



Learning from  
French Hospital  
Design

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Images are drawn from the work of Groupe 6, architects, of Paris and Grenoble and are of built work and designs in Aix en Provence, Arras, Besançon, Chateauroux, Dijon, Guadeloupe, Marseille, Montbeliard, Narbonne, Salon de Provence and Tours.



## 1.0 Introduction

Building Design Partnership is a firm of Architects, Designers and Engineers and the largest such group in Europe. BDP also own part of a French architectural practice, Groupe 6. A quarter of BDP's work is now in the healthcare sector as is half of Groupe 6's work. Groupe 6 are recognised as one of the leading French architects in hospital design.

With the current major UK programme of new health building following a long fallow period, it is necessary for UK designers to familiarize themselves with international design standards and best practice. Our experience of the UK and French scenes provides very strong material for learning and debate. The French health service is admired worldwide yet is not without its critics. The UK service is under enormous pressure to perform. Differences in practice and in value for money turn out to be very significant. This brief report highlights areas where design makes a difference to healthcare outcomes and where design and build practice determines the cost of construction and operation.

The report was first written in 2002 for internal use. This edition is revised for external publication. BDP is now heavily engaged with the hospital PFI programme and with ProCure21. As a member of Be – Collaboration for the Built Environment, BDP is participating in a 'collaborate-to-compete' group with all 12 ProCure21 Principal Supply Chain Partners. The ideas in this report about design and construction will assist work in both areas to improve the way design and construction is procured, taking the best of both UK and French thinking.

Richard G Saxon CBE  
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May 2004

This brief report highlights areas where design makes a difference to healthcare outcomes and where design and build practice determines the cost of construction and operation.



## 2.0 Executive Summary

- 2.1 At 2002 rates, French hospitals cost between half and two thirds of the cost of UK hospitals per m<sup>2</sup>, but per bed they are more similar. Area per bed is much higher in France, with single bed wards used universally. Arguably, each French bed space outperforms its UK counterpart.
- 2.2 Building Servicing costs in France are less than half those of the UK, with French comments that the UK over-specifies. More ambitious automation and ICT are used in France. Fabric costs dominate French examples as they plan for natural daylighting and ventilation and thus generate more gross plan area than UK and US examples.
- 2.3 Contractor-led detail design seems to lie behind much of the economy of means; many Egan-advocated processes are used. Consultants' fees are however comparatively high as a percentage.
- 2.4 The benefits of this approach contribute to the better health outcomes of the French system. Single bed wards assist faster recovery. Daylit plans and good amenities aid staff wellbeing. Better architecture fosters community pride and user morale.

- 2.6 Further design research is suggested on single room economics, servicing and sustainability, the supportive environment, design quality indicators, labour saving systems and lifetime costing. Existing links to research teams should be expanded.
- 2.7 Healthcare architecture is in a period of rapid change, with rising aspirations meeting new thinking on need and construction. French practice could form a valuable model for the UK, combining best thinking from both countries.

Arguably, each French bed space outperforms its UK counterpart.



Better architecture fosters community pride and user morale.

- 2.5 Other published research suggests that future health building needs to put more emphasis on local and home based care, aided by ICT. There will still be a need for hospitals to cater for the more seriously ill but it will be expected that hospitals are built faster, more economically, flexibly and sustainably, based on life-cycle economics. 'Supportive design' features will speed patient recovery.



## 3.0 Comparing UK and French Hospitals

3.1 French construction is generally less expensive than UK construction. Gardiner and Theobald's study published on March 22nd, 2002 in Building magazine suggests these comparisons for non-health buildings (in €/m<sup>2</sup>).



This is in spite of the fact that labour and material costs are higher in France than in the UK, although concrete, France's main material, is 75% of the UK cost. Gardiner and Theobald's updated analysis of international construction costs, published in Building Magazine 12th March 2004, indicates that the difference in France and UK construction costs is reducing as the euro rises against the pound.

3.2 Indicative cost information has been compiled from a selection of UK and French hospitals, based on published cases and the direct experience of BDP and Groupe 6. The samples consider hospitals of comparable size and function.

