The Royal Glamorgan: a last hooray for Nucleus

The Royal Glamorgan is the last example of a generation of hospitals designed and built on the Nucleus format. Nucleus was originally devised during the mid 1970’s by the Department of Health and came to dominate the hospital building programme during the 80’s and 90’s throughout the UK. Some 130 such projects were built at home and further examples were constructed overseas.

Based on a standard cruciform floor plan template of approximately 1000m² which could be linked and assembled on each side of a hospital ‘street’, the Nucleus package offered detailed briefing data, operational policies and standard layouts for a full range of departments. The system allowed for the templates to be stacked to a maximum of three storeys and offered the flexibility of phased linear expansion by extending the street and adding further templates as funding became available.

In Wales Nucleus was adopted extensively to complete the development of district general hospitals that had been started twenty years earlier by adding templates to existing hospitals. The first example was at St Woolos Hospital, Newport in early 1980 to be followed by many phases of Nucleus redevelopment at Morriston Hospital, Swansea from 1980 onwards and at the Wrexham Maelor Hospital the following year. During this period work on two new phased Nucleus district general hospitals commenced on green field sites: the Princess of Wales Hospital, Bridgend followed by the Prince Philip Hospital, Llanelli.

The Royal Glamorgan is the third example of a Nucleus development on a virgin site. Originally conceived as the Taff Ely and District General Hospital, it replaced the facilities provided on the East Glamorgan Hospital in Church Village, which had proved uneconomical to redevelop in situ. The Royal Glamorgan would break new ground by going forward as a ‘one hit’ single phase contract.

❖ Recollections

At this point I should declare my hand. In 1992 as assistant chief architect in the estate directorate of the Welsh Health Common Services Authority (WHCSA) (later to become Estatecare prior to its privatised incarnation within the Capita Group) I recall the early discussions. It was an exciting prospect and by far the the biggest project ever to be undertaken within the practice. It provided the rare opportunity to design a complete ‘state of the art’ hospital on an extremely attractive semi rural site at Ynys-y-Plwm near Llantrisant.
Situated in the middle of the gently sloping Ely Valley adjacent to the A4119 which connects with the M4 to the south at Junction 34, the site was bisected along its north-south axis by the River Ely. This provided two distinct areas. The water meadow of the larger east bank area formed the logical site for the main building development with the rising wooded slope west of the river providing the main carpark and area for staff residences.

As a specialist multi discipline design practice WHCSA had achieved some notable successes in aspects of hospital design during the 1980’s particularly in the programme of community hospitals in Wales. These had featured new approaches to ward design, low energy initiatives and priority placed on sensitive interior design and the key role of landscape in the hospital setting. There was a natural aspiration within the practice to bring this expertise to the Royal Glamorgan project and to transpose its ‘care by design’ ethos to a district general hospital project.

The strategic decision to adopt Nucleus for the design was taken by the Trust after consultation with WHCSA’s project manager and received a mixed reaction within the design practice. With the benefit of hindsight it is useful to summarise the perceived arguments for and against the Nucleus option.

❖ The case for:

- It was seen as the safe option. After all, Nucleus hospitals had been delivered all around the country for almost two decades. There is an apparent safety in numbers and a single phase project of this size needed all the assurance available.
- The design practice had plenty of experience of Nucleus and its detailed workings from the successive phases of development at Morriston.
- The data packs, operational policies, fire safety provisions and standard layouts provided a head start to the client and design team at the briefing stage.
- Nucleus was flexible in that the standard material and plans could be customised to meet local requirements. Whole departments could be designed or amended provided that it was done within the standard envelope and observed the fire strategy discipline of progressive horizontal evacuation.

In the final analysis hardly any of the department layouts at the Royal Glamorgan adhered to the Nucleus standards. However, they served a key role in focussing the user groups at briefing stage on what they did and did not want, whilst the template envelope provided the key constraint on what was affordable.

❖ The case against:

This was entirely directed at the characteristics of the standard cruciform template rather than the general principal of the street with departments arranged in linked and extendable units on either side. All of that was logical, even laudable. The standard briefing material in the data packs was also very useful, as described above. However,

- The dimensions and form of the standard cruciform dictated a high proportion of internal rooms in the core of the template. These required artificial lighting and mechanical ventilation which ran counter to the low energy policy adopted on other projects where natural light and ventilation were harnessed wherever possible.
- The 16.2 m span of the template generated a roof span of industrial proportion and gable ends which presented a real problem architecturally where the general wish was to produce a solution more domestic and human in scale.
- The template’s most damning constraint was on the layout of the ward accommodation. These account for up to 50% of the floor area of the hospital and make up most of the first floor in a two storey Nucleus hospital like the Royal Glamorgan.
- The template necessitates arranging the 6 bed bays such that the bedheads are either against or directly
opposite an external wall. The provision of windows is immediately restricted. Ever since the passing of the dormitory style Nightingale ward, conventional wisdom had orientated beds parallel to the window wall in multi-bed bays. This allowed an unrestricted external wall allowing wide windows with good views out and avoiding any possibility of glare to bedheads sited opposite.

