European Schoolnet IWB Working Group

IWB Procurement Guidelines Report

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1 Introduction

Objectives

European Schoolnet (EUN) has commissioned EdICTs to explore current practices associated with the procurement of Interactive Whiteboard technologies (IWBs) across 13 European Ministries of Education, and to make recommendations for how IWBs should be procured.

The recommendations are intended to reflect the challenges and requirements reported by participant IWB suppliers and Ministries of Education, as well as EdICTs' own expertise in this field.

The scope of this report is broad, as are the range and scale of potential projects and procurements it may be used to support. It is designed to inform decisions of individual schools wishing to provide small numbers of devices into existing learning spaces, larger scale school refurbishment and building programmes and regional/national initiatives providing large numbers of devices alongside or separate to ICT infrastructure developments.

Users of this report MUST seek legal advice from within their own organisations, before embarking on any procurement programme, to ensure they are operating within national or local guidelines and jurisdiction.

The next section provides guidance on how to use the report, depending on the scale and nature of procurement planned.

How to use this report

The report sets out recommendations for the procurement of IWBs, from the inception of a programme, through the development of an educational vision, assessment of schools' readiness, functional and technical specification, the procurement process itself, and the installation and commissioning, together with considerations for training and other factors that are important to the success of the exercise.

These recommendations are based on the experiences of EUN member countries' Ministries of Education and vendors in the IWB market. This is supplemented by knowledge and experience of the procurement of schools' ICT that EdICTs has developed over many years of working in this field, both in the UK and internationally.

It is intended that the report should provide a useful focus for continued development and discussion of a collective approach to procurement, for the members of the IWB working group, as well as a practical guide to running a procurement exercise.

The approach required will depend on the scale and nature of the procurement. The process recommended in this report follows the requirements for an Open Journal of the European Union (OJEU) level procurement, using a Competitive Dialogue route. Smaller projects may not need to follow this process in full:

indeed, different countries and local, decentralised decision makers will have their own procurement thresholds which will determine what level of process must be followed. However, many of the considerations and recommended processes within this report will be applicable; whatever the scale of the procurement being planned and will ensure that it is based on sound, pedagogical decision making.

The report is presented in sections, which relate to the stages of a procurement exercise, and can be read as a whole, or referred to in sections relevant to the user's specific requirements. These are outlined below, with accompanying guidance on their use.

Methodology and findings

This section should be used prior to a procurement exercise. It provides information gathered from the IWB suppliers and EU Ministries of Education, as well as an overview of IWB technologies in terms of their pedagogical affordances and functionality. This information could be used to inform early decisions about the aims of the procurement and the production of an educational vision. Where the term IWB is used, this includes both fixed and mobile solutions.

Functional specification

This section supports the first stage of the procurement process and begins with the creation of an educational vision. Informed by knowledge of the pedagogical affordances (from Section 2), the educational vision forms the foundation of the procurement, providing clear educational aims and objectives for the provision of IWBs. The functional specification articulates the vision as a series of educational aims and objectives, including the perceived positive impacts on learning and teaching. These focus on the learning and teaching opportunities provided by IWBs to pupils and teachers. The focus remains educational, rather than technological. The functional specification dictates the content and pace of the procurement, including the context, requirements and support needs, and, as such, is key to its success. It also provides a means by which to evaluate the success of the procurement at the end of the project.

Recommendations for the scope of the vision and functional specification are provided.

Assessment of readiness

This section makes recommendations about how to assess schools' readiness to adopt IWB technologies. This is a vital stage that helps to maximise the positive impact of IWBs on learners and teachers. It ensures there is a clear picture of the current context of the school/s involved and their readiness to adopt IWB technologies. It can be achieved through a process of review in the schools. This section provides recommendations about how to carry out a review. The outcome of the review should clearly identify areas for development and a plan or strategy for how to make improvements in these areas. The areas for development should relate closely to the stated aims of the educational vision.

Assessing the readiness of schools follows the production of the educational vision, which details the intended pedagogical developments that the procurement brings about. These intended outcomes are used to inform decisions about whether or not schools are ready to embrace developments in pedagogical practice and culture. Without this assessment, procurements may not achieve the educational outcomes expected.

Technical specification

This section supports the process of producing the technical specification that is developed directly from the functional specification. The technical specification interprets the functional information in order to provide a set of specific technical requirements that can be procured. It does not dictate specific products or vendors, as this may limit the educational outcomes and may not conform to European legislation. Ideally it should not specify or define types of product (e.g. IWB technologies) in a way that may limit competitive tendering or innovative responses.

The technical specification takes into account the wider context of the procurement. It includes information about any integration requirements in terms of existing ICT equipment and infrastructure, other ICT projects and procurements and/or building or refurbishment projects going on in the school simultaneously. It also covers the training, CPD, resources and technical support needed to ensure the project is sustainable.

Recommendations for the areas to be included in the technical specification are provided.

Procurement guidelines

This section provides a comprehensive guide to managing the procurement process and how to ensure that is it legal, fair, competitive, transparent and consistent. It provides guidance on how to ensure suppliers are able to present their capabilities effectively, and how to ensure that the educational objectives are met in the most robust, sustainable, economical and innovative manner.

The procurement process supports the project from establishing the need, through managing the procurement, developing the design and implementing the solution.

Type of Procurement

The first priority is to establish the level of procurement to be carried out. For example:

- Will it be national or local, large or small scale?
- Will it be a one off programme or a sustained exercise over an extended period of time?
- Will it be part of a larger capital build programme, or related to established national or local ICT funding streams?

- Is the market for IWBs in any particular country or region mature or evolving?
- How much experience or knowledge relating to effectiveness of IWB technologies already exists?

There will be some basic foundations for procurement:

- Procurements must follow EU law; anyone from the EU must be able to tender if the procurement is above the contract value threshold, unless a closed or framework contract marketplace is developed.
- If a programme is national, large and sustained over time, it may be sensible to develop a contract framework, in order to dictate minimum standards, regulate the way in which commercial organisations can operate in the market, and provide opportunities to evaluate the work of contractors (as in the UK Becta example)? If this is deemed desirable, then:
- The framework renewal frequency and the point at which framework conditions need to be removed to allow a free market has to be determined:
  - If a free market situation occurs, are there other considerations that can help inform and qualify buyers' decisions – i.e. a 'Which' guide?
  - Within a free market the provision of a 'Which' Guide/Amazon rating system can help inform and qualify buyers' decisions.
  - In a mature market, allowing an open/unrestricted market can support, stimulate and maximise innovation. In this case, the procurements should be written with educational objectives in mind rather than being based exclusively on technological specifications

Installation, commissioning and testing

This is a vital part of any deployment process, as it ensures that procured systems work according to the expected functionality and that they deliver value for money. Scopes of Work and contracts stemming from any tendering process should ideally include a requirement to test systems before sign off by a client. Testing and commissioning can then also support development of Service Level Agreements (SLA), which in turn guarantee outcome and appropriate levels of ongoing support (see below) to ensure sustainability of outcomes.

Support

This section outlines the post-procurement support that can be expected from a vendor, which is crucial to the success of any project. The nature of the support required is explained including initial training, ongoing CPD, access to resources, provision of a community of practice and technical support or maintenance. This is a vital element of the procurement and should not be overlooked. It is often the 'winning' factor in any educational ICT deployment exercise, since it embeds

use of the technology and ensures successful delivery of required functional outcomes.

An important element of any SLA for example, will be agreed parameters for Technical Response times (which must be a guaranteed extra to any regular *scheduled* technical support sessions). These are crucial, particularly for immediate, unexpected technical failures, which prohibit important functions in schools and other educational institutions.

2 Methodology and findings

A programme of stakeholder engagement was devised in order to inform the development of the recommendations. The stakeholders comprise four IWB suppliers/manufacturers (eInstruction, Mimio, Promethean and SMART Technologies), and 13 Ministries of Education that are participating in the EUN's IWB Working Group[1].

This stakeholder engagement programme consisted of telephone and desk-based interviews with representatives of the IWB suppliers and a selection of the MoEs, together with questionnaires issued to Ministries of Education. Case study material and other desk-base research supplemented the stakeholder engagement programme.

This report summarises the range of opinion expressed by industry and MoE stakeholders throughout our consultation.

Aims of Stakeholder Engagement

The stakeholders were identified early in the project, as belonging to two groups:

1. Industry representatives (suppliers of IWB technology)

2. Ministries of Education (drawn from the 13 members of the EUN IWB working group).

Our objectives are twofold: Firstly, that we understand the range of procurement practices currently operating within Europe; secondly, that those stakeholders wishing to influence the direction of the programme are given adequate opportunity to do so.

Summary of Key Stakeholder Concerns

Following our programme of stakeholder consultation, a number of key concerns and challenges were identified. These are presented in the following paragraphs.

Key findings from consultation with Ministries of Education

We encountered strong support for the programme's aims, and our approach, from the MoEs who agreed to take part in our consultation. Key findings include:

- Ministries across Europe vary in their current level of adoption of interactive classroom technologies, and in their approach to procurement.
- Several respondents pointed to the way in which the UK example (being an early adopter of interactive technologies through the Becta Frameworks) has helped to shape their understanding of the challenges and possibilities for procurement programmes in their own countries. Becta has been a useful source of information and guidance for other EU ministries.

[1] http://moe.eun.org/web/iwbworkinggroup/iwb

- Several respondents suggested that European Schoolnet could provide a useful guidance function following the dissolution of Becta, but that this should be focused on issues of collective importance, such as interoperability standards.
- Ministries have adopted a range of procurement methodologies, which reflect their unique contexts and requirements. It seems unlikely that one defined procurement methodology will be useful within all of these contexts, yet clear guidance of the key considerations will benefit all parties. Few were able to articulate a full and considered approach to the procurement of IWBs specifically that included educational visioning, evaluation of school readiness, training requirements and so on.

Key findings from consultation with IWB Suppliers

- Suppliers report having encountered a variety of approaches to procurement across Europe. Suppliers are able to adapt and meet the needs of local context, and do not require a single centralised approach.
  - Most suppliers reported a view that there is room for both open and restricted procurement procedures. Restricted procedures – such as Becta's Consultancy Services Framework – can help in an immature market, or with immature technology, by imposing particular standards. However, once the market and its associated technology matures, such procedures can exclude potentially beneficial competition, and innovation, and create a false price market. Also, to overcome prohibitive frameworks that prevent new providers entering the market, a system of approved suppliers means these suppliers can still accommodate new products by working with the providers of the products.
  - The consensus is that the most important aim for procurement is clarity and consistency. MoEs must publish clear requirements and evaluation criteria, and stick closely to these instructions when awarding a contract.
- Several feel that European Schoolnet can assist in publishing recommended procurement procedures which can inform the way MoEs develop their vision for the procurement, and the subsequent Invitation To Tender (ITT) documentation.
- Suppliers and manufacturers vary in their opinions on their role in influencing the choices of MoEs. Some are happy that tender documentation may favour particular product solutions, thereby precluding innovative responses. It is posited by this group that each supplier must work to ensure MoEs understand the possibilities and challenges associated with the various product offerings, thereby influencing the way MoEs conceive their procurement programme at the outset. Others suggest procurement programmes should be as open and

inclusive as possible, focusing primarily on educational outcomes, rather than technological specifications.

- All suppliers in the group are concerned that MoEs should better understand the holistic requirements for IWB technology, content, installation, training, support and so on, before initiating a procurement programme. A focus on the technology alone, it is suggested, leads to an impoverished outcome for schools, and potentially costly, disputed procurement programs. Hence the inclusion of the section on Functional Specifications, since these allow suppliers to innovate and develop their offerings, thus increasing competition.
- Several suppliers suggested that European Schoolnet might usefully compile a 'Which guide' to holistic IWB offerings, in order that buyers can easily understand the range of services and technologies included in a tendered price. However, there is a danger this could be unwieldy due to the developmental nature of technology, and therefore such a Guide would need to be updated more often than would be practical.

Overview of IWB technologies

This section provides definitions of the different types of IWB, associated technologies, software and support available to schools. It also outlines other issues to consider when procuring and installing IWBs in schools. This should be used to inform the procurement process, but it is vital that it is preceded by consideration of the pedagogical affordances of IWBs in order that it is the desired impact on learning and teaching that drives the procurement process.

Pedagogical affordances

IWBs, and the associated technologies, have a range of pedagogical affordances that may have a positive impact on learning and teaching. In order to utilise these affordances fully, and ensure that they have a positive impact on learning, it is vital that teachers engage in professional development that enables them to reflect critically on the use of IWBs and develop pedagogically sound usage. IWBs can encourage and enhance a range of pedagogies and styles of learning and teaching, from teacher-centred, didactic instruction to student-led social constructivist models and a wide range in between. The affordances of IWBs and how they relate to pedagogical styles are outlined below.

Instruction and Demonstration

The IWB provides a large canvas on which to view resources, demonstrate techniques and instruct a group or class. Being able to operate software and the computer from the IWB means that any techniques can be demonstrated using the hand or a stylus, rather than students trying to follow the path of a cursor or pointer on the screen. This can be particularly effective when the use of the IWB is combined with a visualiser. This enables the presentation of specific, delicate and precise techniques, for example soldering, lino cutting, propagation or dissection, which would be otherwise difficult or impossible to share with a large

audience. The IWB software can be used to capture such processes and combine with other media.

Modelling and Exploration of Concepts

Teaching and learning resources can be presented using a wide range of media, thereby appealing to different learning styles and engaging a greater number of students. The IWB enables a further step that allows teachers and students to stop, start, label, classify and record discussions within the media used, in order to explore concepts more deeply and begin to synthesise information and ideas.

Manipulation and Analysis

As well as presenting information and ideas using a range of media, the software of the IWB enables teachers and students to reorganise and edit materials and evaluate the results. This can be enlightening in terms of helping students to understand the construction of ideas, and, through creating their own versions, the development of new information and original ideas inspired by the work of others.

Collaboration and Sharing

IWBs can be used to enable students to share their work. This can be used as a stimulus for discussion and as a resource to demonstrate, explore, model, manipulate and analyse ideas, as outlined above. There is also potential for smaller groups of students, with or without a teacher, to use the IWB to co-create products and resources that would be difficult using only a computer.

For further information about pedagogical affordances and the impact of IWBs, we recommend the following studies:

Rudd, T (2007) Interactive whiteboards in the classroom. Futurelab.

Available at http://www.futurelab.org.uk/resources/documents/other/whiteboards_report.pdf

Way, J et al. (2009) Symposium: Interactive Whiteboards and Pedagogy in Primary Classrooms. Australian Association for Research in Education - Annual conference 2009 Canberra.

Available at http://www.aare.edu.au/09pap/way091149.pdf

Core IWB technologies

Interactive whiteboard (for specification see Appendix 1)

Resistive membrane whiteboards

Resistive membrane IWBs are touch-based systems where a finger or other simple pointing device is used to control the interactivity. The most common resistive system has a membrane stretched over the surface, which deforms under pressure and makes contact with a conducting back-plate.

The location of the 'touch point' is registered electronically, just like a computer mouse movement and left click. Resistive IWBs are not dependent on a specific

pen so the IWB can be used with different types of pointers e.g. a stick, pointer, pen or stylus.

Electromagnetic pen-based interactive whiteboard

Electromagnetic pen-based IWBs have a grid of wires embedded behind a solid board. The board surface interacts with a coil in the pen tip to determine the coordinate position of the pen. The pen has a coil in the pen tip which sends a signal directly to the passive electromagnetic surface of the board.

Where the pens do not have batteries or another power source, the board's active surface interacts with the coil in the pen tip to determine the coordinate position of the pen.

When a pen is brought close to the board surface, the grid of the board tracks it. Approaching the pen tip to the board provides a 'hover-over' function, whereby the user is shown what will be invoked if this item is clicked. Touching the screen then activates a signal like a mouse click to the computer. This attribute is key to strengthening user confidence. These IWBs can be thought of as enormous graphics tablets. Electromagnetic IWBs offer natural pen action and have the ability to offer multiple input from multiple pens.