UK Examples	Floor area m <sup>2</sup>	Building Cost €	Building cost €/m <sup>2</sup>	Number of beds	m <sup>2</sup> /bed	Cost per bed €/bed
Macclesfield DGH	3,353	7,182,634	2,142	85	39	84,502
Hillingdon	3,600	5,495,717	1,527	71	51	77,405
Warley	8,490	17,853,354	2,103	68	125	262,549
Halton Runcorn	5,493	7,698,900	1,402	73	75	105,464
Hospital A	65,000	157,359,042	2,421	410	159	383,803
Hospital B	15,000	53,774,738	3,585	179	84	300,418
Hospital C	72,000	214,479,650	2,979	600	120	357,466
Mean			2,308		93	224,515

French Examples	Floor area m <sup>2</sup>	Building Cost €	Building cost €/m <sup>2</sup>	Number of beds	m <sup>2</sup> /bed	Cost per bed €/bed
Montreuil sur Mer	19,691	16,776,184	852	184	107	91,175
St Chamond	6,953	11,897,767	1,711	45	155	264,395
Amberieu	10,551	9,202,711	872	117	90	78,656
Tours	16,674	17,253,021	1,035	100	167	172,530
Chateauroux	4,994	6,726,183	1,347	23	217	292,443
Dijon	79,151	106,211,172	1,342	578	137	183,756
Arras	59,348	73,407,377	1,237	631	127	116,335
Mean			1,199		143	171,327

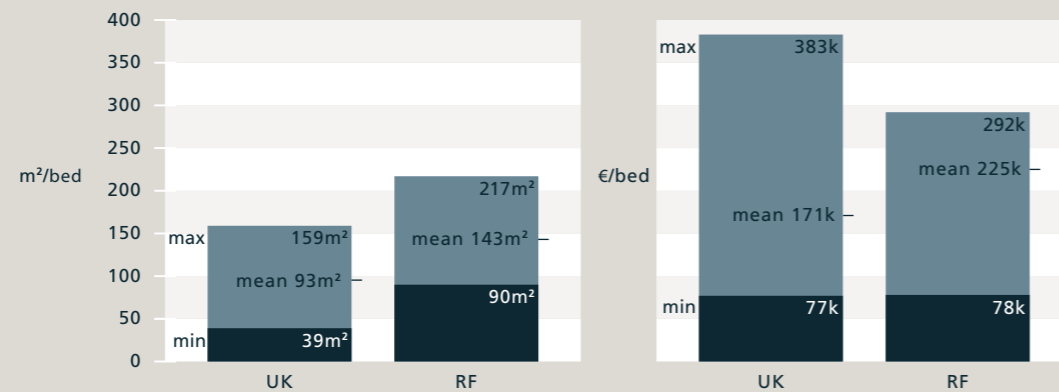
1) All costs are at Q2 2002

2) Exchange rate used is Q2 2002 1.58 = £1.00

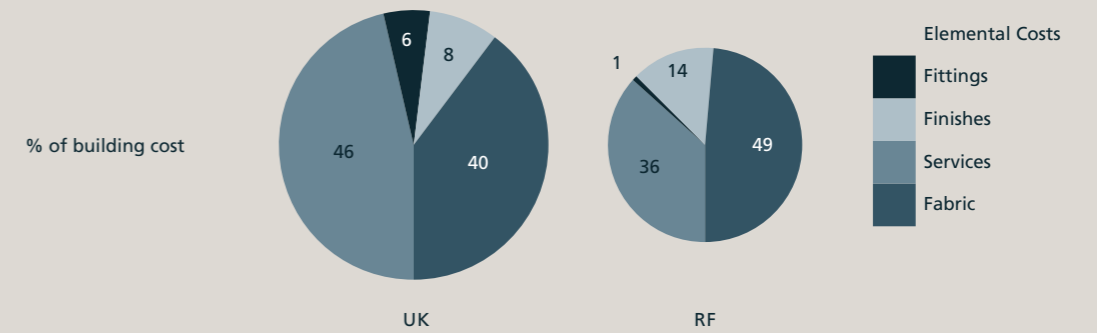
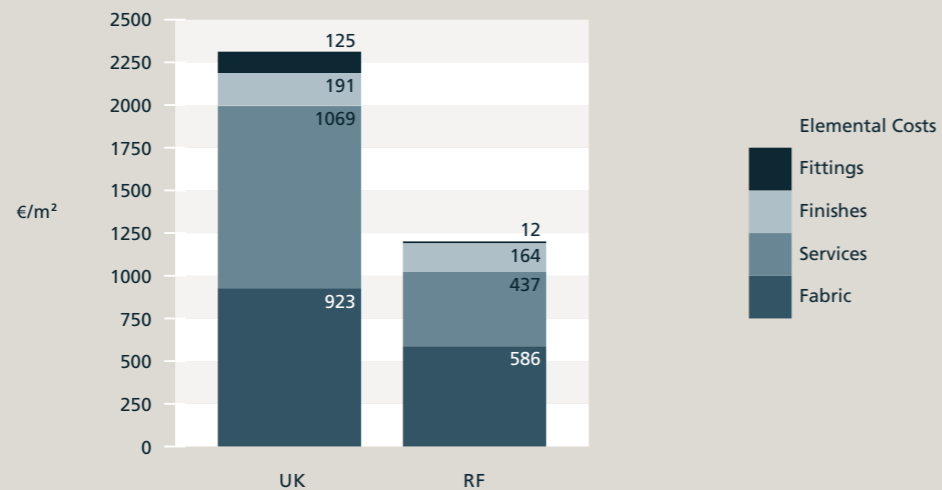
3) Some UK examples are anonymous to preserve commercial confidentiality

