DESIGN & CONSTRUCTION POST PROJECT EVALUATION
OF THE CHILDRENS HOSPITAL for WALES PHASE 2
AT UNIVERSITY HOSPITAL of WALES CARDIFF

November 2015
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Cardiff & Vale University Health Board & Interserve Construction Ltd
EXECUTIVE SUMMARY

The Childrens Hospital for Wales Phase 2 (CHfW) is a world class purpose built facility at the University Hospital of Wales Heath Park (UHW) that provides a one stop for children’s health care in Wales. The second phase completes the Childrens Hospital, including Outpatients, Physiotherapy, Radiology, Audiology, Medical, Renal, Cardiac & Inpatient beds, Operating Theatres and Paediatric Intensive Care Unit.

The new build CHfW project is located in the heart of the UHW grounds, seamlessly connected to the CHfW Phase one building and a link at third floor level to the existing neonatal intensive care.

Cardiff & Vale University Health Board have undertaken extensive dialogue with all stakeholders and in particular patients and their relatives. It is recognised that this interaction and early engagement has realised significant benefits in terms of the patient experience.

The CHfW was subject to a standard business case approval process by Welsh Government namely Strategic Outline Case, Outline Business Case and Full Business Case. Welsh Government approved funding of £60.5 million for the phase two project, which was supported by generous additional funding from the Noah’s Ark Children’s Hospital Charity for equipment to Wards, Theatres & Hydrotherapy Suite.

The project was undertaken utilising the Designed for Life Building for Wales 1 framework with a construction value excluding Value Added Tax of £48m, with the following parties appointed:-

Supply Chain Partner : Interserve
Project Manager : Gleeds
Cost Adviser : Gleeds

The CHfW project was successfully opened ahead of time and within the approved budget and to the required standard. The CHfW project also achieved:-

- a BREEAM Healthcare score of Very Good (predicted).
- an AEDET score of 5.1 at FBC (maximum score of 6, target of 4)
- local labour 88% of personnel were Welsh based
- sub-contractor expenditure of £29m, 80% of total construction cost with businesses based in Wales
- 616,000 hours worked on site with just one Reportable Incident.

CVULHB CHILDRENS HOSPITAL for WALES Phase 2
A summary of best practice and lessons learnt by all parties on this project are:-

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<td>Way finding - engagement not just with adults but children; delivered an innovative and appropriate outcome for its young audience.</td>
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<td>The Contract Manager was involved from inception to completion providing essential continuity.</td>
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<td><strong>Site Management</strong></td>
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<td>Early involvement of the Supply Chain enabled Early Planning which is fundamental to the success of a project.</td>
<td>Early Planning provides more considered and realistic solutions e.g. Traffic Management Plan.</td>
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<td>Project awarded the H&amp;S Considerate Constructors Scheme Gold Award &amp; one of the UK runners up.</td>
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<td><strong>NEC &amp; Contract Management</strong></td>
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<td>The strict application of the NEC3 suite of contracts is an enabler to collaborative working.</td>
<td>Informal ‘Hot Topic’ meetings held weekly were invaluable.</td>
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<td>Proactive use of NEC3 contract procedures and risk register.</td>
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<td>Project Information Forms – PIF’s were developed and used to ensure the Client understood and approved proposed design changes and their cost implication.</td>
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<td><strong>Risk Workshops &amp; Value engineering</strong></td>
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<td>The project was kept within budget through Value Engineering</td>
<td>Value Engineering should not become cost cutting, suitable levels of sophistication for the control of building services should be incorporated.</td>
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<td>Risk workshops were held early in the process and identified and covered the majority of project risks.</td>
<td>Infection control items such as Aspergillus should be properly assessed and appropriately allowed for in the risk register.</td>
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<td>Additional Capital Investment to provide revenue savings adds real value.</td>
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The evidence shows the CHfW was a very successful construction project; an extremely challenging scheme in terms of logistics, delivered ahead of time, on budget and to a high quality. This evaluation has confirmed that key construction objectives have been achieved.

The CHfW provides a truly World Class facility for the Children of Wales, with state of the art facilities, fit for purpose and equipped for the provision of 21st Century Healthcare.