When a pen *with* rechargeable batteries is brought close to the board surface, the pen sends a signal directly to the grid.

Portable ultrasonic, infrared pen-based interactive whiteboard

A portable ultrasonic, IR pen-based interactive whiteboard comprises sensing bars located on the top and left edges or a traditional whiteboard to track where the pen (fitted with a reflective collar) is positioned on the surface of the board.

After a simple calibration of the projected image using the electronic pen, the user can then control the computer. The device or bar scans an area up to 3m by 1.5m giving in theory a 110" interactive whiteboard. Additional brackets can be added so that users can share between different spaces or classrooms.

Mobile Electromagnetic pen-based interactive whiteboard

Mobile Electromagnetic pen-based interactive whiteboards have a grid embedded behind solid hardware. By providing all the advantages of an IWB, it offers the teacher an alternative to a fixed IWB. This introduces the possibility to move around the classroom more, or between classrooms and other spaces, to share the device with students for demonstrating or discussing work in progress. Such tools can potentially support more collaborative pedagogies.

Rear projection units

Rear projection onto an IWB allows the user to stand in front of the board without casting a shadow. The touch-sensitive screen allows the user to carry out all the work that would usually be done at a computer workstation just by touching the screen.

There are two main types of rear projection unit:

- In-wall units where the unit is sunk so the screen remains flush with the wall;
- Cabinet units that can be moved around for viewing in different locations.

The units use digital-vision touch technology for both touch and tool recognition. This requires specialised digital cameras placed in the corners of the screen that track the position of a tool or finger and transmit that position to a computer.

Camera-driven interactive whiteboards

Future boards may be camera-, rather than touch-, driven. These will operate using touch and/or a pen or pointing device, as the point of contact itself will not be active. The camera will register the position of the contact. Camera-driven boards will also support multiple users, increased collaboration and group work.

Interactive projector

Recently, there has been the development of an alternative to the interactive whiteboard, the interactive projector. This turns any suitable surface into a virtual whiteboard. It works by detecting the position of an active IR light pen when it contacts the surface where the projected image is displayed. This allows users to experience some of the interactivity of an IWB, but as with all IR based IWB products, this solution can suffer from problems caused by 'line of sight' between the pen, the projector receiver and other light sources

Projector (for specification see Appendix 2)

Installation

Projector installation should be specified as part of an IWB installation package as it is essential to have the projector correctly aligned with the IWB. Recently the standard: PAS 122 was developed with industry to raise standards of IWB installations. Projector manufacturers have also developed more secure data projectors for the education sector rather than just using commercial products. Despite this, schools still need to ensure adequate signage about teachers and pupils not looking directly at the projector light.

There are three main types of projectors used with IWB:

- Short throw projectors attached to the board on a moveable arm;
- Ceiling mounted projectors (commonly known as 'long throw');
- Ultra-short throw projectors which are attached either to the wall just above the board or to the board itself.

When using short throw projectors, the site of the board pre-determines the location of the projector as they are usually integrated at installation stage. The use of a short throw projector reduces the problem of casting a shadow across the board when working on it. Ultra short throw projectors almost eliminate this problem.

When dealing with ceiling mounted projectors the height of the IWB will affect the height for positioning the projector, the angle at which it needs to be situated and

the distance of the projector from the board. Digital projectors must also be firmly fixed to ceilings. Some classrooms have flexible false ceilings. Where this is the case, the projectors will have to be specially installed, otherwise the whiteboards will be affected by the movement of the projectors and will need recalibrating frequently.

The distance of the projector from the screen gives a maximum and minimum 'image throw distance' for a specified image size. When mounting a projector, it needs to be fixed within its throw distance: too close and the image could be out of focus or not fill the board; too far away and the image could be too large for the board.

Some projectors have built-in security measures such as pin codes. Ceiling-mounted projectors can easily be unbolted, so it may be necessary to consider additional security measures, such as data tagging or physical security such as locks or cages, to protect them.

The power supply for a ceiling mounted projector would ideally be ceiling-mounted and would need to be installed prior to the installation of the IWB and projector. This should be completed before agreeing an installation date for the IWB solution, so that the system can be tested and fully functional by the end of the installation.

Brightness

1,500 ANSI lumens is normally adequate for projection equipment in most teaching spaces. If the space has extremely high ambient lighting conditions, window blinds can be used in preference to increasing the brightness of the projector.

If it is likely that the users will be standing in front of the beam, there are methods of employing brightness reduction, including a brightness adjustment facility or neutral density filter.

Projector bulbs

The projector includes a light source, which is used to illuminate and project the image. These lamps have a limited lifespan and should be considered a consumable part. However they can equally represent a significant proportion of the total cost of the entire unit. Typical lamp lives are quoted in the region of between 2,000 and 4,000 hours. However these figures are based on idealised usage scenarios and are only guidelines. Manufacturers have developed particular technologies to increase these lamp lives and very recently LED projectors have started to appear in the market, which offer claimed lamp lives of up to 20,000 hours.

Many projectors include an economy mode, which is designed to extend the lamp life of the projector by up to 50%. This mode usually causes the projected image to appear less bright so it can be advantageous to use a brighter projector in economy mode to promote the lamp life.

Ultra short throw projectors tend to have brighter lams to compensate for increased scatter due to the wider angles involved.

Cabling

Any cabling must be safely secured for the entire length of the cable, right up to the chosen position of the equipment that will be connected to it. The local health and safety regulations for cabling should be enforced and may affect the location of an IWB. Also – future connectivity needs should be considered when installing cabling for IWBs, since it is expensive to re-install new cabling at a later stage.

Speakers

Interactive teaching and learning often requires the use of sound files and moving images and these should be readily accessible when using IWB technology. When used effectively, these tools can enhance teaching and learning across the curriculum. Projectors often have built-in speakers, which can be small and ineffective. Therefore, it is advisable to have wall-mounted external speakers, which will ensure that sound is of better quality and volume in the classroom or learning space. Some IWBs come with speakers integrated into their frames. Others can be upgraded to have speakers installed at a later date. Some schools prefer quadraphonic sound systems to support carousel teaching in a classroom.

There are usually options to purchase speakers as part of an IWB system and this should guarantee the correct installation, although it could incur extra cost.

Software (for specification see Appendix 3)

Core IWB Software

IWBs enable users to interact with content, to make and save changes when required and to share content with others. An initial consideration has to be whether the tools provided within the software can be demonstrated to be:

- Purposeful
- Easy to use
- Interactive
- Collaborative
- Transforming
- Useful
- Relevant
- Engaging

IWB software allows a user to create separate 'screens' that, when linked together, form a lesson or presentation. Different providers call their software tools by different names, but they all have a range of similar tools that enable users to customise resources already developed (by the supplier or other users) or to start from scratch themselves.

It is important to establish how frequently upgrades to software are released and the implications for running the supplier software when there are changes made to operating systems and plug-ins.

As with many software packages there are a variety of tools available for developing content on the screen. The tools usually found are icon based and are stored within onscreen toolbars/toolboxes.

Common Software Tools

Different suppliers provide a range of additional tools running bespoke features of their software packages. It is important to evaluate the full range of tools and features that is available and carry out a comparison to match a school's vision for use. A list of the most commonly found software tools can be found in Appendix 3.

Additional bundled software applications

Management software

As well as the IWB software, suppliers offer other applications that can be used interactively. Software for teachers to be able to monitor what pupils are doing on their own computers is available. This software allows a teacher to share and deliver a specific learning resource with a specific pupil or group of pupils. Additionally, they can send messages to the pupil(s) and direct their learning or can take over a pupil's computer to demonstrate how to do something or where the pupils are making errors.

Pupil version

Suppliers have developed versions of their main applications for pupils to use for developing their own interactive resources. The application also allows them to make notes on a copy of a teacher-generated resource to improve their understanding of a subject. They can also schedule their work to meet deadlines that have been set for the completion of tasks.

Learner response

Software is available for engaging learners in real-time response and feedback. Details of the educational use of this application are explained in the section on Voting Systems below.

Interoperability

Currently, most content available to run on IWB software is proprietary to each vendor. Recently a Common File Format (CFF) was developed by Becta in the UK. More details of this can be found in Section 7.The advantages are that files can now be shared across different software programs, thereby providing enhanced scope of use for teachers and learners. A good example is delivery of Diplomas in the UK, where students may be working in a range of locations (schools, colleges, businesses, community groups) – all of which may have different IWB software. Interoperability is an important factor here in ensuring students can access their resources in these different locations. Similar transference of learning activity may take place when students advance for school to college or university, and

wish to take files with them. Different systems in different institutions should not prohibit their use.

Additional Teaching and Learning Accessories

To maximise the flexible use of the IWB within teaching and learning, teachers and pupils need to be able to interact in different ways with or without the system. Although pupils like the freedom of leaving their desks to come to an IWB, all users should enjoy the flexibility of being able to connect with the system from anywhere within a space or classroom.

Suppliers have a range of devices to promote diverse ways of teaching, the most common of which includes:

- Interactive tablets
- Interactive panels
- Mobile interactive whiteboards
- Voting systems
- Visualisers

Interactive tablets (for specification see Appendix 4)

Typically, interactive tablets (also named by some suppliers as Mobile Interactive Whiteboards) use a wireless connection to fully integrate with the suppliers' IWB software and/or school network. The dimensions can vary but are usually notebook sized and small enough to be placed on a pupil's desk.

Suppliers offer a range of solutions, some allowing a number of tablets to be distributed to the class for a lesson in order to engage a number of users without the disruption of passing the devices around the room.

Real time student collaboration enables multiple students (as many as 9 with some systems) to interact with content at the same time, either in a single working area or in several independent working areas.

Some suppliers differentiate Learner solutions from Teacher Solutions that can provide an instant feedback from the students using Student Response Systems (or voting systems).

There is only one tablet 'live' at a time: the teacher (or whoever is given control) chooses which tablet to display and when and how often others are brought into the lesson. The tablets are light and robust and most use electromagnetic technology.

Interactive panels/interactive pens (for specification see Appendix 5)

An interactive panel and interactive pen combine the functions of an IWB within an LCD screen and uses a pen-input device. This can be used whilst facing and engaging with pupils. Whilst the solution does not have the flexibility to allow users to move around a classroom, it does enable a user to watch the audience whilst annotating or editing a screen display.

Student response systems (for specification see Appendix 6)

New methods of engaging pupils with their learning are greatly enhanced by the accurate use of individualised assessment. The interactivity available through IWB systems enables pupils to provide information about their understanding in 'real time'. Teachers can use the IWB software to devise quizzes, tests and content-related questions before or during lessons.

Student response systems provided with IWB systems all have similar interfaces but differ in their approach to the integration with the software packages. Suppliers offer bundles of the voting handsets (commonly known as 'clickers') related to the number of responses that can be managed by a receiver.

The handsets are distributed to the pupils who will respond to questions displayed on the IWB or projection surface, by logging an answer through 'clicking' on a button on the handset. Receivers are placed within the classroom or learning space to receive the data. Suppliers recommend the number, distance and setup for the receivers to ensure that data is received and can be manipulated by the software for automated feedback. The responses can then be presented as graphs, pie charts or as individual responses to questions on the IWB.

Assessments of individual pupil responses can be saved for future reference, or can be saved in a format for export into the most commonly used Management Information Systems (MIS), as a .CSV file for example. If pupils' names are tagged to specific handsets, their data can be saved after each time they vote, thus building up a progressive picture of their attainment. Teachers can adjust lesson content to match the level of understanding of the majority of pupils ensuring that every pupil has an understanding of the concepts taught.

Suppliers have different approaches to how the data is stored but provide virtual Mark Books (Grade Books) for the data to be stored and analysed remotely from the system. Reports can be generated from the Mark Book for individual pupils or for group marks. Some suppliers have devised export facilities so that reports can be transferred in common file format for Microsoft applications such as Word or Excel.

As well as preparing questions prior to a lesson, teachers have the opportunity to ask spontaneous questions during a lesson and gain immediate feedback. This enables them to respond to the needs of the students as the lesson progresses. Motivation levels are known to increase when pupils are fully engaged and feel empowered with their learning; using a combination of different types of questions at different stages of a lesson retains pupil concentration on the lesson content.

Self-paced and Homework modes (with some systems) enable students to respond to different versions of the same paper based tests or to respond to different tests at their own pace. This allows teachers to adapt the level of their pedagogy to a specific group of students that can respond either from their desk or from their home. Homework mode can also be used on field trips to capture responses to oral questions.

Visualisers (for specification see Appendix 7)

The range of handsets has been developed to suit the full age range of pupils. Establishing the correct handset for an age group is important if the pupils are to be expected to work autonomously. Evaluating the size of buttons and the complexity of the layout is advisable prior to procuring devices.

A visualiser is a real-time image capture device for displaying a book, document, 3D object or action, to a large audience. They provide a means for co-constructing documents or sharing whole class experiences while pupils remain at their desks.

As the image is displayed in real-time, the teacher (or pupil) can write on the document, paint a picture, carry out an experiment, prepare food or solder a joint while the audience watches. Images etc can be viewed on either a fixed IWB or a mobile IWB.

Unlike most projectors, the ambient light can be stronger as it is not necessary to demonstrate in a darkened area. Some visualisers will automatically adjust the brightness of the display to suit the ambient light level.

Visualisers can be connected directly to the IWB or projection screen. Some also have a range of tools inbuilt into the system, such as a zoom feature and the ability to be connected to a microscope or scanner.

They support a wide range of curriculum applications; for example music pupils can co-construct a piece of music, sharing the music staves on the IWB and deciding what the notes, rhythm and pace of the piece should be. A visualiser could be used here to project lined paper onto a whiteboard, thus enabling a whole class of young pupils to see and copy the formation of letters on a line. However, such activity can also be supported by the use of a simple webcam, and schools would need to be clear about the value of purchasing visualisers at greater cost: normally, decisions would be based on the existence of the extra tools that come as part of the visualiser.

Support (for specification see Appendix 8)

A wide range of support for teachers using IWBs is available from vendors and other sources. This includes, but is not limited to, initial training, ongoing CPD, communities of practice, access to resources and technical support. Further details of the support available and recommendations about how to evaluate it can be found in Section 7.

3 Functional specification

Too often during a procurement programme, the focus remains on the technological features of equipment rather than the desired impact on learning and teaching. As a result, procurement documents can too easily focus on equipment and software features rather than the required educational outputs of a project. At the very least there should be a clearly defined match between technical features and how they deliver elements of the required functionality. This prevents a procurement document from only requesting what is already there, rather than what is needed to support developing practice. A detailed functional specification provides detailed information about the perceived educational aims and objectives of the procurement exercise. It also encourages suppliers or manufacturers to consider how they might *develop* their products so they are more closely aligned with detailed current and future or emerging educational requirements. (The transformation agenda in the UK is a good example of this).

By creating an educational functional specification, and using this as the main procurement document, the focus remains on learning and teaching, rather than just the features of the technology. Again, a good tender response will therefore demonstrate clearly how technical features specifically support required educational outcomes. This is more likely to result in a successful procurement process that achieves the intended outcomes. In addition, it will assist in evaluating the success of the project and informing future procurement exercises.

The first stage in developing a functional specification must clearly identify the educational aims of the project: the positive impacts on learning and teaching that are expected. This is usually described as the 'Educational Vision'. Following this, the functional specification should include a description of the learning environments and context, an outline of what is included in the solution and finally the training and professional development of teaching staff that is expected to be included in the procurement.