4) French costs have had tax removed to equate to UK costs which are not taxed

3.3 Areas and costs per bed range widely in both countries. It appears that the French sometimes spend more per bed than the UK, by providing substantially more area per bed. In the last 20 years, all but a tiny percentage of beds provided in France are in single rooms, typically of 18m<sup>2</sup>. However, the great majority of beds in the UK are in multi-bed wards where, even with the advent of Consumerism, area provision in the ward is unlikely to exceed 14.5m<sup>2</sup> per bed. The French consider single bed wards as excellent overall value, a crucial point to be considered further in section 5.



3.4 The distribution of costs in UK and French hospitals between major elements is set out below for the mean figure in the samples. The differences are striking.



3.5 Spending on the substructure and superstructure fabric is lower in cost but a higher proportion of the French investment. Shallow planning, with daylight to most rooms, generates high spending on frame and walls. Finishes costs are similar in euros, but with again some reflection of the extent of the envelope. French finishes are simpler. Fittings costs are negligible in France, perhaps because of a bias towards movable furniture whilst fixed furniture tends to be of lower quality than in the UK.

3.6 It is in building services costs where divergence is most striking; the French spend less than half of what we spend in the UK, in a climate which is usually hotter in the Summer. Whilst French hospitals are generally daylit and can use natural ventilation more than in the UK, they do have sophisticated mechanical ventilation where it is required. French contractors reportedly regard UK Hospital Building Notes and Technical Memoranda, the standards set here, as excessive in specification. These issues are considered further in section 4.

3.7 The design quality of French hospitals is generally high while in the UK standards achieved in the past five years have often been disappointing. In France generous circulation spines are normal. Groupe 6 achieves these simply, by grouping accommodation into two types, the often multi-storey wards (hébergement) and the mat of diagnostic and treatment areas (plateau technique). Sometimes these are separated by an atrium, with bridges crossing it. At Dijon the ward elements fly above the plateau technique with a partially open entrance level between them. Broad architectural gestures are used, concentrating on entry, orientation and the relationship of these simple elements to generate a sense of place. Groupe 6 designs are extendable and flexible, recognising that they are often additions to existing sites and that they too will change.



## 4.0 Value Comparison – Cost

4.1 UK construction produces high output costs to customers from low input costs in professional and trade labour and materials, compared to most EC countries. This fact is at the root of the Egan critique, pointing out that we have a wasteful system which would cost even more if we paid our professionals and tradesmen better. The waste in the system is variously estimated at around 30%, the amount which might be saved if better practices were used. Egan specifically highlights design and construction process integration, standardisation and prefabrication, and the replacement of tendering to assemble teams with established supply relationships.

4.2 Looking at French design and construction it is possible to see several of the Egan goals in place, but in ways specific to France. Whilst the design process begins with no contractor involvement, they become involved sooner than in the UK and take responsibility for much of the detailed design and specification. They are more likely to buy standard components and systems from regular suppliers in bulk and to predicted flows, not on a project by project basis. These supply relationships enable manufacturers to be profitable whilst charging less per item. In practice, the small and sporadic UK orders are probably not even for the standard product as we are notorious for customising everything. As an example, similar hospital bed lifts can cost half as much in France as they do in UK.

