAM-BOOM'. So it rather looks as if we all agree that specifiers at large should do more towards achieving this stage. "

of As Constructed Information', which logically would have to include the record specification.

Post-construction specifications

Sixty-eight per cent thought that a good specification would accurately document everything 'as built' (i.e. the record specification). This would be completed at the end of RIBA Plan of Work Stage 6, which 75% of companies were involved in. Many specifiers allow the contractor to make proprietary selections and these decisions have to be delivered through the record specification. The record specification should also show any changes made to the specification at this stage (rather than them being surreptitious). The conclusion is that the contractor is best placed to produce the record specification. This is not normally current practice but is something NBS Create enables, if the specification is handed to the contractor in digital form and the contractor has access to the software.

A good number of respondents (47%) reported that their companies were involved in the operation and maintenance (O&M) stages of the project (RIBA Plan of Work Stage 7). More (77%) agreed that a 'specification that is updated for the life of the building benefits everyone'. However, 64% thought that briefs don't consider the end user often enough. This suggests that more has to be done to 'close the loop' between briefing and occupancy, something that NBS Create might be able to help with in the future (e.g. through a 'specification that learns'). As for the future, 74% agreed that specifications will inform the activities of the facilities manager.

The Schedules don't mention specifications in services for Work Stages 6 and 7. Under 'Other services', we have compiling O&M manuals and preparation of 'as built' drawings (but not specifications). Under 'Special services', we have 'make changes or corrections not arising from any failure of the Architect / Consultant', which might be taken to include preparation of a record specification. But in essence, the Schedules assume that the specification has no life beyond Stage 5.

Reflecting this, only 14% of respondents produced O&M outputs, and a mere 3% 'mainly' shared the specification with the facilities manager. At project handover and completion, only 5% modified the specification; fewer (2%) while the project is in use. This is partly down to the current roles that the survey respondents have. As BIM becomes more widely adopted, we can expect to see better integration across the construction / occupancy boundary – essential if we are going to see the 'BOOM' of 'BIM-BAM-BOOM'. So it rather looks as if we all agree that specifiers at large should do more towards achieving this stage. Meanwhile, NBS Create can help right now: a record specification can be handed on to the building owner, in digital form, and can be used by that owner if they have access to the software.

This continuity is essential for maximizing the benefits of BIM.

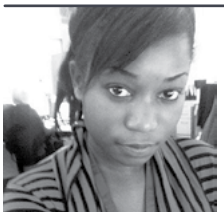
At these final stages the BIM specification would hold compositional, performance and proprietary specifications for all objects right through the object hierarchy, from the complex down to the products. But on a day-to-day basis during occupancy, the proprietary specifications for systems and products would probably see the most use.

For more about the use of the model (and specification) through the project timeline, refer to **BIM for the Terrified** (CPA, 2013), and on the occupancy stage in particular see **Record and operational BIMs** on **www.theNBS.com**

Specification Survey: The student perspective

Elisabeth Matuki
Alex Nesbitt
Nick Ivill

Each year, NBS offers a small number of student placements to those studying towards a career in the built environment sector. This year we have two student placements who are both on the placement year between the second and third years of their undergraduate degree. Additionally, we have another student in the final year of his undergraduate degree working with us part-time. We thought that, given the differences the survey highlighted between younger and older people's opinions and experiences of working with specifications, it would be interesting to get their views on the survey results, specifications and the challenges of working with them. Here's what they had to say.



Specification knowledge and difficulties

Elisabeth Matuki, Technical Team Student Placement, NBS

As students, we have been surprised by the fact that specification is not always taught, or at least not in any depth, on architecture-related university courses. Many students only start to learn about specifications when they begin a work placement or enter the industry. But is this an issue?

Looking at the results from the NBS Specification survey, I would suggest that it is. The majority of people surveyed (75%) told us they re-use specifications that they have written for previous projects. Younger people in particular told us that they produce specifications in this way. A reasonable explanation for this approach is that younger respondents (who are for instance graduates, students or employees new to producing and using specifications) do not have enough knowledge in this area.