Vision

The educational aims of procuring IWBs should include an exploration of the ways in which the IWB will impact positively on aspects of teaching and learning, including:

- Interaction between the teacher and learner and between learners;
- Motivation and engagement of students;
- Opportunities for collaboration;
- The use of a range of learning and teaching styles;
- Access to multimedia learning and teaching resources and the ability to create bespoke materials;
- Assessment practices (such as instant grading);
- Reinforcement of and reflection on learning;
- Sharing and publishing examples of good practice;
- The structure of lessons;

- Planning series of lessons;
- Broadcasting teaching materials;
- Developing communities of practice;
- Providing 'real-world' learning contexts.

Learning environment

Having developed the vision, the learning environments in which the IWBs are to be used must be considered. This ensures that the solution procured will function as required within the spaces in which it is installed. This should include:

- Room size, shape and orientation;
- Number and age of students;
- Type of interaction device/s required;
- Any fixed or portable devices;
- Interoperability with peripheral devices;
- Issues surrounding the inclusion of students with special needs.

Solution

All elements to be included in the procurement must be itemised to ensure that everything that is required is provided and that it is possible to determine the Total Cost of Ownership (TCO). This should include:

- Hardware;
- Software;
- Additional devices;
- Power consumption;
- Cost of spares/consumables such as lamps;
- Infrastructure;
- Installation and commissioning;
- Technical support;
- Warranties;
- Training and CPD.

Training and CPD

For details of the training and CPD requirements that should be included in the functional specification, see Section 8.

4 Assessment of readiness

A vital and early stage in the process of procuring IWBs is the assessment of readiness of the schools wishing to procure. Following the creation of a clear educational vision (see Section 3), it is then essential to evaluate schools' readiness, both in terms of adopting new technologies and, perhaps more importantly, their ability to adapt to and take advantage of the enhanced learning opportunities the IWBs may provide. This can influence the scale and timeline for the procurement programme.

In this section we explore the approaches taken by a number of Ministries of Education to assess readiness and prepare teachers for the provision of IWBs. These are summarised from the responses to the questionnaires sent the 13 Ministries. We go on to make recommendations about how to assess whether a school has reached a sufficient level of maturity to make the best use of new technologies. We outline the UK's criteria-based approach, Becta's Self Review Framework, in more detail and examine how this might be adapted to provide a self-review tool, and indicator of readiness, for schools elsewhere.

Findings

Respondents to the questionnaire report a variety of approaches to the preparation of staff for the use of IWBs in their classrooms. This ranges from technical training provided by vendors to the provision of comprehensive pedagogical support through professional development activities, the provision of case studies, exemplar materials and teaching resources.

Training provided by the vendors is commonly available with the purchase of an IWB. This is generally of a technical nature, rather than focussing on pedagogy. For those countries providing no other preparation for the installation of IWBs in classrooms, this is the only face-to-face option for teachers. This can be supplemented with freely available online materials published by the vendors and educational organisations including schools, universities and regional/national government bodies. Examples of these materials can be found at:

http://kurzy.vsb.cz/obsah_tabule.htm

http://www.lupacovka.cz/

http://gynome.nmnm.cz/board/

http://www.venkovskyprostor.cz/cz/1/interaktivni-tabule/vzdelavaci-program.html

http://edu.vsb.cz/interaktivni_tabule_Smart_Board/SupportingFiles/ViewerWM7.html

http://www.sulinet.hu/iktmuhely/

http://ikt.sulinet.hu

http://kosar.educatio.hu/

http://publications.becta.org.uk/display.cfm?resID=25918&page=1835

Most countries' Ministries of Education (or their agents) provide professional development programmes and advice to support the integration of IWBs into classroom pedagogy or collate lists of providers of such support. Italy and Portugal are the only Ministries that mentioned specific programmes dedicated to IWB training, with Italy providing training for all teachers who have a new IWB and Portugal predicting that 30% of teachers will have received IWB training by the end of 2010.

None of the respondents provided information regarding methods of assessing readiness to adopt IWB technologies into classrooms. Training is associated with the provision or purchase of the IWB, with further professional development available according to the priorities of the schools and teachers. The decision to engage in training and/or professional development seems to be taken at a regional or school level and is often associated with wider initiatives relating to the embedding of ICT in the curriculum.

Resources, such as Becta's Self Review Framework (SRF), enable schools to review and plan how to improve their use of technology. The sections focussing on Learning, Professional Development and Resources may be of particular use when making decisions about the appropriateness of IWBs and assessing a school's readiness to adopt them and integrate them into teaching and learning. A resource such as the SRF, perhaps including specific materials that support schools' decision making about interactive teaching technologies, could be made available to European schools through EUN and enable schools to produce action plans for ICT and identify professional development needs and providers.

Recommendations

Assessing the readiness of schools to take part in a procurement programme is a crucial first stage, the outcome of which should be used to inform the production of the Educational Vision for the project, outlined at the beginning of Section 3. This section recommends an approach to assessing readiness and supporting schools in a process of self-review.

School Readiness

It is necessary to establish an individual school's readiness for interactive technologies in teaching and learning. The use of a criteria-based, self-assessment tool would enable schools to carry out an evaluation before embarking on a procurement process and ensure that all decisions are based on sound pedagogical evidence. See section below for further recommendations about the creation of such a framework for EUN schools.

Understanding good practice for the use of IWBs in teaching and learning is an essential step of any successful implementation programme and should inform decisions about readiness to adopt new technologies. There are many ways to engage teachers and learners in exploring the potential impacts of IWBs on teaching and learning including:

- Attendance at trade shows where a range of IWB suppliers can demonstrate and discuss with individuals what they hope to achieve;

- Bespoke conferences with best practice demonstrated by practitioners;
- Local workshops where teachers can get 'hands on' experience of using an IWB;
- Disseminating video case studies demonstrating the use of IWB embedded into different phases of education;
- School audit of their readiness to embed the use of technologies into teaching and learning and development of an action plan as a response to the audit. Sample audit criteria from Becta's Self Review Framework can be found in Appendix 9.

School development plans

Before schools receive IWB technology they should be required to demonstrate their readiness to embed IWBs into their development plans, action plans, schemes of work and lesson plans. This can provide indicative levels of take up of the technologies for a deployment programme. EUN are currently running the Innovative Technologies for an Engaging Classroom (iTEC) programme which will inform this important area. iTEC is a four year, large-scale project that takes an informed look at the potential classroom of the future.

Starting in September 2010, iTEC will bring together policy makers, researchers, technology suppliers, other technology-enhanced learning experts and innovative teachers in order to design and build scalable learning and teaching scenarios for the future classroom with recognition of the realities of pace of the educational reform process. Rigorous testing of these future classroom scenarios in large-scale pilots will then be carried out in order to significantly increase the possibility that innovation can be mainstreamed and taken to scale when the project ends. iTEC will provide a model describing how the deployment of technology in support of innovative teaching and learning activities can move beyond small scale pilots and become embedded in all Europe's schools. The strategic nature of the project is underlined by the fact that the iTEC piloting in >1,000 classrooms in 12 countries is by some margin the largest pan-European validation of ICT in schools yet undertaken.

Alternatively, some Academy organisations for example, in the UK, now develop their own frameworks for practice with interactive technologies, defining different levels of practice: these can be a useful indicator to practitioners and school leaders as to how effective IWB usage is across their institutions. They also identify who needs to develop further and requires support. This can also encourage use and provide rewards for best practice.

The proposed degree of integration into learning and teaching should inform the staging or phasing of a deployment programme. Planning documentation can then be used to assess the extent to which the IWBs are used effectively and have an impact on learning and teaching. This comparison can also provide an indication of value for money, demonstrated against the financial outlay of the programme.

Approving sites for implementation

When a decision has been made as to the number of schools that can be managed in any phase of deployment, and before making decisions about procurement, it is essential to carry out a full site survey of rooms in which IWBs will be installed. The data from the surveys will inform the specification and design for the procurement stage of the programme that can be discussed with approved suppliers. This process should involve teachers and managers and should be informed by visits to other classrooms with IWBs and information from demonstrations and research. A reference Site Survey document has been created to provide guidance on the variables to consider when carrying out a site survey (see Appendix 10).

Developing a EUN Review Framework

Becta's Self Review Framework (SRF) and the ICT Mark scheme may provide useful models for a tool to assess a school's readiness to adopt IWBs. The form of the existing SRF is outlined here and recommendations are made for the development of a similar tool for use by Ministries of Education across Europe.

In the UK Becta's SRF is an online tool (currently available through Becta's website, but its future is uncertain due to the closure of Becta at the end of 2010) designed to enable schools to assess their current usage of technology and plan how to improve the level of effectiveness across six key elements:

- Leadership and management;
- Planning;
- Learning;
- Assessment of ICT capability;
- Professional development;
- Resources.

The SRF is designed to be used by the ICT Co-ordinator, e-Learning Co-ordinator and/or members of the Senior Leadership Team. Once registered, providing an ongoing account which can be updated as progress is made, schools review their use of technology in a structured way, answering a series of questions in which they rate themselves against five level descriptors and provide evidence. Examples of good practice are included to help schools identify appropriate evidence from their own settings. Once completed, an action plan is generated that can be used to inform the school's improvement strategy and plans.

The overall aim is "to use ICT to enable pupils to make better progress and to raise attainment" rather than to use ICT for its own sake. It encourages schools to integrate ICT effectively into learning, teaching and administration. As such, it is designed to be updated regularly to inform ongoing developments in schools, rather than being used in isolation to provide a snapshot of the use of technology at a particular moment.

The SRF complements the UK national inspection framework, Ofsted's Self Evaluation Framework (SEF), and as such can provide detailed evidence in support of a school's SEF in preparation for inspection. In the UK the SRF is also linked to the ICT Mark, a national award that recognises schools' achievements

and maturity in the use of technology. This, in turn, can lead to the achievement of an ICT Excellence Award. Similar European ICT awards could be developed, perhaps contributing to the creation of a group of schools across Europe demonstrating best practice in the use of technology.

In order to create a SRF suitable for use across Europe, the Becta approach could be adapted and updated to reflect the variety of educational settings, including curriculum, learning and teaching models. In recent years, the development of new curriculum approaches in the UK, such as the competence-based and creative curriculum, has resulted in many teachers reflecting deeply on their use of technologies. A EUN SRF tool would need to reflect these and other major movements in learning and the educational applications of ICT, also making it more accessible and applicable to the Early Years and Primary phases of education. It would also need to be regularly updated to include new learning opportunities afforded by recent developments in mobile and cloud technologies and interactive presentation devices.

The addition of a range of case studies would help to make the SRF accessible to schools in different countries. These would need to focus on learning and pedagogy, including a wide range of curriculum models, learning and teaching styles and technologies. They would highlight the impact of ICT on learners, teachers, families, school leaders and administrators, as well as providing examples of best practices in a range of contexts. In particular, these should include a balance of examples from across all age groups to ensure that the SRF does not appear to be targeted specifically at the secondary phase of education. Ministries of Education in the Working Group have produced a number of case studies which could potentially be further developed with specific reference to a self-review framework (http://moe.eun.org/web/iwbworkinggroup/library).

Czech Republic – The Research Institute of Education in Prague (a ministerial research institute of the Ministry of Education, Youth and Sports) is at the moment finishing the same tool for Czech schools http://www.nuov.cz/ae/profil-skola21(information on the project). The tool is available on http://skola21.rvp.cz/.

Additionally, Becta have recently developed an ICT visioning tool named 'ProVision' http://www.becta.org.uk/visionfortechnologyinlearning which is designed to support school and local authority stakeholders to collaborate on and develop a vision for learning and school management with technology.

5 Technical specification

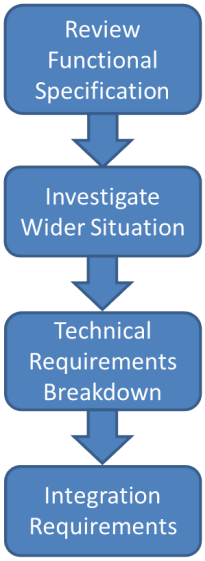
The development of the technical specification of an IWB deployment project essentially involves the conversion and interpretation of the educational vision and functional specification into a specific technical requirement that can be procured.

Undertaking such a process requires specific market and technical knowledge to ensure that the functional requirements are properly articulated in terms of available products and technologies. It can therefore be advantageous to employ the services of specialist consultants to support this process. Any consultants used should have both technical and educational expertise and experience.

The technical specification must consider the requirements not only of the IWB, projector and other associated technologies, but also the wider issues of integration with existing technologies, including networking and power, and/or solutions that are to be procured imminently.

The document needs to become a common reference point for all involved in the procurement and any wider project, such as a school building or refurbishment project, to ensure that a uniform and common understanding of the deployment scenario is maintained even by those contractors not familiar with the technology in question. This commonality between a procurement requirement and a deployment brief should help to ensure that all involved have the required information to fully complete their responsibilities outlined in the responsibility matrix (see Section 6).

The process is summarised in the diagram below and a detailed explanation follows.



Review functional specification

The functional specification is often produced in isolation from the technical situation. The functional specification must be reviewed regularly, which may involve further discussion and refinement of the requirements, before the

technical specification can be produced. Aspects that may need to be reviewed are outlined here.

Alignment with current products

The review will need to investigate how the functional requirement aligns with the products currently available in the market. This does not indicate product selection; rather, it is a test to ensure that there is one or more product/s that can meet the functionality requirement that has been developed and to aid the development of a cost model.

Budget

Although the functional specification may be achievable, it needs to be tested in a preliminary way to ensure that it can be achieved in the context of the allocated budget for the project. Although the total costs for the project will not be fully understood until the procurement is underway it is possible to produce a cost model that can help to ensure that the produced technical specification can ultimately be delivered.

Investigation of the wider context

The successful deployment of interactive technologies into an educational environment is heavily dependent on full consideration being given to the wider scenario. This may include building or refurbishment work in the school and/or other technological procurements or installations. Any issues, once identified, can be dealt with through the matrix of responsibilities (see Section 6) to ensure an integrated solution at completion.

Building (Installation situation)

The installation of interactive technologies often happens in parallel to the building or refurbishment of schools. Installation and integration with new buildings is significantly simpler than where an existing building is being used. There are a wide range of issues to consider in the installation scenario such as locations, obstructions such as pipe work, doorways and windows, the suitability of the walls for mountings and hazards such as asbestos. Equally, depending on the state of buildings, available budgets and educational requirements, a balance needs to be struck in terms of whether to deploy fixed or mobile interactive technologies.

Selection of particular pieces of equipment such as boards deployed on stands or trolleys can reduce the total cost of the installation significantly, however they may not be appropriate to meet the educational requirements specified in the education vision.

Location

A major consideration for selecting the correct board for a teaching space is the size of the IWB and its location, which both affect how it can be used. Displaying images and documents with text on a small board in a large space can be problematic. To ensure that work can be seen clearly at the back of the room, an

appropriate sized board, along with a projector with sufficient brightness, must be specified.

Accessing all areas of an IWB is essential for teachers and desirable for pupils. Consideration should be given to positioning the board so that it is high enough to maximise visibility from all areas of the space while ensuring that all areas of it remain accessible to the particular age group of students. It is acknowledged that positioning boards for primary pupils to access all areas is unrealistic. It is important to locate it so that they can access a sufficient area, potentially by using pointers but without the use of a platform.

Thought should be given to where the board will be located in relation to desks and tables. Access to the board should be made as easy a route as possible, as placing barriers in the way can destroy the pace of a lesson.

Special consideration should be made for pupils who require wheelchair access, with attention paid to a realistic height for their reach.

Identifying the path of the sun throughout the day is an additional factor when siting the IWB. The boards can be difficult to see in direct sunlight. Should it be necessary to site a board in direct sunlight at any time of the school day, black-out blinds (or similar) will be needed.

If the lighting within a room runs parallel with the IWB it will assist in eliminating glare on the board. Structured lighting that allows the user to switch off the row of lights closest to IWB is ideal.