4.3 Constructional simplicity follows from the French approach. French architects have little control of details and do not worry too much about doors, windows, ceilings etc. Low cost concrete structure and envelope is put up rapidly with basic techniques.

4.4 For all its low cost, the French hospital has very sophisticated technology. Lift provisions are generous by our standards. Conveyor and robot delivery systems bring supplies from loading docks to their destination. ICT installations are becoming very ambitious. Infection control is given high priority as risks from drug-resistant strains increases. Whole room contents are sterilized between patient uses.

4.5 There is little material available on French hospital operating costs. Low M&E operating costs may be inferred, but high cleaning costs are likely to maintain hygiene standards given their more basic quality finishes.



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## 5.0 Value Comparison – Benefit

# 5

- 5.1 Simple cost comparisons assume that the benefit being delivered is comparable. There are many variables at work between the French and UK health services: and their physical expression in a hospital is only the tip of an iceberg of nationally specific practices. Health outcomes in France are superior generally to those in the UK and faith in the national system is higher. There are 50% more beds available per head in France than in the UK. There are two particular design related issues where value appears higher in the French product: the use of single rooms for patients and the general provision of daylight and views to all areas.
- 5.2 France has used single-bed patient rooms in all new hospitals for twenty years, with occasional two-bed rooms for patients who prefer company. There are two, strong assumptions behind this apparently expensive choice; firstly, bed utilization is superior and secondly patient recovery is faster. Fewer beds are needed to serve the same population at the same standard. Because of these factors, the effective size of a French hospital compared to a British one cannot be counted by bed numbers. It is not possible to relate population served to bed provision as this is not determined by the design team. However, one can surmise that bed numbers could be 15–25% fewer for the same population served if a single-room policy is followed and other policies are equal. In practice, France provides more beds per head and a different service level to the UK.
- 5.3 Anecdotal evidence from America suggests that 85 single-room beds are as effective as 100 beds in multi-bed wards from the point of view of utilization. In multi-bed wards a bed can only be made available to a patient of the right gender and probably the appropriate speciality for the ward. Single bed rooms equipped for all specialities can be utilized fully.

- 5.4 Research is required to compare patient outcomes in single-bed accommodation with that in multi-bed wards. It is firmly believed in France that hospital infections are less likely to occur with single-bed rooms. These infections, increasingly hard to treat, regularly cause complications and lengthen stays in hospital. At a less critical level, patients in single rooms have several of the most desired facilities: privacy, quietness and control of conditions. They sleep with fewer drugs and get more and longer visits from family and friends. Coupled with a window view of nature and activity, these qualities are associated with more rapid recovery than in multi-bed wards. Some British patients prefer the company of a multi-bed ward and feel they will be less likely to be ignored when they need help. France is driven by the medical certainty that single rooms are superior for health outcomes and utilisation. Telemetry monitors patients. Whole room contents are sterilised after the departure of each patient. Handwash facilities at the door of each room support good hygiene practice.

Health outcomes in France are superior generally to those in the UK and faith in the national system is higher.







- 5.5 Groupe 6 uses a pair of 3.5m wide (to centre of wall) patient rooms to form a 7m structural bay, 5m deep. Bathrooms are either on the exterior or interior side. They do not group rooms in wards of any size but provide a continuous strip of rooms with nursing centres at intervals. The logic of high room utilisation is enhanced, as the ratio approach used in the UK and USA is always approximate. So a supposed 30 bed unit has the facility to expand or contract according to its need and that of neighbouring groups.
- 5.6 French law requires daylight to all rooms where people work. At least 25% of the window wall should be glazed and the view should be onto a courtyard of a minimum 7m width, wider if the court is taller than two levels. Operating theatres have windows to the outside as standard. Views from patient rooms are usually onto spaces wider than 7m. The effect of these rules is that the plateau technique is usually a 'woven mat' of 15m wide space. Space over 4.5m from the window and in the crossovers is used for utilities where no one works continuously.
- 5.7 Compared to the US-style deep-plans, the French plateau technique covers 25–30% more ground, with increased internal circulation and far more external wall. Atria are acceptable alternatives to external courts but require protection from smoke and fire, reducing their attraction for occupiers compared to exterior space.
- 5.8 The value point of this daylight regime is that it provides better staff wellbeing, aiding recruitment, retention and good patient care. Staff amenity rooms in France also reflect this respect for staff in a way not found in the UK equivalent. Comments from visiting UK patients and health professionals that French hospitals "seem like palaces" reflect the respect for them that people sense in a building with generous main circulation spaces, high daylight levels and good amenities.
- 5.9 It is not possible to put numbers to the comparison at this stage, but the conclusions on benefit value comparison must be that French hospitals would need fewer beds to serve the same population at the same standard as the UK, expose their patients to less risk and are more likely to be fully staffed. Morale levels are likely to be higher in both patients and staff, leading to better outcomes.