Difficulties in writing and producing specifications are not unique to younger people. Nearly nine out of ten people responding to the survey have encountered difficulties while using or producing specifications. The fact that people are still having difficulties even while in practice comes as no surprise: specification has never been taught much, at undergraduate level or anywhere else. I would suggest part of the issue is that courses are not providing students with sufficient knowledge across all elements of a very broad subject (specification), and as a result students who graduate or those who have just entered the construction industry will not be fully aware and ready to specify.

Specifiers learn in practice from older, more experienced specifiers, as one would expect. Undoubtedly, all students working in a construction practice who are exposed to specifications will have the opportunity to learn how to write them. Furthermore, they will come to understand how specifications work and more importantly, their function, place and use within a project timeline.

Before coming to NBS for our placement, we knew very little about what specifications really do and how important they are; the same applies for the RIBA Plan of Work. As students, we have not been taught and informed enough about what we are expected to know once we get into practice.

Having spoken to construction professionals who regularly give talks on specification to Part 2 architectural students, it seems we are not alone in knowing little about specifications. These construction professionals have come to the conclusion that serious collaborations need to take place between the construction industry and universities. It is important that both architecture and architectural technology courses cover specifications in more detail. It would be a good idea for universities to try and get more visiting speakers, perhaps from NBS and other construction companies to help increase students' knowledge of specification.

As an Architectural Technology student, I believe that the in-depth study of construction technology and detailing, and the incorporation of specification modules into university courses, is crucial. Even if it doesn't solve all of the problems that people experience when producing and using specifications (maybe some will never be prevented), if it solves some of them then it will help save valuable time. They could then spend their time more productively, dealing with the unavoidable difficulties that occasionally arise when producing and using specifications in practice.

Elisabeth Matuki

Elisabeth is currently on her placement year between the second and third years of her BSc in Architectural Technology from Northumbria University. For her placement year she is working at NBS, within the Content Development Team. Throughout her placement year Elisabeth hopes to enhance her skills and contribute towards the work of NBS.

What are the challenges that graduates face when entering the construction industry with no specification knowledge?

Alex Nesbitt,
Market Research Assistant,
NBS

A major recurring theme of previous student surveys is that students lack the knowledge and understanding of what specifications are; their importance; and how they are produced. Findings from the NBS Specification Survey are no different. They demonstrate a lack of confidence in producing specifications, especially among younger people.

But why do they lack confidence? In 2013, NBS undertook their second annual Student Survey. The survey was sent to students across multiple educational institutions within the UK, investigating topic areas taught as part of their courses including specification and BIM. The responses showed that only 15% of students were taught about specification. These responses raise the question: What are the challenges that graduates face when entering the construction industry with no specification knowledge?

Before entering the construction industry (or any industry for that matter), you must be employed. The biggest barrier to graduates gaining employment is not having enough 'real world' experience. Specification writing is a vital skill for any Architect or Architectural Technologist; the more skills you gain, the more employable you become. In my experience, having a fundamental knowledge and understanding of what a specification is and the role it plays within a project is crucial. Once I began to understand these concepts, it unlocked many hidden doors and allowed me to piece everything together.

In my experience and understanding, specifiers are required to have three sets of skills: contractual, technical and editorial. Contractual skills relate to the pivotal role that a specification plays within contract documents. Technical skills relate to the appropriate levels of quality for a given project and how these are best communicated to the contractor. Finally, the requirement for editorial skills – the specifier must ensure brevity, accuracy and consistency whilst removing redundant information and avoiding repetition. An understanding of these requirements will provide a good starting point for producing a good specification, which in turn can save time, confusion, frustration, money and (occasionally) reputations.

As the specification is an essential contractual document for communicating the design intent to the contractor, it is important that the fundamental principles of specification are still taught as part of architectural and architectural technology degrees and architectural technician courses. Or is it?