This Design & Construction Post Project Evaluation has been carried out with the involvement of the whole delivery team in a proactive and a blame free culture. Thanks are extended to all those involved.
DESIGN & CONSTRUCTION POST PROJECT EVALUATION METHODOLOGY

Context

The requirement for undertaking a Design and Construction Post-Project Evaluation is a constituent part of delivering the NHS Capital Programme within Wales; this was highlighted within the Welsh Government guidance issued to all NHS Wales bodies on 18th June 2013, and reiterated in the NHS Wales Infrastructure Investment Guidance issued on 30th June 2015. Framework Members can view this guidance using these hyperlinks http://www.designedforlife.wales.nhs.uk/welsh-government-requirements and http://www.wales.nhs.uk/sites3/Documents/254/WHC-2015-012%20-%20English%20Version.pdf

Consequently Design and Construction Evaluations are to be facilitated by NWSSP Specialist Estates Services and are to be undertaken during Stage 5: Operational Commissioning and Project Closure; the outputs of an evaluation should focus upon the performance of the project delivery from start of Stage 2: Outline Business Case development to Stage 5: Operational Commissioning and Project Closure (N.B. Stages as defined in the Designed for Life: Building for Wales process maps and Schedules of Services).


Why carry out a Design & Construction PPE?

Post-Project Evaluation is a fundamental tool in achieving Best Value for Money and through lessons learnt can improve future project performance and decision making by key stakeholders.

Post Project Evaluation can be an aid to:

- Improved design, organisation, implementation and strategic management of projects;
- Promote organisational learning to improve current and future performance;
- Avoid repeating costly mistakes;
- Improve decision-making and resource allocation (e.g., by adopting more effective project management arrangements);
- Improve accountability by demonstrating to internal and external parties that resources have been used efficiently and effectively; and
- Demonstrate acceptable outcomes and/or management action thus making it easier to obtain extra resources to develop healthcare services.
How has this PPE been carried out?

In accordance with the ‘Guidance’, this evaluation has been undertaken in an impartial, objective and Blame free culture, which has involved the Health Board and all other key stakeholders of the Project Delivery Team. A specially structured suite of Pro-forma & questionnaire was issued to all (refer to Appendix A) to evoke memoirs of issues both good and not so good that occurred during the project journey. A workshop was then held with a select number of attendees representing Client, Supervisor, Project Manager, Cost Advisor and Supply Chain Partner, to further investigate the main themes and issues noted within the questionnaires to fully understand and highlight lessons learnt. The draft report was then reviewed with the Health Board and signed off prior to publishing.

In the interest of continuous learning and to benefit future project design, planning, development and management; this Design and Construction Post-Project Evaluation will be shared with Welsh Government, all NHS bodies, Framework Members and the Service Post Project Evaluation Team Members.

The Service Post-Project Evaluation, completed in accordance with the Benefits Realisation timeframe, will be initiated by the Health Board (normally during Stage 6: Completion). The Welsh Government Integrated Assurance Hub will provide support in developing and undertaking the Service evaluation.
The Children’s Hospital for Wales Phase 2 has a construction value of £48M and has been delivered through the Designed for Life 1 Framework Agreement. The UHW is a large and extremely busy campus; each day sees a great number of visitors, by car, bus and on foot; add to this the high number of staff and the result is an extremely congested site.

Construction on the Heath Park site commenced in 1963, the dental hospital opened in 1965 and the Main Hospital was occupied in 1970. Various buildings have been added to the site over the intervening years so enabling the Health Board to respond to ever evolving service requirements; it is fair to say that site development is near capacity.

This second phase project completes the Childrens Hospital (Phase One of the Childrens Hospital was completed in 2005). Throughout the Design and Construction stages there were various challenges to consider and triumph over to ensure the provision of Hospital Services continued uninterrupted. The demolition of an existing building, construction of the new facility within the confines of an extremely busy live hospital environment, immediately adjacent to a number of existing buildings and adjoining the Phase one building, and not least ensuring traffic management arrangements worked well.

This second phase project completes the Childrens Hospital (Phase One of the Childrens Hospital was completed in 2005). Throughout the Design and Construction stages there were various challenges to consider and triumph over to ensure the provision of Hospital Services continued uninterrupted. The demolition of an existing building, construction of the new facility within the confines of an extremely busy live hospital environment, immediately adjacent to a number of existing buildings and adjoining the Phase one building, and not least ensuring traffic management arrangements worked well.