Computer location

A decision is required about the type of computer that will be used to connect to the IWB. It should be located close to the IWB unless a wireless or tablet solution is being sourced. The computer should have internet access. Internet access could be a hardwired or a wireless solution, but consideration must be given to the type of demonstrations and interactivity that will be taking place during lessons to ensure sufficient internet speed is available.

Additional power sockets may be needed near the IWB to reduce the number of extension leads required for peripherals such as printers and scanners.

A desktop computer could be permanently connected to the IWB, with peripherals such as scanners and a printer also connected. This would facilitate ease of use for the less confident teacher and seamless switching between the devices.

A docking station for a laptop could be permanently connected to the IWB and peripherals enabling teachers to lock in place their school or personal laptop. This would also enable the use of authorised pupil or guest devices.

The final solution would be to have power socket, data point and IWB cabling available for any authorised device to be connected.

Furniture, fixtures and equipment (FF&E)

The installation must integrate with the furniture and other fittings in the room. This may be as simple as making sure that a table or desk exists for the controlling computer to be deployed on.

Mechanical and electrical (M&E)

The interactive technologies will require power and other forms of connectivity. These requirements may be met within the installation location in full or in part and therefore one solution may be more appropriate than another because of the associated cost savings. Power requirements often present a real challenge, so the physical readiness of learning spaces for which iWBs are planned, should be fully assessed well before any procurement takes place. Retrofitting spaces can be prohibitively expensive and could undermine value for money on a programme.

ICT Systems

IWBs rely upon software and content made available through computer systems and the internet. The selection of software needs to be based on the functional requirements. However, there equally needs to be an opportunity to make the most of the wider facilities that are available in individual and regional organisations. The functionality and collaboration possibilities of the wider ICT resources will need to be assessed and considered in the specification.

Computer operating systems

The IWB software will be specified for use with specific operating systems. It is important to consider the connectivity of the computers that will be using the IWB and ensuring that the correct operating systems are available through the network or stand alone devices.

Other Procurements

If the IWB procurement is being carried out in parallel to or independent from other ICT or other procurement, this may have an impact on device selection and deployment. This should be carefully considered when producing the technical specification.

Other potential functionality

The technical specification should include an investigation into other potential uses for the included technology that might be advantageous to the end users, even though it is not part of the functional specification. For example, the ability of the Interactive Whiteboard and projector installation to connect to the IP network to allow for improved manageability and control over the devices.

Health & Safety requirements

Any specific health and safety considerations relevant to the school/s involved should be included in the specifications. This may include the consideration of hazards such as asbestos.

As there will be a range of users of different heights accessing the IWB, it is important to be aware of the implications of using projection equipment in the classroom. Children could stand in front of the projector beam when presenting to the rest of the class, with potential to cause eye damage. The use of short throw projectors minimises this problem. But where ceiling mounted projectors have been installed simple guidelines should be established:

Examples of Health and Safety guidelines include:

- No one should stare directly into the beam of the projector;
- If users have to cross the beam to present, then they should not look towards the class/audience for longer than a few seconds whilst in the beam;
- Users should try to keep their backs to the projector beam when in it;
- Pupils should always be supervised when a projector is being used.

Health and Safety information should be visible close to IWBs to ensure that any users unfamiliar with the technology can appreciate best practice.

Local regulations

There may be local regulations that prohibit the use of certain types of technology, for example placing a limit on the brightness of projectors to be deployed in classrooms. These should be detailed in the technical specification.

Environmental requirements

The technical specification should include any environmental issues relating to the project. For example, there may be restrictions on the transport mechanisms and distances covered in the manufacture and delivery of the equipment, the materials used in the boards' manufacture or the disposal of any packaging.

Technical requirements

Once the wider situation and the functional requirements are understood, a breakdown of the technical requirements can be produced.

Quantity of devices

The number of each type of device must be defined and the specification for each individual device; for example the size of board and brightness of projector, must be included.

Types of devices

Any items of hardware and accessories or peripherals should be specified. However, vendors should be free to offer alternative solutions that meet the requirements of the functional specification. This should prevent schools missing out if new technologies become available or if there are solutions that they had not considered.

Software requirements

The requirements for the software solution must be specified. This may be included as part of a bundle with the hardware solution or procured separately.

Licensing agreements should be specified, including use by staff and pupils away from the hardware. If the software is required to be compatible with other vendors' products, this must be detailed here.

Connectivity requirements

The technical specification must provide detail about the full connectivity requirements for the installation. For example, the different types of video inputs required to deliver the full range of functionality need to be specified. Also, maximum cable lengths need to be specified.

Warranty and support

The warranty and support requirements must be specified, particularly where these extend beyond what is available from the manufacturers as standard. The technical specification should outline the ongoing and service requirements from the supplier (see Section 5 for more detail).

Security requirements

The level of security required will depend on the wider situation, including the security provided in the building as a whole. This may include security marking or physical security measures to prevent theft of the devices.

Integration requirements

The requirements for integration both within the building as part of the installation and within the wider systems used within the organisation should be considered.

Systems integration

If there is a requirement for the solution to integrate with other systems, for example software that can save and retrieve content directly from a virtual learning environment, this should be specified.

Dependencies

If there any dependencies that must be completed before installation can take place, such as the provision of additional electrical supplies to an area, these need to be outlined and dates provided.

Installation requirements

There may be particular requirements for the installation in a specific location. This not only includes the connectivity types discussed earlier, but any local requirements for dado trunking to be used from particular manufacturers or restrictions on the location of sockets within particular distances from other items. This may be due to the construction or layout of the building or local building regulations.

Total Cost of Ownership (TCO)

The cost of deploying an IWB project across a school or region forms only part of the TCO, in terms of the services required to support and embed the technology,

the maintenance, refreshment and disposal of equipment during its life. It is important to consider from the outset the TCO of any new technology. Vendors must provide information about the cost of the equipment over its lifetime in any tender documentation. This should be clearly requested.

The total cost of ownership includes:

- Initial equipment cost;
- Installation;
- Infrastructure e.g. electrical or data;
- Running costs (electrical);
- Consumable costs (bulbs, filters etc.);
- Initial Training;
- Continuing professional development;
- Ongoing support and maintenance.

The table below outlines factors affecting the TCO and suggests solutions that could be considered and included in the technical specification.

Factors	Items	Solutions
Restricting alteration work	Installation Cabling Projector Computer	• Carry out no room modifications: • Place whiteboard on portable stand • Use USB cables directly into an existing laptop/computer • Put projector onto table
Continuing Professional Development	Training packages Face to face Online tutorials	• Access the websites for the free tutorials • Create a cascade training programme where trainers train next level of trainers • Apply for an online support session provider by a supplier • Negotiate supplier training sessions as part of the procurement package
Support	Level of support available Warranties Availability	• 24 x7 online/email free or negotiate rate to suit hours required • Negotiate warranty at procurement stage, seek to get extended warranty is required • Local based support available or training provided for local technicians to become qualified as support • Languages, dates, times for helpdesk support
Applications	Cost and licensing Frequency of	• One off cost or annual licence • Negotiate upgrades free after original purchase, or schedule in an upgrade

	upgrades Additional titles Third party applications	schedule • Broaden the software by including the applications available from 3rd party or reduce cost by not including them
Refreshment	Durability Maintenance Replacement of malfunctioning parts Disposal	• Determine which board technology suits intended use • Check separate components are replaceable and not prohibitively expensive, e.g. pens, pen trays • Check regime for projector filters, lamp replacement, battery replacement, remote controls • Check the costs associated with the disposal of the equipment at the end of its useful life.

6 Procurement guidelines

It is vital that procurement processes are legal, fair, competitive, transparent and consistent, in order to allow suppliers to effectively present their capabilities, and to ensure client educational objectives are met in the most robust, sustainable, economical and innovative manner.

Introduction to procurement

IWBs are procured through various different routes, mainly due to local conditions around funding and control. However, no matter which route is taken, most follow a similar process to move from the identification of a need to the handing over of a fully implemented solution into an operational state. We have distilled this thinking into a best practice model covering all of those stages, but which elaborates on the procurement element to provide greater detail around the specifics to be considered when purchasing IWB solutions for teaching and learning. The process referred to here is known as competitive dialogue procurement**.** There are alternatives: i.e. non competitive. The latter involves selection of a preferred bidder following an evaluation of suppliers matched against preset criteria, followed by pre-contractual dicussions to discuss detail and then signing of contracts. The competitive dialogue route has been included here, since it is rigorous and reliable in terms of guaranteeing quality outcomes. It also includes the advantage of a PQQ process, where suppliers' capacity and capability can be quality assured before any tendering takes place.

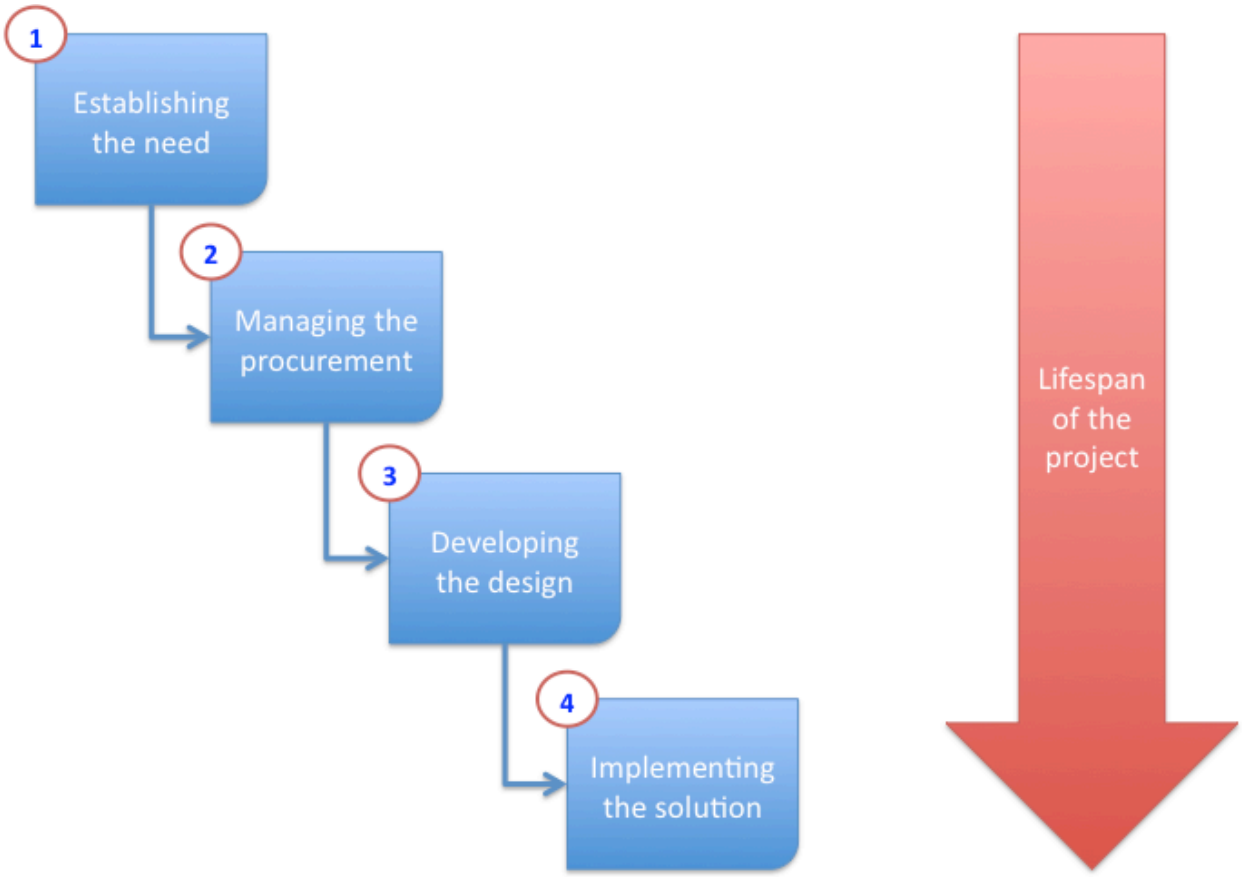
The skills required, as a purchasing body moves through this process, can change quite dramatically, from educationalists with a solid background in what ICT can do and what is available, through procurement experts with a background in how ICT solutions are developed, to project managers experienced in implementing ICT in an educational environment.

Procurements will also be significantly affected by the context in which they are being held, as those linked in to a significant construction programme (such as the recently dissolved Building Schools for the Future (BSF) programme in the UK) will have additional opportunities, and risks, when compared to smaller scale solutions going into existing buildings. Issues surrounding the context of the procurement are expanded later in this document, along with the types of IWBs that are typically being implemented at this time and how they too differ in terms of dependencies and implementation.

The Procurement Process

The model shown in Figure 2.2.1 provides a high level view of the major stages involved. Whilst they are shown as a serial set of stages, in reality certain steps may occur in parallel or overlap. The model is followed by a brief account of the steps involved in all stages bar procurement, providing greater detail about the steps shown in the model.

Figure 2.2.1 High level view of the major stages



Stage 1 Establishing the need

This stage is where the strategic and visionary thinking is distilled down into a tangible need that can be assessed and justified from an educational, technical and commercial perspective. More details of this stage of the process can be found in Sections 3,4 and 5.

Step 1a Developing the vision

This usually forms part of a larger exercise where a client will look at the provision of their educational or wider public services, and either want to move them in a new direction, or invigorate current provision. In terms of IWBs, this is likely to come from a pedagogical standpoint in how teaching is delivered, or how teaching areas are to be used, derived from a need to improve student attainment, engagement, attendance or even wider socio-economic aspirations concerning social well being. It is important at this juncture to get the balance right between inspirational strategic aims and grounded reality about what is likely to be achieved.

Step 1b Defining the required functionality

Defining how ICT is deployed in the classroom and beyond should always start with the functionality that is needed rather than a technical solution that appears to fit the need. In terms of IWBs, there are a growing number of solutions that schools can employ, so being clear about how schools want the students to interact, both with each other and the teacher, along with how content is found,

used and stored should be clearly established. The integration of the chosen solution with the other ICT elements and the physical fabric of the building should be considered, along with how they will be supported post-implementation.

Step 1c Assessing and justifying the requirement

It is usual for a 'business case' to be developed, that details the scope of the project, the risks, resources and commercial implications (not only of doing it, but also of not doing it), along with how this effort fits in with any overall strategic direction or greater programme. This summary should then be presented to the client's authorising body, for instance a Local Education Authority or Ministry of Education, for review and approval prior to commencement of procurement.

Stage 2 Managing the procurement

The specifics of how the goods and services are procured will obviously vary considerably depending on local conditions and the size of the procurement. However, for this report we are assuming that this is an Open Journal of the European Union (OJEU) level procurement and must therefore be bound by its rules. The most common version used for major, non-framework, educational ICT procurements is the Competitive Dialogue route, a route recommended for technically, legally or financially complex projects or programmes. We recognise that not all IWB procurements will fall into this category, but for simplicity this is what we have based our report around, as this appears to be the direction that contracting bodies are being encouraged to follow for anything but the simplest standalone procurements.

Step 2a Deciding on the procurement strategy

As explained above, for the purposes of this report we have assumed that the majority of clients will opt for the Competitive Dialogue version of a standalone OJEU procurement. However, it is very important that this is validated as the correct route, as there are a number of different ways in which IWBs can be obtained from the market.

The scale and complexity of procurement will often dictate which route is chosen.

- If the total value exceeds the relevant OJEU threshold, then an OJEU-compliant process must be followed which allows suppliers from across the European Union to tender for the work in an open, transparent way. This provides guiding principles around how tenders are evaluated, along with defined stages and timescales between or within those stages. To run an OJEU-compliant tendering process, an organisation must either use an OJEU-compliant framework (i.e. where suppliers can been selected for that framework by tendering through an OJEU process) or by running a standalone OJEU process themselves.
- If the total value does not exceed the relevant OJEU thresholds, then organisations will only have to follow their own internal procurement rules.
- Further details of the EU and UK procurement regulations and thresholds can be found at http://www.ojec.com/UsefulLinks.aspx.