❖ Returning

Returning to visit the hospital five years after its opening was a fascinating and happy experience. Inevitably in such a large development with such intensive usage there have been some problems, but the overwhelming impression is of a hospital that looks good, is well used and is well looked after. From this architect’s viewpoint the focus was on the design and specification decisions taken originally. What follows is a personal view of how the detailed translation of Nucleus has worked out at the Royal Glamorgan.

The building layout is straightforward and particularly well integrated with the external areas on the site. The river forms a natural boundary between the hospital and the main car park with the white steel footbridges strategically located on the axes of the centrally located main entrance and the entrance to the out patients’ department. The radiussed steel ambulance canopy at the main entrance reflects the structure of the footbridge and the turning circle for vehicles. The integration of building, footpaths, roads and car parks is further enhanced by the generous and now mature planting which is arranged in drifts around the perimeter and in more formal patterns within the courtyards of the building. These provide attractive views from and light into the main departments and the extensively glazed hospital street which forms the spine of the development.

The overall length of the street approaches 200 metres on a single axis. Whilst this serves the key function of routing traffic from one department to another, it also provides a clear sense of orientation for visitors which is vital in such a large building. This is supported by a signage system which is both informative and discreet. The setting of the central rotunda stairway behind the main entrance concourse into the street axis provides a visual break which prevents its length from being overwhelming.
1 General Ward
2 Maternity Ward, Delivery and Neo Natal Unit
3 CMU & AMU Ward
4 HDU, ITU and Anaesthetic Services Ward
5 Operating Theatres
6 Pathology
7 Post Graduate Centre and Medical Records
8 Endoscopy & General Surgical Ward
9 HSDU
10 Human Resources and IT Suite
11 Admin and Trust Offices
12 Energy Centre
13 Accident and Emergency
14 Radiodiagnostics
15 Dining and Catering
16 Pharmacy and Store
17 Dental OPD, GUM Clinic and OCC Health
18 Maternity OPD, Women's Health and Diagnostics
19 Children's Ward
20 Children's Centre and Children's OPD
21 Rehabilitation
22 Ophthalmology, ENT and OPD Consulting
23 OPD and Fracture Clinic
24 Prime Care and Diabetics
25 Mental Health Unit

Main Entrance
11 Energy Centre Service Yard
12 Staff Residences

WHE Intranet website: howis.wales.nhs.uk/whe
Key to the character and success of the building’s appearance are a series of decisions taken concerning its elevational treatment. Specification of low maintenance materials was a prerequisite. The pale buff brickwork provides the main element of the external fabric, its lightness enhancing the quality of light in the courtyards and ensuring that the overall mass of the development is never austere or sombre. This lightness is also evident in the white metal elements of the canopy structures, service centre flues, windows and doors. The theme is further developed in the white rendered frieze at first floor level and inset panels on the plantrooms and courtyard bays. A pale pink render is also used in certain areas for contrast and tones in well with the ‘multi’ hue of the brickwork.

The frieze performs two roles in the composition of the elevations. The horizontal band helps to reduce the perceived vertical scale of the building which has a substantial suspended ceiling zone between ground and first floor. It also solves the visual jarring which can arise by the mismatch of window size and location between the different departments at ground and first floor level.

Reference has already been made to the industrial scale of the roof span and this has been cleverly handled on the gable ends by breaking the roofline into three distinct elements - the ‘split pediment’ - and modelling the gable wall with large oriel windows at first floor level capped by a curved lid supported on white tubular stanchions. The result is a composed hierarchy of elements which lends the whole development a distinctive character and human scale, far removed from earlier examples of Nucleus featuring bland uninterrupted expanses of dark brickwork extending vertically to barn-like gable spans.

WHE Internet website: www.wales.nhs.uk/whe
It is pleasing to report that the fabric is wearing well with no significant problems associated with the materials and construction. Internally there have been instances of floor finishes debonding from the floor screeds which have been attributed to workmanship problems and these have been rectified on an on-going basis. Similarly trolley traffic damage to the internal doors has been addressed by specialist provision of a discreet reinforcement system throughout.

Generally interior finishes are performing well and the decor maintains a fresh and attractive ambience throughout. This is attributable to the care taken at design stage to code and coordinate the interior scheme for each department individually in consultation with end users and a committed approach to sensitive maintenance by the Trust. Examples too numerous to mention are evident which demonstrate the ‘care by design’ ethos from set in floor motifs, borders, tiling, fabrics and accent lighting.