Phase 2 is shown in the photograph below within the red circle, which depicts the congested nature of the campus and the obvious challenges this posed.
The hospital is expected to admit 23,000 inpatients and 50,000 outpatients each year. The children of Wales deserve the best facilities, and with its child friendly design the building...
provides a dramatic and reassuring introduction to the hospital experience with the use of colour and themed graphics on the walls, each floor has its own colour and theme to help children and parents with way finding around the building. The building is fully inclusive and accessible.

Accommodation

Accommodation and facilities over the five floors include:

New outpatient’s clinic with 17 consulting rooms, cafe and waiting areas.
Physiotherapy
Hydrotherapy pool
Radiology (including fluoroscopy, x ray and MRI scanners)
Dedicated audiology department with 2 sound proofed rooms.
31 medical, renal and cardiac bed spaces, with playrooms
51 inpatient beds
5 operating theatres and recovery
Paediatric intensive care unit

New Build Construction

The new build construction comprises a steel framed building with in-situ concrete upper floors on profiled metal decking. Plant rooms and plant located on the roof generally had an insitu concrete floor, whilst the remainder of the roof area was insulation laid to falls on metal decking with single ply membrane roof finish. Pre-cast concrete stairs were installed to both stair cores during steel erection. External walls generally comprised of SFS frame system lined with cement particle board with Sto render finish on insulation. Feature cladding panels were used on some elevations, with face brickwork to window cill height on the main road elevation. The external walls to the plant rooms at roof level had single skin metal
cladding. Aluminium double glazed curtain walling system with vertical multi coloured Brise soleil panels were used in the courtyard elevations to bring natural light into the Atrium. Aluminium windows were installed to all other areas, with horizontal Brise soleil panels on South facing window elevations. A large roof light was also located at the top of the Atrium ceiling/roof, again to let in light and also provide ventilation and a smoke extract system. Plasterboard interior skin to the external walls with a polythene barrier added in order to help improve air tightness values. Internal partitions comprised of metal stud with plasterboard, taped and jointed. Suspended grid ceilings to most areas and MF ceilings in specialist areas e.g. Theatres. Vinyl flooring was predominantly used with the odd room having carpet. Whiterock cladding to walls was fitted where a greater level of protection was required e.g. pool & shower areas. The M&E installation comprised of sprinklers, High efficiency condensing boilers, radiant heating ceiling panels, mechanical ventilation with heat recovery, automated LED energy efficient lighting, induction hearing loops to reception /nurse bases. CCTV generally to all areas accessible to the public such as reception, ward entrances, lift lobbies, corridors etc. Each of the two access cores also had 3 lifts, 1 bed lift and two passenger lifts with one of these lifts being a fire fighting lift.

Segregation of staff and public areas was achieved by extending the hospital TDSI security system to relevant doors. This networked Health Board wide system operates locks using staff ID badges, and assists in ensuring security and safety can be maintained without the use of large numbers of keys. The existing air tube conveyor system was also extended into appropriate areas of the new hospital.
**Delivery Team and Headline Information**

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<th>Client</th>
<th>Cardiff &amp; Vale University Health Board</th>
<th>Supply Chain Partner</th>
<th>Interserve</th>
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<tbody>
<tr>
<td>Project Director</td>
<td>Geoff Walsh</td>
<td>Architects</td>
<td>Boyes Rees</td>
</tr>
<tr>
<td>Health Board Project Manager</td>
<td>Jonathan Brickley</td>
<td>Structural Engineers</td>
<td>Opus</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Gleeds</td>
<td>Building Services Engineers</td>
<td>Hoare Lea</td>
</tr>
<tr>
<td>Cost Advisor</td>
<td>Gleeds</td>
<td>Cost Manager</td>
<td>N/A</td>
</tr>
<tr>
<td>Supervisor</td>
<td>Parsons Brinckerhoff</td>
<td>Health Planner</td>
<td>Boyes Rees</td>
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| Gross Floor Area          | 15,119m²                              | Construction Cost    | £48M       |
| Commencement on Site      | May 2010                              | Completion (Section 1 - Building) | January 2015 |
| Clinical Accommodation    | Open to Patients March 2015           |                      |            |