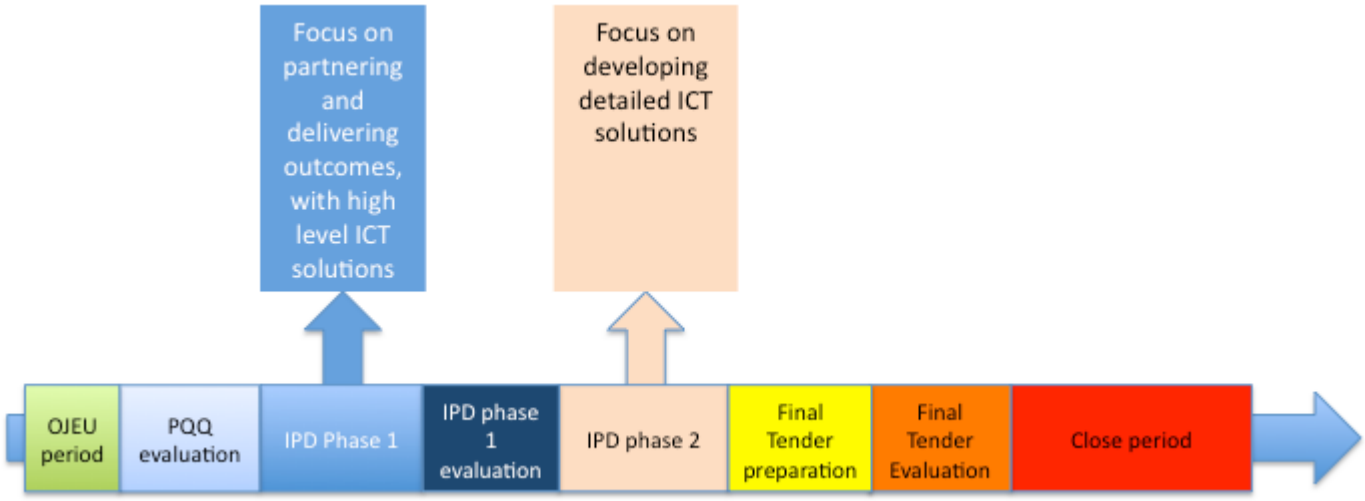
Deciding on the procurement strategy allows the procurement team to plan the process properly, train the procurement team if necessary and use the correct templates and timeframes.

Step 2b Developing the procurement documentation and planning the procurement process

For our chosen route, the Competitive Dialogue process, there are a number of key documents and major milestones that should be reviewed and personalised for any procurement. If there is a public body that is tasked with being responsible for administering your process, (for example Partnership for Schools in the UK), they may have developed guidance and templates that can be taken and amended, along with having defined the high level stages within the overall timeframe.

An overview of the typical Competitive Dialogue procurement process milestones is shown in Figure 2.4.1. This assumes that the Dialogue (or Invitation to Participate in Dialogue (IPD)) phase of the procurement is split into two distinct steps, enabling the de-selection of one or more suppliers between them.

Figure 2.4.1 High level view of the procurement process



This process is far more suited to a larger procurement and, in the case of IWB solutions; the split between IPD1 and 2 is only really valid for more complex procurements. For smaller procurements, where there is limited or no responsibility on suppliers to deliver collective partnering targets or contractual responsibility on educational outcomes, it is recommended that only one Dialogue stage be used or an alternative OJEU process (for example, a mini-tender from a framework or the Open procedure) be used.

In terms of regulatory timescales that must be adhered to, there are relatively few within the Competitive Dialogue process, as the philosophy is that Dialogue should continue until both sides are comfortable that enough information has been passed between them.

Therefore you must only:

- Allow 37 days (or 30 if the contract notice was submitted to the Official Journal electronically in the correct format) for the expressions of interest (or Pre-Qualification Questionnaire);
- Leave 10 days (the 'stand-still' period) between informing all suppliers post-Final Tender Evaluation of the outcome, and actually entering into contract with the chosen supplier (or 'Preferred Bidder').

Once the overall milestones are established, the Dialogue meetings that are to be held during the Dialogue phase (be it split or not) should be defined and scheduled. These should cover:

- Partnering requirements, if the contract is large enough and the intention behind the procurement is to appoint a 'partner' rather than just a 'supplier', or professional services requirements if a traditional client-supplier relationship is sought;
- Technical requirements, looking at the technical solutions that need to be deployed;
- Commercial requirements, including the legal and financial aspects of the services being tendered for.

All suppliers must have the same level of Dialogue offered to them, so each must have the same number of meetings planned, with the same personnel available across each set of meetings. It is recommended that school visits be built into this schedule, along with an opportunity for Bidders to present to the client on the overall offering. For flexibility, it is also typical to have 'Bidders Choice' meetings that allow Bidders to gather any issues or areas not addressed in the more rigid set of meetings, to be dealt with.

It is therefore very important, even at this early stage to:

- Establish your procurement team, so they can be planned into the process;
- Engage with the schools, to help them feel involved, get them contributing and beginning the change management process;
- Communicate the plan clearly across your own organisation, to every learning institution involved and to all potential bidders, showing what you plan to achieve and how the approval process will work.

Key documents that will need to be sourced or created, completed and approved include:

- The legal contract for goods and services;
- The standard appendices to that contract, for instance defining requirements, the schools involved and the service level agreement;
- The OJEU Contract Notice;
- The Pre-Qualification Questionnaire, Invitation to Participate in Dialogue and Final Tender documents;
- The Evaluation Criteria document defining how of all the above will be evaluated;
- The Evaluation Model, usually a workbook, for each of the documents above;

- The Evaluation Report;
- The Final Business Case;
- Agreements between, for instance, the Authority and the school, should the Authority be procuring on behalf of one or a number of schools;
- The cost model.

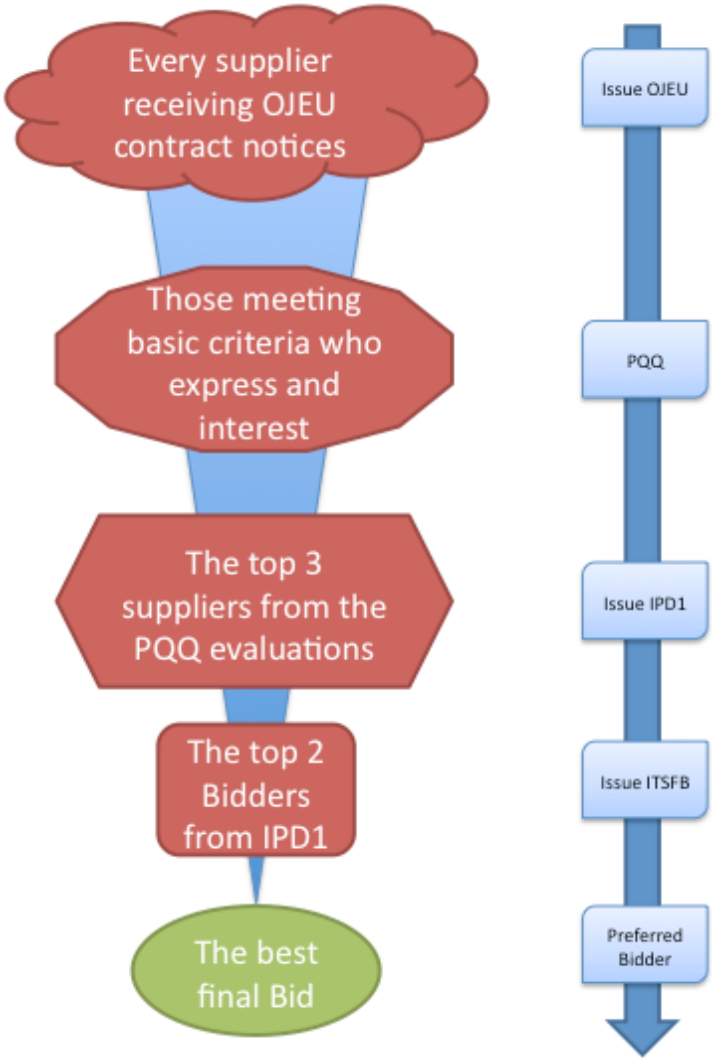
All of these standard documents should be as simple as possible, whilst still providing clarity around scope, risk and contractual responsibilities. They should be driven by the first stage in the process (Establishing the Need) and draw a clear line between the educational (and other) outcomes that the contracting authority are looking for, and the requirement against which Bidders are being asked to tender.

Step 2c Issuing the OJEU notice and running a pre-qualification exercise

The issue of an OJEU contract notice is a well-defined procedure that we will not repeat here. However, it is worth noting that using the correct format, and submitting the notice electronically, can reduce your timeframes if this is a concern. The scope of the contract notice is often made wider than the immediate requirement to allow for other potential services to be drawn in at a later date. It is therefore recommended that any potential areas related to your IWB needs, but as yet not sufficiently defined to allow for tenders to be submitted against (e.g. wider educational ICT solutions), are included for subsequent discussions.

Careful allocation of Common Procurement Vocabulary (CPV) codes to the contract notice should ensure that only relevant suppliers express interest in your procurement that, along with clear definitions of scope, timescales and budget, will reduce inappropriate responses. You can also specify certain qualification criteria within your contract notice, for example a minimum turnover, which again will allow you to filter out organisations that you know will never be able to meet your needs. The whole procurement process is designed to initially filter out organisations that are fundamentally inappropriate, but then to compare those who could deliver the services, and decide which will provide the best, most economically advantageous solution to your requirements. Figure 2.4.2 illustrates the stages at which suppliers are filtered out of the process.

Figure 2.4.2 Filtering of suppliers



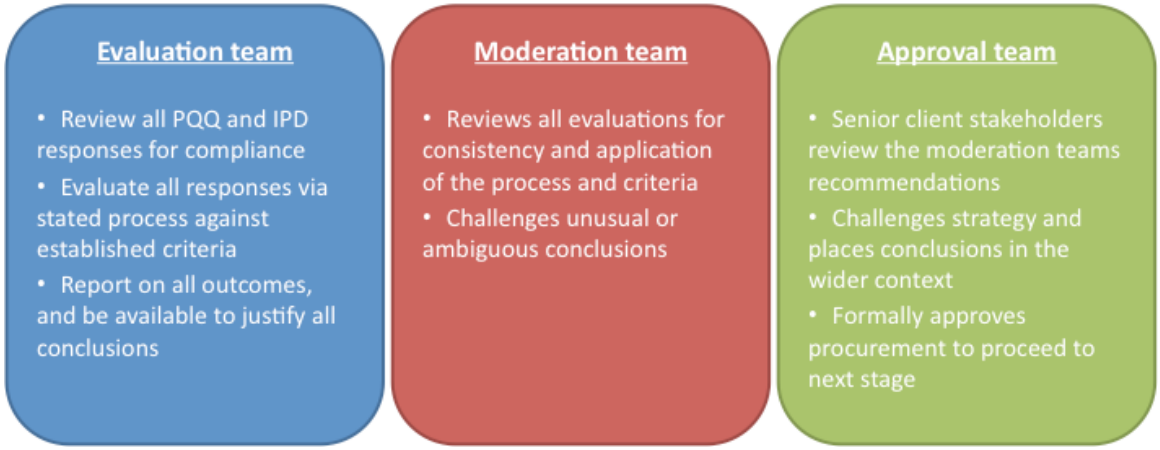
The pre-qualification process is concerned only with an organisation's past, and not what they can provide in the future. It should assess key, relatively broad areas to come to a conclusion about which suppliers are best suited to go forward into the dialogue process and develop solutions for your IWB needs. These areas are typically:

- Financial, in terms of the soundness of their financial footing, and whether this would impact on their ability to fulfil their contractual obligations should they be successful;
- Skills and experience, where they should demonstrate a track record that shows they have used the competencies that they will need used in a situation similar to this one;
- Processes, to prove that they have a system of quality management in place appropriate to the delivery of interactive technologies into education, along with other accreditations that you would like to see in a prospective supplier.

The Pre-Qualification Questionnaire (PQQ) that is used to assess these areas should be issued to all suppliers who expressed an interest and have met any stated qualification criteria. The method of its evaluation should be determined prior to issue and distributed with the PQQ itself so any organisations responding are completely clear on how they will be assessed.

The makeup of the evaluation team(s) is down to local requirements, but it is recommended that for each phase there is a moderation panel or function, usually made up of the same people, with the same brief, across the duration of the procurement. The headline terms of reference for each of the teams involved in the procurement process should look similar to those outlined in Figure 2.4.3.

Figure 2.4.3 Procurement teams



In terms of how the evaluation proceeds, the following process should be followed:

1. Train the procurement team on the objectives, the process and their responsibilities. You should also make it clear how they, and all of the procurement team, maintain probity throughout the process.
2. Gather the evaluation team together to encourage a consistent approach to the process and address any concerns individuals may have.
3. Allow evaluation team members to assess on their own.
4. Reconvene the team for a final session to pull together all the scores and help clarify any areas of ambiguity.

The guidance provided to the evaluators should show them both the philosophy behind the scoring and some practical pointers on how to come to a score for each question. This typically involves characteristics that a score of, say, 1 out of 5, would display along with statements against each question of what a good response should contain. For instance, for a question that asks for demonstrable experience, an extract of the scoring guidance (assuming the scoring ranges from 0–5) could be:

Score 0 – Unacceptable	Response information provided is wholly irrelevant, and/or unacceptable

(Response is missing or wholly irrelevant)	No provision of any responses that demonstrate experience relevant to the <clients> interactive strategy as defined in the tender documentation
Score 1 – Very poor (almost unacceptable & well below expectations)	Some experience of relevance, but the majority is generic and not specific to the <clients> interactive strategy as defined in the tender documentation Some information wholly irrelevant or incomplete

Certain areas of the PQQ may well be a 'yes or no' type of question (especially around the legal and financial areas), in which case the evaluation team must decide how these types of questions should be scored.

This, alongside some statements specific to each question that provide examples of what an evaluator expects to see if they are reviewing a response that is of an acceptable standard, should allow even those with limited direct knowledge to make an informed judgement. However, it must be clearly stated from the outset that if any evaluator does not feel that he or she has either the skills or experience to evaluate a particular area or question, they should not evaluate that area for any of the responses.

Once all evaluation is complete, a report summarising the outcomes should be compiled for subsequent moderation review.

The evaluation team (or a sub-set representing them) should present their outcomes to the moderation panel and expect significant review and analysis. If this analysis reveals areas that are worthy of re-assessment, then the evaluation team should reconvene and look at those once more. However, if the moderation panel is satisfied that the process has been run as intended and that the evaluation criteria have been appropriately and fairly applied, then the recommendations can go forward for formal approval.

Each client will have different internal approval regimes, but in terms of the procurement, it is recommended that senior members from the organisation, or a limited number, be gathered to review the moderated recommendation report. The procurement or project lead should present this, highlighting any areas of particular interest and answering any questions that this empowered group of individuals may have. These may be around the alignment of this exercise with the original outcomes of the procurement, the discipline around how the process has been followed or the outcomes of the evaluation itself. Once complete, this should allow for a small number of companies, ideally 3, to be taken forward into Dialogue. Those companies that are unsuccessful should be given brief feedback as to why they did not proceed, along with the opportunity to have a more detailed discussion if they feel that would be useful. This should also be offered to unsuccessful suppliers at each stage in the procurement.

Step 2d Enter into dialogue with a limited number of tendering organisations

Once you have formally selected a number of companies from the pre-qualification process, you officially open dialogue with them and initiate all of the meetings planned earlier on. The objective of Dialogue is for all the chosen suppliers to glean as much information as possible about you and your requirements, as this is a process that they should be driving. Suppliers should set agendas, request additional meetings, request attendees and generally try to define what they need to deliver the best possible response at the end of each dialogue stage. The meetings typically focus on the areas of Partnership, Technical Requirements and Commercial matters, although the most logical split should be one that follows the structure of your Invitation to Participate in Dialogue (IPD) document.