In order for a graduate Architectural Technologist to gain Chartership, they must show competence in a number of underpinning areas. One of these areas is specification. The applicant must demonstrate sufficient knowledge and provide evidence of drafting a prescriptive technical specification and defining performance specification requirements. If the applicant has completed a degree accredited by the Chartered Institute of Architectural Technologists (CIAT), they will be exempt from having to prove underpinning knowledge. Will Chartered Architectural Technologists that have followed this route really be competent, or will additional training be required?

In an increasingly complex construction industry, with changing methods of procurement, there has never been greater pressure to prepare high quality contract documentation, including the specification, within a short timeframe. Time is money, so in a competition between Mr Bloggs, who can write a specification to a good standard, and yourself, with a basic understanding, Mr Bloggs will win.

Alex Nesbitt

Alex first started working for NBS in 2012 on a student placement within the Research, Analysis and Forecasting team. He is currently working part-time at NBS whilst completing his BSc in Architectural Technology at Northumbria University.

Alex has particular interests in Passivhaus design, BIM (Building Information Modelling) and is considering undertaking an MSc in Building Design Management and BIM.

"Responses showed that only 15% of students were taught about specification... Before entering the construction industry... you must be employed. The biggest barrier to graduates gaining employment is not having enough 'real world' experience."

Relevant survey statistics →
Younger respondents in particular tell us that 'lack of communication within the design team' causes difficulties, again suggesting that they feel they need more support when producing specifications.

The future of specifications

Nick Ivill,
Market Research Placement,
NBS

Speak to those in academia or the construction industry and you might pick up on a general feeling that young graduates and professionals, year on year, are equipped with less of (what you might call) the 'traditional skills'. Graduates do have a lot of skills – just not skills that the industry is fully embracing yet. The evolution of the modern-day construction student is in the middle of one of its biggest changes in decades. This means considerable changes to the skills students are learning and developing at degree level; a prime example being the teaching of 3D modelling techniques in place of 2D CAD, which itself had replaced the teaching of hand drawings. Could specification writing as a skill be next?

Specification writing is a key part of the building design process and is a skill needed by graduates in industry. So what is the future of learning specification writing as a skill? A look at future expectations of the built environment sector may give an answer.

One of the biggest developments in the built environment sector, now and in the future, is Building Information Modelling (BIM). The NBS National BIM Report 2013[1] showed that 93% of respondents believe that they will be using BIM in 5 years' time. This indicates that BIM is here to stay, and so will influence the skills students come to acquire.

BIM has been backed by pretty much all areas of the construction sector. Government strategy and initiatives are about embedding BIM, both in the UK and globally. Industry leaders and experts in BIM, including NBS, are leading the BIM revolution. Academia also has a role to play in the delivery of BIM. Northumbria University was amongst the first to adopt BIM and is now reaping the rewards. The work being done, both by its affiliate the BIM Academy and some of its graduates in the industry, should be endorsement enough of the benefits of embracing BIM.
The future generation of professionals must be BIM-literate, so the prioritised learning of BIM is fundamental for the development of the industry.

The specification survey results show an expectation from the industry that specifications will be an integral part of the BIM model in the future (75% believe this), or that it will at least digitally link to CAD drawings – 2D and 3D. As a student, I share these views. Specifications are moving into a new age, a future in which they are an integral part of BIM.

This could explain why universities are no longer teaching specification as a separate discipline. In the future specifications will be an integral part of the information model. After all, the specification is the non-geometric 'Information' in the Building Information Model. The need for communication between all the elements of the BIM means that the skill of specification writing isn't separate from the skill of creating and developing the BIM. Specifications and the BIM will be inseparable; this is predicted and supported by the findings of the survey. This will be a change away from traditional methods of specifying.

NBS is leading this change. Geometric data and specification information are integral parts of the BIM. With new tools and information, NBS is making it easy for the BIM to link to and verify the specification and geometric information. NBS Plug-ins and links between software such as NBS Create and Autodesk Revit are the first stages in linking together the pieces of the puzzle. The award-winning NBS National BIM Library and its objects are another example of how they are looking to do this. NBS is pioneering in the industry and has seen that in the future there may not be room for both a separate specification and a model, but that the two will be integrated within a BIM.