**Some note worthy points considered as part of the evaluation are included below**, wider issues are considered in detail and can be found under ‘Best Practice & Lessons Learnt’:

**Design strategy**... The hospital has been designed specifically for the children, with plenty of areas for them to play and get well. Tailored to the needs of its young patients with attention to detail, it is light, bright and airy. The staircases have two handrails, one at adult height and one at child height. As the children move through the hospital they go from one child friendly environment to another. All single bedrooms have their own en suite shower and wc facilities, and multi bed bays again having access to their own facilities located within that space.
There was a need to connect the new building to the Phase 1 building and also to the Neonatal Intensive Care Unit on the third floor in a different adjacent building. Not an easy task, however the new building incorporates ‘SKY LINKS’ to enable this access. The route for the sky link to Neonatal was further complicated by having to be constructed through the middle of a live existing plant room; it was not a simple task to ensure continuity of services.

**Future proofing by design...** On the 2nd and 3rd floors some voids remain in the building to accommodate future service development. The internal partitions throughout are metal stud and plasterboard which will also aid any future remodelling.
Patient Interaction... There are specialist state of the art LED lighting systems included in the Radiology department which improve the environment for the children whilst they receive treatment. The Hydrotherapy pool has immersive lighting and music provides an exciting and enjoyable experience for children, enhancing their treatments.

Health & Safety..... High on the agenda and considered of the utmost importance. The feedback from the evaluation group recognised that site safety standards were very high. The project recorded just one accident for around 616,000 man hours of construction.

Winner of National Interserve Team of Year.... The project site team for the Children’s Hospital for Wales was named Team of the Year at the Interserve Group UK awards in November 2014. An accolade in recognition of the hard work of the whole team, which they are rightly very proud of. (See Appendix C)

Community Benefits..... Framework KPI’s on the use of local labour and suppliers were collected which identifies value for money investment of the Welsh Pound, and the Welsh Government Community Benefit Measurement Tool shows for every £1 spent on the project £1.77 was reinvested in Wales. A total of 470 apprenticeship and 612 traineeship weeks have been completed. The figure of 16,807 Tonnes of waste was diverted from landfill with a saving of £1,647,086.00. The team also embraced a major fundraising campaign – raising £54,000 for the hospital’s Noah’s Ark Appeal Charity. The team also raised a further £6,000 and carried out goodwill gestures in excess of £15,000 for other local charities and organisations through raffles, auctions, cycle rides, runs and even skydives.
A number of other community benefits initiatives were also undertaken involving the wider community,

- A level student summer work experience
- Degree student work experience
- PHD work experience shadowing Interserve Contract Manager for circa 6 months
- 3 visits from Swansea University engineering students
- Site visits for students from St John School.
- Construction of a new demountable stage for Riverside community project.
- Design, seek planning permission for and construction of a small extension for disabled toilet facilities for Grange Town community project.
- Collected 2,700 milk bottle tops (8.2kg) for local school who were collecting these following a horse riding accident of one of their pupils.

**Noah’s Ark Children’s Hospital Charity...** has generously provided the funding for the equipment required for the wards, theatres, hydrotherapy pool installation and MRI scanner in the new hospital, providing state of art apparatus. Two of the five operating theatres provide camera links for training and improved integration of the operating environment with benefits for surgeons & patients. Noah’s Ark also provides unwavering support to the young patients and their families. Further details of their work can be found using this link..... [http://www.noahs-ark-appeal.org/](http://www.noahs-ark-appeal.org/)

The Health Board have also designed and installed their own Electronic Check in system for Patients which works really well in practice.
BEST PRACTICE & LESSONS LEARNT

Engagement with Children & Parents

The Childrens Hospital is a special place it conjures up a huge amount of support and good will from the public, it was essential to ensure the building design provided the right fit for its young patients, which requires a different environment to an adult hospital. Extensive Stakeholder Consultation was carried out with the patients and staff at a very early stage. The young patients, parents, local school children and other groups were involved with certain elements of the design process, from choosing colours, themes for each floor level, naming of the wards, the design of the courtyard area and facilities they would like to see in the new hospital. Staff assisted in detailed design, from initial department relationship planning through to final commissioning. Infection control were involved in the project and provided comments on the sample ward bedroom and ensuite shower/wc’s and tap fittings to ensure a successful outcome. One of the most improved areas is critical care and theatres; designed with families in mind they have improved patient experience including areas to support parents which were not previously provided. Children requiring surgery now travel from the surgical ward to the children’s theatres and return via a very short route compared to previous arrangements. When children are recovering from their illness and treatment once they are feeling better they get busy, and the new hospital encourages them to do so and has areas for them to play in. The level of consultation has enabled the design to take account of the special needs of all the building users, especially and most importantly the children.