The IPD should cover every aspect of your IWB requirements, including:

- The partnering and/or professional services that you expect as part of the solution, incorporating design, integration, implementation, training, change management and operational support;
- The functionality required of the technical solutions that are within scope, including the IWB and/or projector, the standard and non-standard software, the cabling, the mounting, the sound system, any other peripherals, e.g. tablet notebooks, slates and voting systems, along with any other infrastructure you believe may be required;
- The legal and financial aspects that the commercial agreement will require, including full lifecycle costs and licensing.

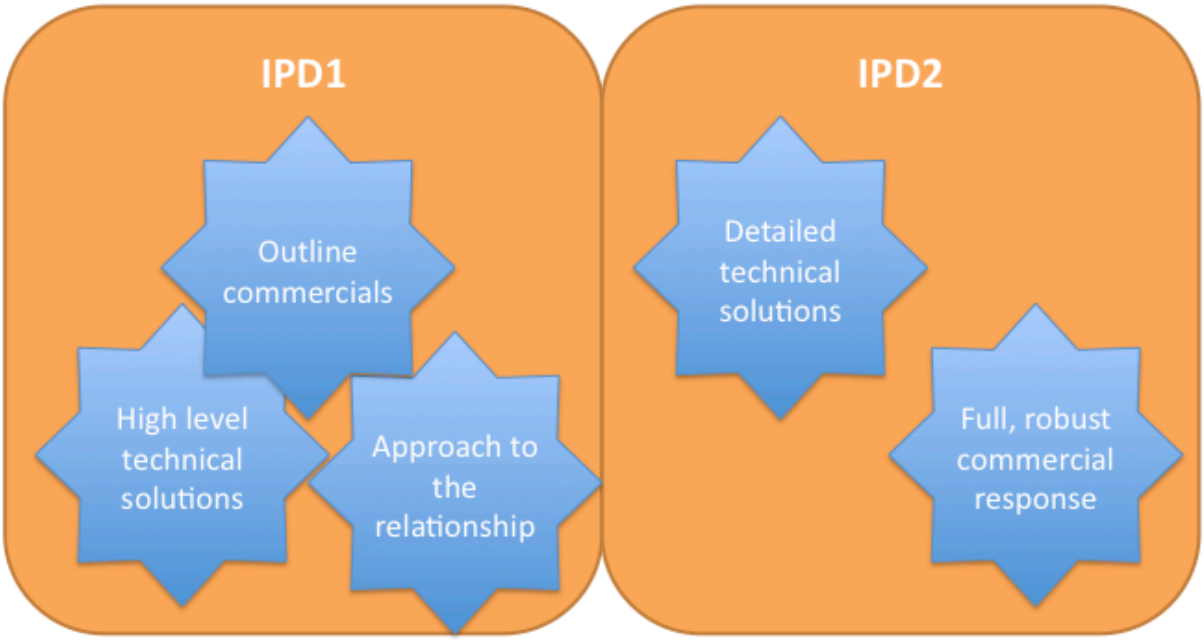
These areas can be expanded exponentially for larger projects, with those such as the Building Schools for the Future schemes in the UK including all the areas of employee transfer, long term partnering commitments and targets and extensive change management objectives.

The ideal way to split the evaluation team is along the same lines as your IPD document and your dialogue meetings, so people become familiar with their particular area/s. This allows subject or area experts to be placed where their skills and experience provide the most benefit. All tenderers must be treated equally and therefore given equitable access to people and resources within your organisation (including school visits), but as the programme of meetings progresses, the tenderers build up a better picture of what the IPD document is asking for.

A key part of the dialogue process is clarifications, or questions that tenderers ask concerning various parts of the IPD where they remain unsure either around the question being asked, or the information they have received during the dialogue meetings. The evaluation team must have a disciplined process for accepting and responding to these clarifications efficiently, allowing all suppliers as much time as possible with as much information as necessary. It may also be appropriate for the client body itself to clarify some areas where they feel they have been too ambiguous, even if none of the tenderers have specifically picked up on it.

If the IPD stage is split, different areas should be focused on within IPD1 and IPD2, see Figure 2.4.4. One supplier should then be deselected at IPD1, using the same evaluation philosophy and approach as detailed in step 2c above, leaving two suppliers to continue through the second stage towards submission of a final response. Meetings within each stage should reflect the areas being prioritised, and the IPD document should make it very clear what is expected from the initial and final bid responses.

Figure 2.4.4 – IPD split



Step 2e Closing dialogue, performing a final evaluation and appointing a preferred supplier

Once both sides are confident that the final two tendering organisations have received all the information they require, and that the commercial agreements have no material areas that remain in dispute, the client should formally close dialogue. Once dialogue has been closed, only very limited communication can occur between the tenderers and the client, using defined processes and not involving any major areas of clarification. Nothing significant should change between the close of dialogue and the submission of final tender responses.

The final bids are evaluated again, as per the process already detailed. Where one submission, and therefore one supplier, is deemed to be superior, they are appointed as a Preferred Bidder i.e. you disclose you intention to enter into a contractual agreement with them, but do not actually enter into that contract. Once this has been communicated to all the tenderers, a standstill period is entered, where essentially nothing is progressed for a minimum of 10 days.

Step 2f Achieving financial close and entering into a contractual arrangement

The process of achieving what has been commonly defined as 'financial close' comes down to how many areas still remain slightly ambiguous. The concept of

Competitive Dialogue is that these should be relatively insignificant as the vast majority of the solution is agreed during dialogue, but there have been numerous instances where this has not been the case and reaching financial close has been a long and arduous process.

Clients should bear in mind that:

- If the procurement process has been particularly protracted, technology or the sector may have moved on significantly and that they are not therefore about to contract on an out-of-date solution;
- They are prepared to enter the next stage of the project or programme, with schools ready for either design development or implementation, and all other major stakeholders engaged and well informed.

Finally, once both sides have approved all commercial agreements, the contract is placed and the preferred supplier becomes the partner in delivering the IWB solutions that have been defined throughout the procurement process.

Stage 3 Developing the design

The development of a design can occur in a variety of ways, and be carried out either wholly by the client or the supplier, or a mixture of both. The level of design responsibility placed upon a supplier will usually be determined by the skills of the client's in-house team. However, this report assumes that an output-based specification is produced that suppliers then tender against, and develop solutions from, as the procurement process moves along. Some, if not all, of the design development may well have occurred during the procurement process and it should be seen as necessarily following its completion, but wherever it occurs, the process should be the same.

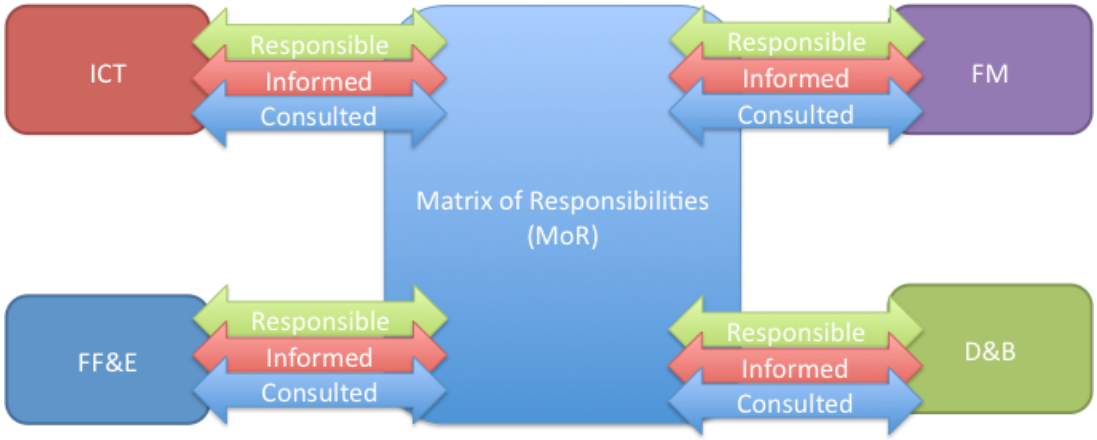
Step 3a Translating the functional specification into a technical specification

Put simply this takes the non-technical requirements and defines them in terms of the actual solutions that can be procured and implemented. In the case of an IWB procurement, this may start with a requirement such as 'two students are able to interact with content simultaneously' into a 'IWB Model X' along with the cabling, infrastructure and software require to make that happen. As this develops, cognisance must be paid to the affordability and integration of all designs.

Step 3b Integrating into the built environment and with other design disciplines

Providing an interactive solution in a school is obviously not a standalone process. Either you will have to integrate with the construction of a new building, or the operation of an existing one, with IWBs being only part of the picture in terms of how ICT can be used effectively to enhance teaching and learning. Therefore the first step should be to define everyone's responsibilities in the design and, ultimately, implementation of the solution. This forms the matrix of responsibilities, see Figure 2.5.1.

Figure 2.5.1 Matrix of responsibilities



Exemplar Integration Model

It should be noted, that not all institutions will require the following level of integration. Indeed, in some circumstances, a far more simple approach will be desirable. For example, mobile interactive technologies will not depend on this level of technical integration. Conversely, where a large-scale procurement exercise includes integrated AV and a broader network infrastructure, the following model may apply.

When integrating an IWB solution, the number of dependencies is numerous. What follows is an example of all of the aspects of a standard IWB that must be communicated across a design team delivering these solutions to schools. Figure 2.5.2 shows the typical cabling, dimensions and structural loading. A brief description of each faceplate precedes this.

The IWB faceplate

The IWB faceplate serves to connect the IWB to both the Local Area Network (LAN) and the client devices of the teaching (or potentially administrative) staff in that particular area. It is recommended that the IWB faceplate has the following as a minimum:

- Single (minimum, double if possible) Universal Serial Bus (USB) 2.0 connection to Audio/Visual (AV) faceplate;
- Single VGA (minimum) connection to AV faceplate;
- Single data (RJ45) CAT6 connection to LAN;
- Single power socket.

The AV faceplate

The AV faceplate serves to connect any type of IWB to the client devices of the teaching (or potentially administrative) staff in that particular area. It also provides the member of staff with power for their client device(s) and data connections to the LAN. The placement of the AV faceplate is integral to the teaching philosophy being implemented, and therefore could be as a wall mounted faceplate, or located within a floorbox. Co-ordination with Fixtures,

Furniture and Equipment (FF&E) consultants is vital at this juncture. The presence, or otherwise, of such items as a teacher's desk, workstation or lectern should also have a major bearing on the faceplate's final location. The distance between the client device and the AV faceplate should not exceed 4 metres.

It is recommended that the AV faceplate has the following as a minimum:

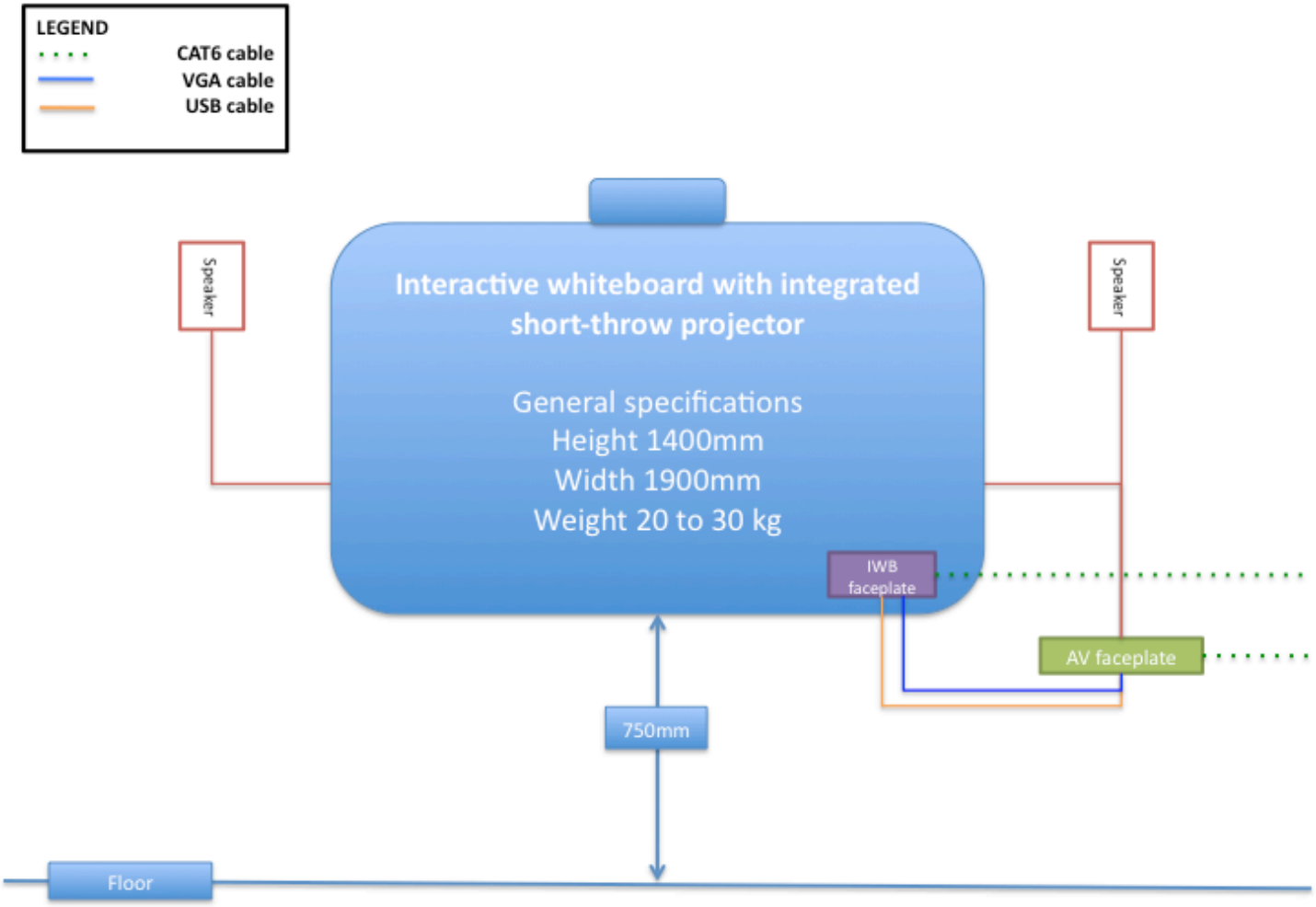
- Single (minimum, double if possible) USB 2.0 connection to Audio/Visual (AV) faceplate;
- Single VGA (minimum) connection to AV faceplate;
- Double data (RJ45) CAT6 connections to (LAN);
- Double (minimum) power socket;
- Stereo connections for class speakers.

General recommendations

Only by firmly establishing the educational outcomes required will the solution be one that delivers real benefits. However, overall integration with all of the other design disciplines is another vital element to the success of these installations. Generally, it is recommended that:

- All classroom lighting runs parallel with the IWB or projection surface. All lights closest to the whiteboard or projection surface should be on a separate circuit so that this can be switched off when the IWB or projection surface is in use whilst leaving the remaining lights on;
- All rooms with a projection surface are fitted with blinds to control glare from external light;
- The length of USB 2.0 cable runs should not exceed 5 metres. If this is to be exceeded, it is recommended that some form of USB hub or extension cable be used to ensure integrity of the signal. Even when using this type of technology to extend the range, it is recommended that the maximum overall length does not exceed 22 metres. The only exception to this recommendation is if a CAT6 data cable is run between the two termination points instead of a USB cable, and appropriate solutions are employed to run USB over Ethernet;
- In some instances a height adjustable IWB may be required to allow for its use by very small children, those with special educational needs or staff with physical disabilities, for example, in a wheelchair. This introduces some significant new dependencies in terms of the IWB's size (the frame will extend almost to the floor) and weight (the weight will increase significantly to around 90kg).