Since the hospital was commissioned several works of art have been incorporated which develop and enhance the caring environment. These range from sculptures in the courtyards to examples in various media within the public spaces inside the building. Notable examples include the stained glass work to the cylindrical clerestorey over the main entrance lobby which in colour and motif evokes the four compass points, seasons and life spirit cycles. Multi hued dyed silk textile hangings flank the altar in the hospital chapel and a silk curtain to the window diffuses the natural light. These early commissions are uncompromisingly modern and work perfectly to enrich the architecture.

In 2002 the Trust, through charitable donations in a joint funding partnership with Cywaith Cymru Artworks Wales has had two artists in residence on site. They have stimulated interest, arranged an exhibition of work by staff...
and produced their own installations in consultation with building users. Their large suspended ‘mobile’ in the rotunda staircase comprises five sections of lightly framed painted silk evoking natural organic forms which add warmth and interest to the space through the richness of colour.

The outer face of the rotunda facing into the main concourse area features a large wrought metal tree installation. The space is otherwise rather sterile and bland as fire safety considerations have precluded soft furnishings. However, it is interesting to note that the space has been used for concerts and performances which encourage community engagement with the hospital.

The 6 bed bays in the ward accommodation at first floor level have attracted some criticism on the grounds that the windows are narrow with limited views out and a perception that the space is inadequately lit. The perception of a vertical slot is exacerbated by the thickness of the external wall construction at the window reveals. The windows are in fact inverted L shaped, part vertical and part clerestory and provide a sufficient combined area of glazing to light the bay. This arrangement was designed to accommodate the necessary bedheads and associated paraphernalia on external walls which the Nucleus cruciform demanded, leaving limited wall area between beds for fenestration.

Notwithstanding the implicit requirement for artificial light and mechanical ventilation to the core rooms of the Nucleus template, every effort was taken at design stage to make the Royal Glamorgan a low energy hospital. The selection of energy efficient architectural and engineering principles formed the framework for operational management. Detailed benefit to cost ratio studies were undertaken at design stage to develop the final package of an energy efficient building envelope with sophisticated control and environmental management systems. It incorporates around fifty air conditioning plants, an intelligent lighting system and state of the art building management system all focussed on patient care and comfort. By facilitating the monitoring of energy use the hospital can be fine tuned for optimum efficiency.
Review

It is perhaps unsurprising that after two decades of Nucleus dominating centrally funded hospital development, the emergence of PFI would signal a sea change in approach. Design teams were ready to shake off the shackles of central control and ‘template tyranny’ in the quest for bespoke solutions.

It is therefore easy to overlook the significant and positive contribution that Nucleus has made. After all, its introduction in the 1970’s was in large measure a response to a previous generation of hospitals where contracts routinely ran massively over programme and budget. The University Hospital of Wales, Ysbyty Glan Clwyd, Prince Charles Hospital and finally Ysbyty Gwynedd were the examples of this era in Wales.

Neither is the current generation of PFI developments in the UK immune from criticism. Some examples are deemed to display lavish investment in the first impression provided by the entrance concourse areas, whilst the ‘back of house’ clinical areas are barely bog standard spatially and in specification ‘All fur coat and no knickers’!

Nucleus was never intended to be prescriptive. Project teams were at liberty to customise and adapt as required even if the standard cruciform put such a constraint on the ward accommodation; this was the Achilles heel.

In general terms, the advocates of Nucleus can legitimately claim to have provided a legacy which forms a ‘backbone of flexible building stock’ and the data packs still provide useful reference information for those engaged in designing ‘one off’ hospitals today.

The Royal Glamorgan is in some respects an anachronism - a publicly funded Nucleus in the late 1990’s. This was to be its last hooray in Wales. The end result is unquestionably the finest and most elegant example yet and deserves at least three cheers. Hip hip…

Acknowledgements
The Project Review was carried out by Phil Withecombe on behalf of Welsh Health Estates. Phil is an Architect with many years’ experience in the health design sector. Welsh Health Estates is grateful for the assistance provided by Pontypridd & Rhondda NHS Trust.

Project Details
Details exclude the Diabetic and Prime Care Centre, the Mental Health Unit and the Staff Residences.

- Start on site: November 1994
- Building Project Completion Date: May 1999
- Opened to patients: November 1999
- Project out-turn costs: Approximately £100 million
- Floor area: Approximately 43,000m²
- Contract Type: Joint Venture based on JCT 80
- Client: Pontypridd & Rhondda NHS Trust
- Project Manager: EstateCare Projects – WHCSA (Completed by Babtie Project Management)
- Architect: EstateCare Design – WHCSA (Completed by Capita)
- M & E Services Engineer: EstateCare Design – WHCSA (Completed by Capita)
- Quantity Surveyor: EstateCare Design – WHCSA (Completed by Capita)
- Landscape Architect: Veryard and Partners
- Structural Engineer: AMEC/ Matthew Hall Joint Venture
- Main Contractor: AMEC/Matthew Hall Joint Venture

For further information contact: Peter Wiles on 029 2031 5542 or e-mail: peter.wiles@whe.wales.nhs.uk