Originally the graphics intended to be used in the hospital were targeted towards the younger patients, with a more childlike design or theme. However, following interactive sessions with the young and older patients a move towards a more contemporary approach transpired. Each floor was given a bold, bright and colourful theme.
Each theme then continues to departments which have names associated with the chosen theme, Ground level is known as Ocean with the departments named as adjacent:

This assists the children and parents with finding their way around the hospital, where they associate with the colour of the floor they need to find, and then by way of the name and associated picture, of an Octopus perhaps. Younger children can find this fun whilst finding their way, and it can also help take their mind off any fears they may have about visiting hospital.

Around two thirds of the way along the construction period the hospital was fortunate to be provided with funding from the Welsh Children’s Cancer Charity LATCH, to provide some very special interactive technology. The innovative Philips system is bespoke and is the first of its type in the UK. It comprises LED Mood lighting set in bulk heads to the perimeter of rooms as well as interactive screens set into the ceiling. Using touch screens children can select the colour of the room, play the pre loaded software, listen to their own music or even bring in their own favourite DVD to watch while they receive their treatment.
The children can play with the mini MRI Scanner and Screen as well as the interactive ball floor. All of this interactive technology is there purely for the children and their families, and is intended to help take the children’s minds off their treatment and make them as comfortable as possible during their visit.

There is also a full height interactive wall panel for them to have fun with.

Although the inclusion of this late change proved extremely challenging for the team they worked very collaboratively and resolved issues to bring the whole concept together in order to set up this unique installation so that it works in practice as it was envisaged. All the team agreed that it was a fantastic addition and well worth the effort required to enhance the children’s experience.

The main best practice and lessons learnt points are:-

**Best Practice**

- Early Engagement with the right people to meet end user needs, essential to engage with children and parents.
- Way finding - engagement not just with adults but children; delivered an innovative and appropriate outcome for its young audience.

**Lessons Learnt**

- Added Value – the instruction to include the Specialist Interactive Technology was late in the programme, in spite of this teamwork delivered an excellent outcome for the children.
The project handover was originally planned to take place in April 2015, however due to pressures for the hospital to open sooner an earlier target of January 2015 was agreed. Through determined effort, teamwork & planning the project was delivered on time to the earlier date. However the implication of an accelerated programme meant that the commissioning period was compressed. This was recognised as not ideal by the team, although the ‘building’ elements went well it did cause issues particularly for the commissioning and witness testing of the many systems and items of plant within the building. The coordination of trades during the shorter commissioning period and run up to the handover also proved to be very difficult. The team were aware of the implications of shortening the commissioning period, and working collaboratively it was agreed that to enable early occupation some of the non essential systems were to be tested after handover. It was also noted that the involvement of ‘Cardiff Commissioning’ who were employed directly by the Building Services Installer greatly assisted the process.

The Fire Strategy for the building was signed off and agreed at an early stage as is appropriate, however at that point not all design development had taken place, particularly in respect of mechanical & electrical services. Subsequently as the Fire Strategy was developed in terms of the detailing of the smoke & fire dampers a misfit between the two occurred due to a change in design strategy. This resulted in the need for a large number of dampers having to be removed and replaced with the correct units. This was discovered after the ceilings had already been installed which made the remedial work quite difficult to undertake. The Specialist Estates Services Fire Safety Advisor was involved and consulted on the original Fire Strategy; however the Fire Safety Advisor was not consulted during the intervening period on the various iterations of design development. When they were consulted to comment on the design after installation had commenced/taken place only then did they discover the discrepancies. Had NWSSP - SES been requested to be involved at the various design stages then the possibility of incorrect equipment being installed could have been minimised. It was suggested by the group that the appropriate points where the Fire Advisor should review the design could be agreed at the initial meeting with them.