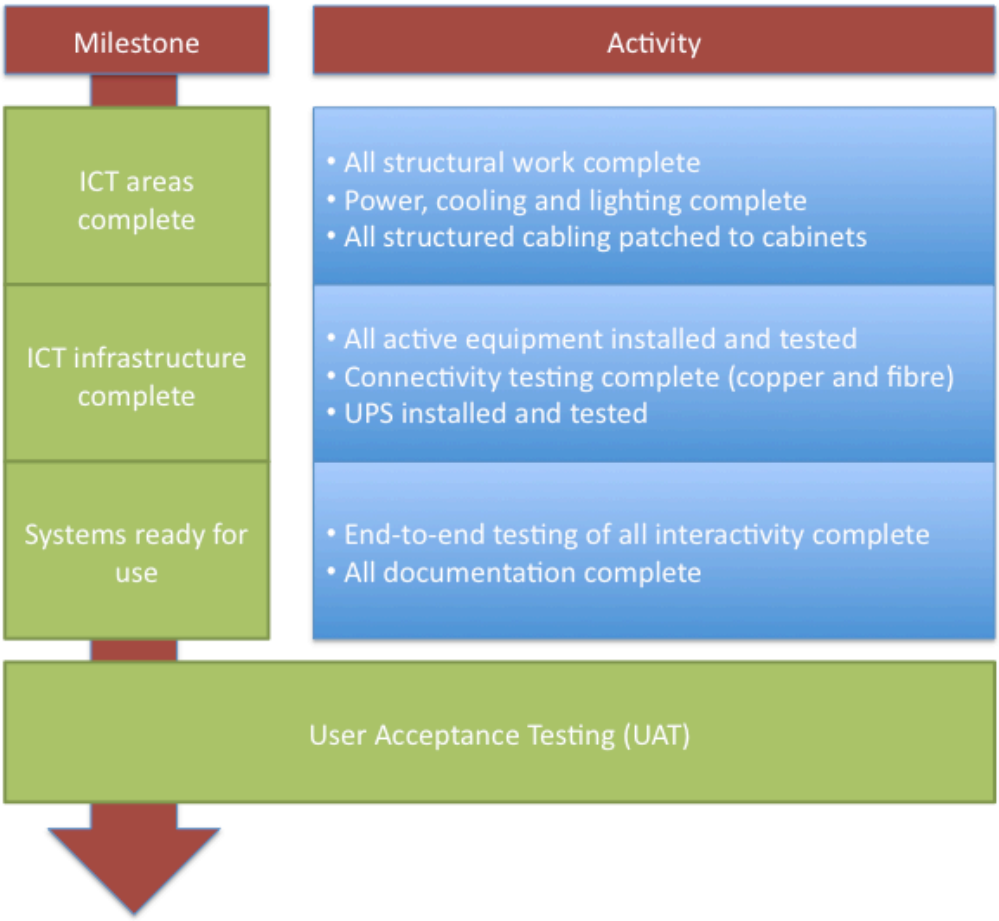
Figure 2.5.2 Exemplar fixed IWB set-up



Step 3c Agreeing testing and acceptance documentation

The IWB solution will have its own standalone testing and acceptance routine, but it will rely on other areas to deliver against its stated educational objectives. This will include the infrastructure that it relies upon to communicate with anything else, and the area where it will be sited. Testing and acceptance documentation should reflect these major dependencies, and be structured to reflect the 'layering' of technical solutions required. The testing and acceptance process is illustrated in Figure 2.5.3.

Figure 2.5.3 Testing and acceptance process



Step 3d Client approval for the final design

The final step is to present the fully developed design for client approval. The balancing act between schools and procuring bodies (assuming they are different) can often be tricky, which is why it is vital to engage with schools at the earliest possible opportunity and ensure the functionality is fully agreed from the outset. However, once this is agreed, the solutions can be moved into implementation to start delivering on the original benefits.

Stage 4 Implementing a solution

The proposals involve a programme of various activities that are derived from the educational requirements. These must be delivered on time, on budget and to the required standard of quality in order to meet the stated aims, and as such must be managed in a disciplined way. A project includes four key phases:

- Start up;
- Initiation;
- Delivery;
- Closure.

An ongoing element of control is applied during all of the phases listed above.

Step 4a Start up

- Plan the project definition for each school;
- Develop an agreed draft ICT budget for each school;
- Agree the key stakeholders from each school, including the formation of a project board;
- Review and reiterate the vision and educational objectives;
- Develop the aforementioned functional specification for each school, derived from any overall project functional specification, but showing the specific functionality required in each establishment.

Step 4b Initiation

- Review the technical specification against which the supplier will deliver;
- Plan the timescales of each, and how they integrate with any overall programme;
- Define the resourcing required, from both sides;
- Develop and agree a detailed budget;
- Develop relationships and stakeholder requirements.

Step 4c Delivery

- Deliver all elements of the project;
- Monitor and chase progress;
- Maintain the ICT plan and monitor against any overall build programme;
- Demonstrate/accept integrated performance;
- Manage and resolve risks and issues;
- Manage changes;
- Resolve resource issues;
- Maintain up to date status reports;
- Manage cross project dependencies.

Step 4d – Closure

- Gain clear sign off of project outputs;
- Achieve acceptance of project outcomes;
- Ensure transition into 'Business as Usual', and initiate all training;

- Develop list of lessons learned to ensure any wider programme learns from each experience;
- Perform benefits realisation exercise.

7 Installation and commissioning

Recommendations

It is imperative that the supplier of the equipment should also be responsible for the installation of the equipment. The client should provide guidance, in consultation with the supplier, as to their particular requirements. An agreed installation guide should be produced and signed by both a parties. This may be in the form or a sketch supported by documentation.

The key considerations are:

- The requirements for power and data;
- If adding a considerable number of power points it may be necessary to upgrade the main electrical distribution board;
- That the selected board will fit over the dado trunking if that is the chosen solution. This is particularly important if the selected IWB is height adjustable;
- How power and data should be installed (dado or other);
- Height of dado;
- Height of board;
- Space either side of the board;
- Where the leads from the IWB should be terminated; i.e. on the teaching wall or teacher's desk;
- Is how trailing cables will be avoided if the termination is on the wall close the where the teacher's computer will be located;
- If the termination is on the teacher's desk, define how will the cables reach the desk safely, possibly under the floor;
- Direct sunlight on the board, there may be a requirement for blinds;
- When should the boards be installed, possibly after school hours or in the holidays;
- Should there be security checks on installation staff if this work is undertaken whist children are on the premises;
- It is important that the installers deliver the IWBs on the day they intend to install. This will avoid unnecessary damage;
- The agreement should specify that the installer should remove any packaging on completion of the job

Warranty (for specification see Appendix 8)

The warranty agreements available may vary considerably between the suppliers. It is important to be clear what is covered within the agreement and for how long.

Additionally, details of how repairs/replacements are managed should also be clarified.

Interoperability issues

IWBs themselves raise no particular interoperability issues. They perform as any other touch-sensitive monitor that is supported by current operating systems. However, the presentation software that is commonly bundled with the IWB, such as Smart NotebookTM or Promethean ActivStudioTM or RM's EasiteachTM, may well raise significant interoperability issues. There is a common confusion between hardware and software amongst many non-technical teachers, who may regard these programs as being an integral part of the whiteboard itself. The presentations that are used to create and display are often referred to as "IWB content".

Whiteboard manufacturers have used the bundled presentation software to promote their boards as a one-stop teaching solution, and to distinguish their products from their rivals. Presentation programmes using proprietary file formats are often backed by large libraries of free presentation files and facilities to share further user-generated presentations in the proprietary format. At the same time, presentation software has often been licensed only to run on own-brand IWBs, being blocked by technical means from running on third-party IWB hardware.

This commercially-driven competition can prevent teachers from sharing user-generated content with colleagues working in schools with a different brand of IWB, or from taking their own presentations with them when they move from one school to the next, or even for using content in different classrooms within the same school.

In 2008 the UK Government commissioned a project to create a common file format to enable users of one type of IWB to use their resources on a different supplier's board (see below). This can be of critical importance to teachers who have to change between sites or rooms that have different types of IWB installed and are required to teach the same subject content.

Becta Common File Format

The Becta IWB Common File Format (CFF) standard has now been completed and has formally been supported by all major whiteboard suppliers. Whilst it is not yet clear whether the standard will provide a sufficient level of interoperability, the initiative has already created a very useful collective focus, and solid foundations on which to build sustainable solutions.

Concerns for Interoperability

A number of IWB suppliers argue that the imposition of a standard may inhibit the development of advanced and innovative features in their programs. This argument reflects a potential limitation of common data formats in immature markets: the standard will be useful for standard content, but may fail to translate content which encapsulates advanced features offered by some proprietary authoring systems. Another argument suggests that a more

sustainable approach to interoperability might be to encourage the development of free player software, while allowing software houses to make their returns on the sale of authoring tools—a model used successfully by Adobe for Acrobat and Flash, for example.

From a procurement perspective, it is important that the following considerations are reflected in the evaluation criteria:

1. Look for CFF conformance, as this will provide a useful minimum requirement. Be aware however, that the CFF standard does not yet guarantee full interoperability and questions will need to be asked of suppliers in terms of the possibilities and limitations of their products from this point of view.

2. Check that there are no licensing or technical barriers to running bundled presentation software in conjunction with third-party IWB hardware. Such restrictions may be designed to lock users into using only proprietary IWB hardware, and should not be accepted unless a compelling, logical and testable case is presented by the supplier.

3. Check for the availability of free player/viewer software, allowing files created on bundled authoring systems to be displayed in environments in which third-party IWB hardware is installed (e.g. Becta's free open source CFF player).

8 Support

As well as the procurement of hardware and software, the support available should also be considered during the procurement process. As a result of questionnaires and interviews carried out with vendors, the following recommendations outline the types of support that should be available during and after the installation of IWBs. There is also advice about how to compare what vendors offer in order to evaluate how well they meet the needs of the staff that will be using and supporting the IWBs and the value for money they provide.

In addition to specific support for the use of IWBs, schools should engage in the longer-term evaluation of the impact of using IWBs. This should inform future action planning and procurement. Engagement with an ongoing self-review process, focussing on wider use of ICT in schools, should include an element that focuses on the use of teaching technologies. This provides a sustainable approach to ICT development, including procurement that is fully grounded in the impact on learning. It also enables schools to take responsibility and ownership of the process, ensuring that it is relevant to their school communities. For more details of our recommendations about an EUN self-review framework, see Section 4.

Recommendations

Initial training

Initial training should be available at the time of installation of the IWB/s and may vary in length. It provides an overview of the functions of the board and software and enables teachers to start using it in their classrooms immediately. It should also include an introduction to any other resources that are available, such as prepared files, images and peripheral devices. Initial training may be carried out on a one-to-one or group basis and can be face-to-face, supported independent study or online.

Continuing Professional Development (see Appendix 11)

Continuing Professional Development (CPD) should be available to build on the initial training and provide a richer pedagogical context. It may be provided by the vendors or from other sources. Any costs involved should be included in the procurement process and the comparison of vendors' solutions offered.

Programmes of professional development offer longer-term building of knowledge and skills, specifically in the context of learning and teaching. This will develop critical reflection skills and enable teachers to make decisions about when the use of the IWB enhances learning and teaching. CPD programmes recognise the importance of contextualised learning and the ongoing nature of developing an understanding of how to make best use of IWBs in the classroom.

Community of practice

A supplier/vendor may provide direct support to schools or may provide access to a community of practice. If the vendor does not offer this, an alternative source of this type of support should be sought and made available to teachers. For

example, a regional multi-supplier exchange platform could be developed by institutions. Many Ministries of Education or educational institutions or entities want to be able to manage the way content is organized and provided in classrooms. This ensures content is suitable for the proposed curriculum and supports the required pedagogical model being developed.

It connects users of IWBs in order that they are able to ask questions, engage in discussion and share ideas and resources, such as learning and teaching resources, case studies and exemplar materials. This is usually an online community and may be complemented by meetings or events. A community of practice can provide a rich source of support and development through sharing and support from fellow practitioners with recent and relevant experience of using the IWBs in the classroom.

Suppliers are now making use of other collaborative websites such as Twitter, Facebook, Teacher-Tube, Linked-In and You-Tube. Users can follow suppliers to receive news and information about updates and advice.

Suppliers' websites also enable teacher-to-teacher connections through a range of different forums and blogs. Although some are not moderated, a number of them are controlled and you must join a group and be approved before you can contribute to online discussions.

Suppliers have created online knowledge databases. These provide users with answers to specific technical problems and assistance in locating resources and advice.

Teaching resources

All of the major suppliers now have developed a wide range of educational resources for use with their IWB. Most of the content is of a high quality with good interactive content. New resources (both from the suppliers themselves and teacher/user generated resources) are shared through collaborative websites and are frequently updated.

Typically suppliers have developed a separate website for sharing good practice. Although each website differs in layout and appearance, they all offer free teaching resources which are usually categorised and searchable by:

Skill level:

- Teacher
- User.

Subject or type:

- Lesson plans
- Resource packs
- Weblinks
- Age
- Phase of education.

In addition to the teaching resources, there are vast amounts of images presented through galleries that can be downloaded and used by teachers when they are creating their own resources.

Suppliers have negotiated with third party providers of other resources or software and their products can be used through links on the website. The purchase of third party products would be negotiated with the suppliers as part of an IWB package.

As well as searching for resources on the website, teachers can upload their own resources for sharing with other users. Before uploading a resource, they have to enter into a Share Agreement. The Share Agreement is a form of moderation; by accepting the Agreement the user acknowledges that they are responsible for any offence or criminal liability related to their work.

It may also be possible to access and use freely available materials available on the web. However, it is essential to check if these are compatible with the IWB installed and are interoperable on different boards and software.

Technical support

Technical support may be available, but may vary in nature. This may be part of a warranty and what is covered, and for how long, should be made clear. This may be provided by an onsite engineer or by telephone. It may provide new for old replacement, like for like replacement, repair of existing devices or temporary replacement. Requirements for IWB technical support may relate to the availability of wider ICT technical support in schools.

Comparing support packages

All suppliers have developed extensive support networks, including most or all of the elements outlined above. A comparison of their support packages is necessary to determine which model of support best fits individual requirements. A breakdown of suggested criteria for comparison is provided in Appendix 8. Any judgement should be based on the requirements of the specific procurement that should be contained in an educational vision and should take into account the level of technical and pedagogical support available locally.

9 Recommendations for Next Steps

The purpose of this paper is to provide guidelines for the procurement of fixed and mobile IWBs and associated technologies. However, the consultation process has highlighted the need for further and more specific guidance that could support governments, local authorities and schools. This could include some or all of the following:

- A 'Which Guide' to IWB offerings – including all components of technology, content, support, training, installation, warranty, price etc. This would provide a clear and pragmatic guide for MoEs, local authorities or schools to make informed choices and decisions. It could also include an expanded version of the exemplar guide in Appendix 1 and could detail specific product features and their associated pedagogical benefits. This would ensure that the best quality products are available to the market and that buyers are fully aware of the benefits of these products. Such a guide would need to be updated and published regularly, perhaps annually.
- Further expansion of the recommendations on procurement within this report could focus on the detail of determining the best route to procurement within different contexts, for example, local programmes versus national; programmes attached to capital build versus technology procurement programmes; open versus restricted (including framework contracts) and how to develop these structures. Different countries will have different priorities and will require different approaches, but guidance on this could be helpful.
- A central European Schoolnet resource bank of guidance to sustain the useful contribution made by Becta.
- An EUN Self Review Framework that supports schools in identifying their readiness to adopt IWBs, and supports them in identifying CPD needs.
- An EUN ICT Mark that recognises best practice with IWBs
- A virtual network for practitioners to share ideas and resources (a good UK example being www.myschoolnetwork.org set up by the Specialist Schools and Academies Trust)

10 Appendices

Appendix 1 Checklist for IWB specification

The specifications outlined below should not be seen as prerequisites to any IWB procurement decisions, but are an outline checklist for the various different IWB technologies. It is likely that different IWB products have either a full complement or combination of the following functions and features. Indeed, purchasers will have varying opinions about which features are or are not important. It will be important therefore to ensure procurement decisions are based firmly on matching educational requirements or outputs to technical specifications.