Specifications are about so much more than just proprietary information and links to CAD models. Key information about performance, standards, workmanship, legal requirements and prelims/project management all form part of the specification document. Therefore, specification writing as a skill should not be lost: rather, it must find a new home in a BIM-dominated world.

I would suggest that both universities and companies consider the gap between the 'BIM train' and the 'traditional methods platform', and make sure that some skills and key information aren't lost in the gap or left behind completely. This is happening in the best institutions, which are equipping their students for the changes we will see in the construction industry. New skills are needed, and who better than graduates to provide them? ●

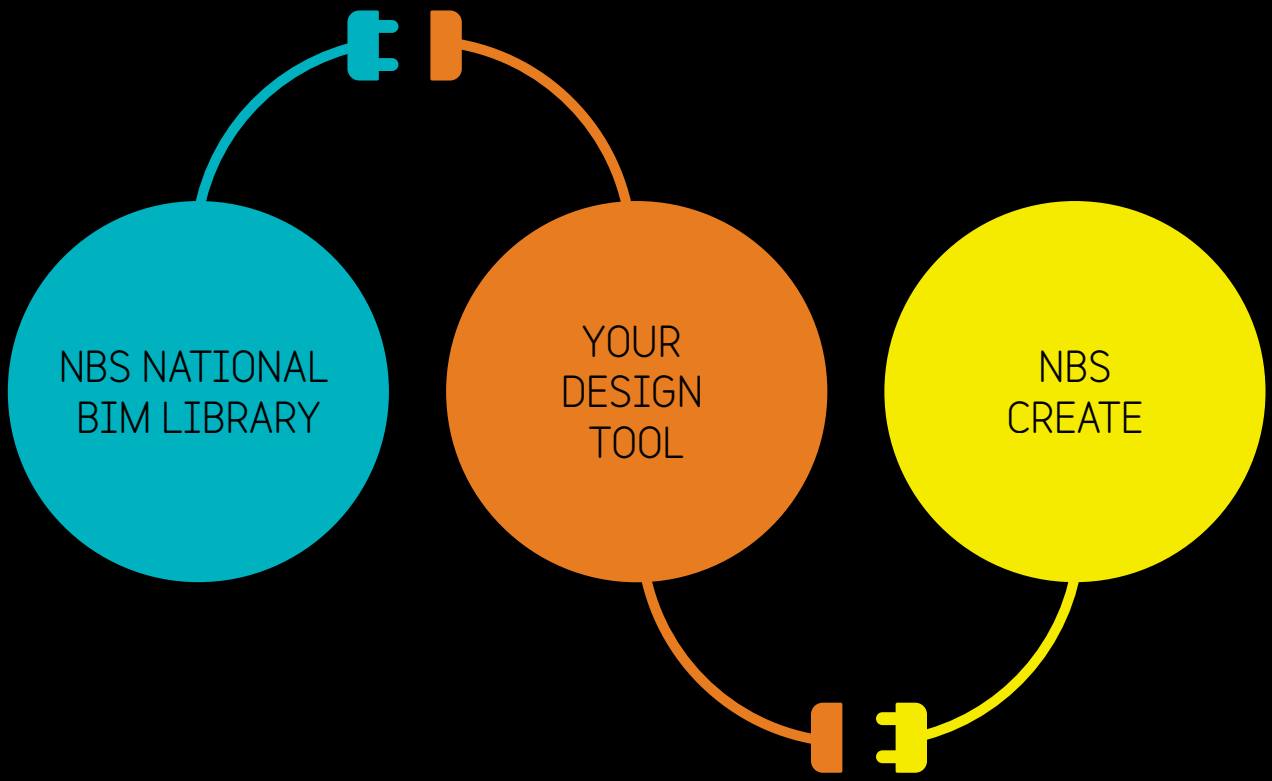
Nick Ivill

Nick is currently working with NBS on a student placement within the Research, Analysis and Forecasting team. He is currently studying towards a BSc in Architectural Technology at Northumbria University.

References
1. www.thenbs.com/pdfs/NationalBIMReport2013.pdf

Notes

Your solution for a co-ordinated BIM



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