The appropriate involvement of the Health Board’s Estates Team was raised. Members of the Estates team were invited to attend site and familiarise themselves with the building and systems being installed, and to attend such events as commissioning & witness testing, as well as to participate in the training programme for operating the building along with building users. However the attendance and take up of invitations was sporadic. It was
recognised that the Health Board staff resources on both Capital & Estates are under pressure to carry out their day jobs, but it was the consensus that the investment of time on behalf of the Estates staff would be of benefit when they become responsible for the management of the building.

The main best practice and lessons learnt points are:-

**Best Practice**

- Teamwork & Planning enabled the programme to be accelerated and the project to be delivered ahead of time.

**Lessons Learnt**

- Allow for a realistic Commissioning Period, which should be protected in the event of changes to the overall programme.
- Fire Strategy & Fire Damper Design – to avoid abortive works and cost ensure timely consultation with NWSSP SES Fire Advisor at agreed stages.

**Communication & Collaboration**

Communication throughout the project was generally very good, for example all User Group meetings were scheduled with six weeks’ notice to ensure attendance, and this worked particularly well and had a positive impact on the programme. However during the project channels of communication were disrupted by staff leaving the project. The group consensus was that continuity of personnel throughout the life of a project was preferred and would bring obvious benefits. However it was also recognised that inevitably some changes to key personnel may occur. In the event of changes on the project it is important that the rest of the team support and welcome any new members of the team, and impart detailed knowledge that perhaps is not recorded. It was noted that a change in Health Board staff had a very positive impact on the project and assisted in decisions being made more promptly. From the Supply Chain Partners perspective it was acknowledged that there is the need for different people with different skill sets to be involved at pre-construction and at construction stage. The transition to the construction stage is dealt with by having the Contract Manager involved from inception to completion.
The group believed the Framework assists and enables a collaborative environment, particularly the benefits of having early contractor involvement. All agreed that the project was delivered in a very collaborative nature, and trust was developed between all members of the team. It was highlighted that although there are processes embedded in the framework it is the people that make the team, and it is of great importance to select the right people for the project, with the right approach to collaborative working, those with a ‘can do attitude’ and who want to do the best for the project, working within the ethos of a ‘no blame’ culture.

The sheer scale of this project and the fact that it is a Children’s hospital also had a bearing on the way all the team members immersed themselves and were willing to go that extra mile.

All Design for Life 1 Projects have access to ‘Asite ‘ a cloud extranet portal which is available for the whole project team to communicate through the design stages, construction stage and through to completion. The portal should ensure that all members will have access to the most up to date information at any given point in time, thus avoiding the use of out dated or incorrect information. The whole team stated that they found the Asite portal was unfortunately too slow in use, and it proved too difficult uploading large sized drawings and documents, with difficulty in keeping up with the progress of the project, subsequently a ‘Team’ decision was taken to stop using the portal and revert to using emails instead.

The main best practice and lessons learnt points are:-

**Best Practice**

- The Contract Manager was involved from inception to completion providing essential continuity.
- The Framework enables Early Contractor Involvement which fosters a collaborative environment.

**Lessons Learnt**

- Changes in personnel are to be avoided throughout the project, and must be well managed when they inevitably occur.
- The chosen Project Communication Extranet Portal must be efficient & easy in use.
Site Management

Early planning and the early contractor involvement was seen as fundamental to the success of undertaking the project and ensuring exemplar Health & Safety during the eventual construction stage. There were regular site liaison meetings with end users which had clear benefits and allowed the decant of existing accommodation to occur with the minimum of disruption and enable continuity of hospital services throughout. The early involvement of the contractor and the rest of the team also benefitted the planning of the works within the confined parameters of the site, as well as delivery of materials and plant through the heavily congested site. The original plan for site traffic management was convoluted and proposed to use four sets of traffic lights, added to the cars on site and the public buses which actually travel around the site and right up alongside the site hoardings. The traffic management plan although acceptable to the Hospital management was recognised by the team as unworkable in practice. It therefore required a radical rethink of how a sustainable and practical traffic management plan could work, and the bold proposal of creating a one way system around the campus was floated. This was not well received at first but with the assistance and backing of the Health Board Capital Project Manager the proposal was accepted by the hospital and the Bus Operator. During the works it was proven to be absolutely the right choice and an unreserved success, again making a huge difference to the continued operation of the hospital, well worth the determined efforts of the team.