	Please circle/complete
Touch Recognition	
Does the IWB require a proprietary pen or stylus?	Y / N
Can you write on it with your fingers?	Y / N
Can you erase areas with your whole hand?	Y / N
Is the board immune to inadvertent contact (accidental hand/finger contact etc)	Y / N
Do you have to manually select the different tools or does the software detect what you are using and change automatically?	Manual / Auto
Can you switch between input devices through a control tool/remote control?	Y / N
Modes of working	
Does the IWB support dual users?	Y / N
Does is support multiple user if so how many?	Number:
Does the IWB support dual users over its entire surface, or is each user limiteds to a particular area?	
Does it automatically switch between a single and dual/multi-user?	Y / N
Network enabled	
Is the IWB projector IP addressable?	Y / N
Theft resistant	

Is the projector security enabled?	Y / N
Can it be locked down	Y / N
Does the software make it unusable if removed?	Y / N
What is the bulb life of the projector? (Hours)	Hours:
What is the replacement bulb cost?	Cost:

Pens/Drawing tools

Is there a place to store/select pens attached to the board?	Y / N
Are the pens automatically detected by the software?	Y / N
Are there pointers adapted for younger pupils?	Y / N
Are there special pens for SEN users?	Y / N
Do the pend offer a 'hover over' function?	Y / N

On screen keyboard

How does a user activate the onscreen keyboard?	Give answer:

Overwriting during a presentation

Is it possible for a user to 'write' over:

• Documents;	Y / N
• Images;	Y / N
• Videos;	Y / N
• Websites?	Y / N

Saving screens

Is it possible to save a screen that has been worked on?	Y / N
Can a saved screen be edited?	Y / N
Can it be edited in other applications as well as the IWB software, e.g. Microsoft Word, Excel and PowerPoint?	Y / N
What other applications can be used in conjunction with the suppliers' own software?	Y / N

Connections

Is the IWB connected through a USB cable?	Y / N
Can the IWB be used with Bluetooth, RF, or wireless functions?	Y / N
Is it accessible via a wireless connection?	Y / N

Mounting

Is the IWB wall mounted?	Y / N
Is it attached to a bracket?	Y / N
Is there a floor stand available?	Y / N
Is the floor stand height adjustable?	Y / N
Is the above electrically or manually adjusted?	

Speakers

Does the IWB package include speakers?	Y / N
Are the speakers attached to the IWB?	Y / N
Do they require separate brackets?	Y / N
Are the speakers stereo?	Y / N
What is the wattage of the speakers?	Wattage:
Can additional speakers be added to provide sound at the rear of the room?	Y / N

Aspect Ratios

Is the screen viewed locked to a standard view format?	Y / N
Is a wide option view available?	Y / N

Warranty

Are warranty agreements available for the IWB packages?	Y / N

Is this included in the initial price? Y / N

How many years warranty is included?

Years:

What components are included within the warranty agreement? A:

Surface durability

How robust is the surface of the IWB

How has it been treated?

How can it be cleaned?

Damp Cloth	Soap and water	Propriety cleaner	Manufacturers cleaner			

IWB size specifications

Size: Height: Width: Depth:

Active screen size: Height: Width: Depth:

Active screen size

Weight:

Appendix 2 Projector

Ceiling or short throw projection units

Does the IWB support the use of a short throw projector unit?	Y / N
Does it support a ceiling mounted projector?	Y / N

Short throw projection

Is the projector boom fixed?	Y / N
Could it be altered to accommodate different room sizes?	Y / N

Projector maintenance

What is the average lamp life of the projector?	Hours:
How frequently should the projector filter be cleared?	Days:

Projector specifications

Size	Height:	Width:	Depth:
Weight			
Shipping weight (if applicable)			

Remote control

Size	Height:	Width:	Depth:

Extended control panel/module (if applicable)

Size	Height:	Width:	Depth:

Appendix 3 Software

As well as functionality listed below, these items should be considered:

- How software is delivered (online download, DVD, memory sticks)
- What operating system the application runs on
- What languages the software supports (menus, resources, helpfiles, hand-writing recognition)
- Whether there is a free-of-charge version available for students, teachers at home etc)
- Licensing options
- Whether upgrades and enhancements are included in the licence
- Whether the software is closely coupled with online free and premium resources
- Does it include built-in 'Help' resources

Software Function	***Offered by the software? Y/N***
Add Link (to item);	
Align Items	
Animate items;	
Delete;	
Dual Page Display;	
DVD player;	
Eraser;	
Export file;	
Fill Tool;	
Font Tool;	
Freehand Drawing Tool;	
Full Screen;	
Insert Animation;	
Insert Blank Page;	
Insert File;	
Insert Image;	
Insert Text;	
Insert Table;	
Insert Video;	
Keyboard;	
Line Tool;	
Lock Items;	
Next Page;	
Open;	
Paste;	

Pen;
Previous Page;
Print;
Redo;
Reveal/Hide Screen;
Save;
Screen Capture;
Select Objects;
Shape Tool;
Show/Hide Toolbox;
Sound recorder;
Text Tool;
Undo;
Video player
Volume Control;
Zoom;

Appendix 4 Interactive tablet

Battery Type:		
Bluetooth or RF connectivity:		Y / N
Active area diagonal:	Height:	Width:
Active area dimensions:	Height:	Width:
Battery charge time:		Mins:
Battery Life		Mins:
Computer Connection:		
Fully integrated with IWB software:		Y / N
Fully integrated with voting/student response software		
Ability to use several tablets simultaneously		
LCD interface:		Y / N
Operating Distance from Receiver:		Metres:
Operating systems supported:		
Operating Temperature:		Degrees C:
Output rate:		
Pen weight:		
Proximity for working pen:		

Resolution:			
Single/dual functionality:			
Storage Temperature:			
Technology used e.g. electromagnetic:			
Warranty:			
Weight:			
Wireless connection:			
LCD screen communicating with voting clicker for result feedback per student			

Appendix 5 Interactive panel/interactive pen

Colour Depth:			
Computer connection:			
Display Area:	Height:	Width:	
Input video signal:			
Luminance:			
Operating Systems supported:			
Operating Temperature:			
Pen tool buttons:			
Size:	Height:	Width:	Depth:
Storage Temperature:			
Supports common software applications:			
Technology used:			
Tilt stand available:			
Viewing angle:	Horizontal:	Vertical:	
Warranty:			
Weight – with stand:			
Weight – without stand:			
With tilt stand – highest position:	Height:	Width:	Depth:
With tilt stand – lowest position:	Height:	Width:	Depth:

Appendix 6 Student response systems

Creating quizzes and tests	
Does the software support:	
Yes/No questions;	Y / N
True/False questions;	Y / N
Multiple choice questions;	Y / N
Full text responses.	Y / N
Answer series	
Numeric	
Homework mode	
Self pace mode	
Is the student response system integrated with the IWB software	Y / N
Is the student response system a standalone application?	Y / N
How many response options are available on the clicker?	Y / N
Does it have bidirectional automatic connection?	Y / N
Communication with wireless tablet to display reports of answers?	Y / N
Can the questions be weighted?	Y / N
Can the responses to the questions be exported into other applications?	Y / N
Can users change their responses?	Y / N
Can the questions be scheduled to appear for a set period of time?	Y / N
Are there software tools available to help set up specific questions such as scientific equations and algebraic expressions?	Y / N
Are multiple languages supported?	Y / N
How many languages are supported?	
Displayed feedback	
Does the data automatically appear as graphs/pie charts?	Y / N
Can the graphs/charts be saved for later interrogation?	Y / N

Can the data automatically appear in real time on another device (e.g. wireless tablet, screen other than computer's?) Y / N

Data storage

Can the individual pupil responses be tagged to that pupil? Y / N

Can a record of individual pupil responses be kept for?

- A term: Y / N
- An academic year: Y / N
- A pupil school lifetime: Y / N

Response mode

Can a handset be tagged to an individual pupil? Y / N

Can a pupil respond anonymously? Y / N

Virtual Mark Book

Can the teacher determine how their Mark Book is set up? Y / N

Can the Mark Book be used to track pupil progress over a period of time? Y / N

Handsets

What type of technology is used?

Is the system wireless based? Y / N

Maximum number of handsets per receiver?

Do you need line of sight between handset and receiver? Y / N

Operating distance from receiver?

Do the handsets require batteries? Y / N

What type of batteries is required?

What size are the handsets? Height Weight:

Can rechargeable batteries be used? Y / N

How heavy are the handsets?

Can the handsets transmit from multiple locations? Y / N

Operating systems supported?

Warranty?

Receivers

RF Frequency?

IR?

Computer connection?

Do they need external power supply?

What size are the receivers? Height: Weight: Depth:

What weight are the receivers?

Operating systems supported?

Warranty

Appendix 7 Visualiser

Features of the system

Auto Focus

Auto tune – ambient light

Can the neck of the visualiser be rotated to capture images from all angles?

Is there a Freeze frame feature?

Is there a zoom feature?

Size: Height: Width: Depth:

Weight:

What operating systems are supported?

Is it TWAIN compatible?

What are the system requirements?

Warranty:

Output

Resolution:

Frame rate:

Is there analogue output to VCR/TV?

Connections

How can you transfer images to a computer?

Image features

Is there any internal image storage?

What capacity is the internal storage?

Will the storage manage whole screen presentations?

Is there a slideshow facility?

What is the capture area? Height: Width:

Can images be rotated?

Is there a pan feature?

Lamp

What is the lamp type?

What is the average lamp life?

How many lamps are required?

Appendix 8 Support packages

Global reseller network

What can the local resellers offer?

How many countries does a local reseller support?

How are their resellers chosen?

What level of training do the resellers have in the products?

Consultation services

How do they consult with clients?

- Face to face
- Tele conference facility available
- Virtual meetings

What level of support do they offer throughout the deployment stage?

Can they offer any support for strategic planning?

Do they offer any support with strategic planning?

Documentation

What types of documentation are available for users?

- Technical
- Content developers
- Application developers

Technical support

What is the size of their support team?

Do they have country specific teams available?

Is there any additional cost for support packages:

- Online
- Telephone
- Email

What level of trouble shooting support do they offer?

Do they offer any on-site support for maintenance/repair work?

Warranty agreements:

How long is the agreement for?

What is covered by the agreement – Parts and labour?

Is it covered for work on site?

Is it a return to a base agreement?

If the goods are found to be faulty on delivery how is this dealt with?

If goods have to be shipped for repair/replacement who covers the cost?

Is there any warranty extension/enhancement available?

Appendix 9 Becta's Self Review Framework (SRF) criteria

Becta's SRF is composed of the following eight elements. School leaders and practitioners can assess their schools' current practice against the detail in these eight elements. Outcomes can then be used to plan future developments, which will include procurement of interactive technologies where these are deemed to have a potentially beneficial impact on learning and teaching.

The eight SRF elements are:

1. Leadership and Management
    - The vision for ICT
    - A strategy to achieve the ICT vision
    - The use of ICT to improve organisational effectiveness and efficiency
    - Monitoring and evaluation
2. Curriculum
    - The planned ICT curriculum
    - Pupils actual ICT experiences
    - Curriculum leadership and review
3. Learning and Teaching
    - Teachers' planning, use and evaluation
    - Learning with ICT
    - Leadership of learning and teaching
4. Assessment
    - Assessment of, and with, ICT
5. Professional Development
    - Planning
    - Implementation
    - Review
6. Extending Opportunities for Learning
    - Awareness and understanding
    - Planning and implementation
7. Resources
    - Provision
    - Access
    - Management

8. Impact on Pupil Outcomes

- Pupil's progress in ICT capability
- Pupils' progress more widely
- Attitudes and behaviour

Appendix 10 Suggested site survey structure

Site Survey Record

It is also recommended to include a detailed exemplar room/learning space sketch.

Positioning the board

Wall location/type of wall/flatness of wall

Is trunking required, and if so, who will provide this?

Is the location clear of obstacles (e.g. is there an old board to be removed)

Location of brackets

Board Height

Board Width

Board Depth

Clear access from tables/desks

Projector installation

Ceiling mounted (Secure fixing points)

Beam route – clear line of sight

Board mounted – short throw

Data Points

Close to IWB

Close to computer access

Close to projector

Power sockets

Close to IWB

Close to Projector

Computer location

Close to IWB

Internet access

Speakers

Board mounted

Bracket mounted

Power supply (if applicable)

Sunlight/ambient light

Blinds required

Brightness reduction required

Appendix 11 Exemplar CPD Design

It is advisable to develop a tailored, blended approach to CPD, dependent on school contexts and levels of existing expertise. While the main focus in this instance, would be on embedding use of interactive technologies to support learning and teaching, any CPD must also be clearly focused on raising standards of achievement for every student. What follows is an *example* only, but could be a useful starting point for development of a CPD and training programme.

The programme could consist of, but may not be limited to:

- Strategic leadership workshops
- Practitioner workshops
- Face to face training and presentations
- Specific hardware and software training
- Establishment of a Coaching and Mentoring system within a school, to build on developing expertise and to sustain on-going improvements in practice
- Establishment of accredited, action-research opportunities for teaching staff to enable them to focus on how interactive technologies support or enhance learning, possibly leading towards recognised accreditation
- Linking with other existing networks for collaboration and sharing best practice or resources

Principles underpinning design of CPD

A modular approach is often a sound approach, where a list of core modules is available for teachers to choose form, according to their confidence and expertise. This ensures CPD is personalised for each practitioner. Core aims should include:

- All staff involved in learning are able to use interactive technologies effectively in their personal, professional and learning capacities
- All staff are skilled in making the very best and most appropriate use of interactive technologies to enhance learning and teaching
- Staff consider a range of pedagogical approaches, so that learning provision focuses on improving the personalised learning experience for individual learners.

Scope

The Training Programme could focus on:

- Change Management: for all staff, including Personalisation, e-Portfolios, Assessment for Learning , Management and Administration, Inclusion and Relationships or any other key local educational agenda

- Operational Training: for all staff who support learners, including differentiated induction training in operating new systems and peripherals
- Curriculum Training: to support development of personal confidence and competence and professional efficacy in the use of interactive technologies in learning and teaching, personalisation, raising standards and innovation (e.g. through examples, case studies and short term projects).

Example Modules

Optional modules could include the following:

Description of Training
Change Management training
Raising Awareness – Transforming Learning and Teaching with interactive technologies. Understanding the Vision & Developing a strategy and a programme.
Enhancing Learning
Enhancing collaboration
Inclusion
Management and training
Assessment for learning
Total cost of ownership
Technical support requirements
Operational training
Use of hardware – with exemplars
Use of software/content – with exemplars
Developing/creating new content
Mobile Learning – how to use mobile interactive devices to support teaching and learning
Collaborative tools
Curriculum training
Introduce learners to key features to maximise the learning opportunities available
Introduce teachers to the key features to maximise the teaching opportunities available
Creating content - establish a quality threshold for in-house produced content
Selecting subject specific content (Public / Commercial) to support personalised learning
Interactive technologies and the Learner – maximise the benefits of new technology and develop individual study skills, collaboration, presentations and communication
Interactive technologies the Teacher - maximise the benefits of new technology and develop individual study skills, sharing best practice, presentations and communication
Developing schemes of work and Lesson Plans that embed use of interactive technologies