The project was registered with the Considerate Constructors Scheme and following successful site inspections the project was awarded a coveted Gold Certificate, and received even further accolade by being judged one of the few ‘Runners Up’ in the whole of the UK. Recognition indeed of the hard work of the
team and their performance way above compliance. An outstanding exemplar for Site Management all round given the project was developed within the confines of this extremely congested ‘Live’ hospital environment. Well done all.

One of the very few complaints was received somewhat surprisingly given there were no issues throughout the demolition stage. Unexpectedly when using roller plant to compact granular fill, vibrations were experienced in the ‘IVF’ department which were outside allowable tolerances, immediate action to stop work was taken and agreed safe times to carry out the work were scheduled.

A specific issue raised on this project was the prevention of patient contamination by Aspergillus, which following consultation with Infection control was deemed necessary to have special consideration on the site. The higher risk related to the proximity of patients with suppressed immune systems who were undergoing high dose chemotherapy for leukaemia and related illnesses, who are at greater risk from infection. Aspergilli are tiny fungi which can be released into the air during construction/renovation activities, and can be transported great distances by normal conditions such as air currents and wind. Interserve produced an extensive method statement to mitigate this risk which comprised minimising the dust created during demolition & construction activities. Measures included moving patients further away from work areas, sealing all windows, doors, air intake and exhaust vents containing patients classified as high risk, the use of additional impervious or moistened sheet covers to debris prior to transporting, as well as careful planning of transportation routes. Continual liaison took place with Infection Control throughout demolition and risk assessments were carried out to inform methods of working.

The main best practice and lessons learnt points are :-

**Best Practice**

- Early involvement of the Supply Chain enabled Early Planning which is fundamental to the success of a project.
- Project awarded the H&S Considerate Constructors Scheme Gold Award & one of the UK runners up.

**Lessons Learnt**

- Early Planning provides more considered and realistic solutions e.g. Traffic Management Plan.
**NEC & Contract Management**

The project was managed in strict accordance with the NEC3 suite of contracts; this benefited the smooth and efficient management for all, ensuring that early warnings and compensation events were dealt with in a timely manner. Risk was managed through the Risk Register which was formally updated monthly, vital to managing cost & stakeholder expectations. Separate regular finance meetings were held to ensure the Health Board’s Capital Resource Limit was managed appropriately.

Although some quotation requests took an extended time to process there was good communication and agreement to extend timescales where necessary. Keeping the Health Board informed, with no surprises, it was again recognised that the NEC3 fosters collaboration. To underpin the NEC contractual management, the team also held more informal weekly meetings where they discussed only the hot topics affecting the project, which were simply summarised on a tracker. The idea was to be short and sweet and look to resolve things before they got out of hand, quite often avoiding paperwork which was negated by ‘Actions’. These meeting were found to be invaluable.

The team also developed ‘PIFs’ Project Information Forms on the project. They were issued so that the Health Board agreed and approved proposed design changes; these were signed and returned by the Health Board Capital Project Manager to close the communication loop and understanding by all.

The main best practice and lessons learnt points are:-

**Best Practice**

- The strict application of the NEC3 suite of contracts is an enabler to collaborative working
- Proactive use of NEC3 contract procedures and risk register.
- Project Information Forms – PIF’s were developed and used to ensure the Client understood and approved proposed design changes and their cost implication.

**Lessons Learnt**

- Informal ‘Hot Topic’ meetings held weekly were invaluable.

**Risk Workshops & Value Engineering**

The project remained within budget despite coming under extreme financial pressures, due in part to discovering previously hidden asbestos, coupled with the need for extensive measures being identified to mitigate the spread of Aspergillis. Although both items were
included in the risk register with hindsight these items should have had more appropriate values set against them, and those values should remain in place until invasive investigations are carried out, which should be as early as possible. Subsequently the team carried out value engineering to ensure the project remained within budget. It was felt within the team that the required extent of value engineering had repercussions throughout the project, one such example is a much smaller courtyard garden being provided. The project was fortunate that the downturn in the market place meant that as the project progressed actual costs came in lower than anticipated for some of the work packages.

One specific cost saving initiative was to ventilate theatres in pairs rather than have dedicated ventilation systems for each. In practice this has had repercussions in that each pair of theatres has a ‘master’ which can adjust/set the conditions for that theatre; unfortunately it sets the exact same conditions for its subservient which is less than ideal.

A common fire control panel for Phase 1 & Phase 2 buildings was incorporated into the scheme. Which was done at the request of the Health Board for both cost and operational reasons. This resulted in an unforeseen effect on the commissioning process to the earlier mentioned Fire Dampers, in that it was difficult to fully commission the new installations which added to the other commissioning issues mentioned previously.

Counter intuitive to saving on capital cost, the Health board added energy efficient LED lighting throughout the whole of the new building. This meant a higher capital cost but with a payback period of just seven years, savings in revenue expenditure for electricity and maintenance along with reduced carbon emissions will be recognised and is seen as a great added value to the project.

The main best practice and lessons learnt points are:-

**Best Practice**

- The project was kept within budget through Value Engineering
- Risk workshops were held early in the process and identified and covered the majority of project risks.
- Additional Capital Investment to provide revenue savings adds real value.

**Lessons Learnt**

- Value Engineering should not become cost cutting, suitable levels of sophistication for the control of building services should be incorporated.
- Infection control items such as Aspergillus should be properly assessed and appropriately allowed for in the risk register.
In recognition of the fantastic charities who support the Childrens Hospital for Wales
TESTIMONIALS

Geoff Walsh, the Assistant Director for Planning, Capital, Estates and Operational Services at the health board, said that great care had been taken to make sure the hospital was tailored to the needs of its young patients. He said: “There was also a major role for young patients and parents too. We involved children, mums and dads, carers, school kids and others in reviewing the options and in some elements of the design process – particularly in naming the wards, choosing the colours and the design of the courtyard area. “I think that’s really helped to make it such a good fit for the needs of young patients and families.”

Dr Mair Parry, Officer for Wales, the Royal College of Paediatrics and Child Health said: “The opening of the second phase of the Children’s Hospital of Wales will improve the care delivered to children, not only with complex and rare conditions, but will also provide tertiary services for young people in south and mid Wales, keeping all children’s services under one roof in a child-friendly environment and acting as a centrepiece for paediatrics in Wales. “The opening of this world class centre of excellence is a sign of Welsh Government’s commitment to improving children’s health, and means Wales is no longer the only country in the UK without a children’s hospital.

Charlotte Church, patron of the Noah’s Ark Children Hospital Charity, mixed with staff and patients, posing for photos for guests and with the hospital choir.
She said: “It’s amazing to come here. It’s hard sometimes and gives you perspective on life, but the work they do here is just immense. “If anything ever happened to any of our children, then there’s this amazing, state-of-the-art, world-class facility here.”
Nurse Cath Davies... “The facilities for the children are the best. It caters for their needs and their family’s needs too.
“It has made a massive difference. Everything is geared to the family. When a child is in hospital all they want is to have their family close and not to be stressed that and the hospital now does that.
“It is such a special place. It can be very sad but it can be the most happiest of places at times.”

Jennifer Evans, a Consultant Paediatrician at the Children’s Hospital, said... “The new building is light, bright and airy and thereby adds just that little bit of something to your mood, whether you’re there as a patient or part of the team who cares for them.”
“The children of Wales deserve these facilities and the best care that we, as professionals, can give them. “The team I work in is determined to do the best by the children under our care and to offer the best training to young medical professionals working alongside us - we now have state-of-the-art facilities in which to pursue that and I am proud to walk into that building to play my part.”

Maria Battle, the Chair of Cardiff and Vale University Health Board, said ... “the journey to where the hospital is today has been a remarkable one.”
She said: “I am very grateful to the Welsh Government, Noah’s Ark Charity and the many generous benefactors who have helped to get us where we are today making Phase One and now Phase Two such a success. Everyone involved has contributed to make sure that the children of Wales now have a world class facility, delivering the best care to them and their families.”
“Since the hospital opened we have had staff in tears, moved by the lovely facilities where they can now provide their excellent care to children. I have seen the difference this hospital is making by being designed specifically for children.”
“We know that hospital can be a frightening place for everyone, so every little thing we can do to make that easier can make a big difference and helps to make the children’s time with us that much easier.”

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