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## 6.0 Anticipated Developments in Healthcare Design



- 6.1 One purpose of this study is to look beyond examples of the present and recent past to anticipate the requirements which will determine success in the near future. Some elements of this come from the work on-going at BDP and at Groupe 6, but the bulk of these comments come from the literature search.
- 6.2 There is strong consensus in conferences and writings in the UK, US and Europe that the healthcare environment contributes to patient recovery. It is also expected that in future in-patient hospitals as such will become less focal to care provision, with more dispersed, outpatient and home based care. Facility flexibility is essential to long term value, with operating cost economy being a critical success factor.
- 6.3 The clinical and construction community agendas can be lined up together as follows:
  - 6.31 Healthcare in the next decade will move towards a "managed clinical network" of ICT-linked services. More patients will be able to stay at home with visiting carers. Local health maintenance centres will provide 24 hour urgent care, but also therapy, fitness, community and social service facilities. Social regeneration and health are closely linked. Diagnostic and treatment centres will deal with serious in- and out-patient cases. Recovery care locations will provide longer term patient hotels or hospice settings. Ancillary clinical functions like pharmacies, optometrists, dentistry, chiropody and retail support will be in commercial locations. Modern ICT enables staff at any location to access patient records and diagnostic data to enable co-ordinated care not previously possible outside a hospital.
  - 6.32 Construction is looked to for the provision of integrated design, construction and operation. Whole life-cycle optimisation is expected, to improve performance and reduce costs simultaneously. Design quality will be measured

for functionality, performance and impact. Sustainability is especially important for healthcare, given the need for universal access, exemplary environment and minimum cost for an ever-expanding demand. Techniques such as lifecycle databases and mass-customised standard products are anticipated.

- 6.4 The rest of these comments refer to the more conventional hospital model. It is expected that the diagnostic and treatment space within hospitals (plateau technique in France) will continue to expand and change as new techniques are possible and demand rises. Increasing public use of Accident and Emergency units for minor but immediate help will tend to split these into linked critical and non-critical units. In-patient space will decrease proportionately over time. In-patients will be more critically ill as the less ill will stay at home or be recovering in other locations. Bed-blocking by the convalescent will be attacked by new emphasis on recovery locations and long term care. Whole hospital area per bed is rising from 90m<sup>2</sup> pre 1990 towards the 135-155m<sup>2</sup> current in the USA and France.

There is strong consensus that the healthcare environment contributes to patient recovery.

6.5 The patient experience is now the focus of design and operation for good healthcare. Previously the convenience of the carers or managers was prioritised, minimising travel or cleaning difficulty. Patients put first recover more rapidly and put less stress on staff. The core economy is to have good patient outcomes.

6.6 The supportive environment for patients has such characteristics as:

Single rooms for quietness, privacy and safety from infection.

Representational, unchallenging art, especially nature scenes.

View of nature, movement and sunlight; access to gardens is ideal.



Carpet flooring to aid walking confidence and encourage visitors to come and stay longer (a counter-intuitive finding).

Control by the patient of all environmental features, TV, music and communications.

Space for family visits and overnight stay in-room, often in a convertible window seat/bed.

American research suggests that supportive environmental features pay through attracting elective patients, reducing the need for drugs, reducing length of stay and reducing staff stress and turnover. Good environment in itself often goes unnoticed whilst it has its effect, but poor environment is a "dissatisfier".

6.7 UK research by Professor Bryan Lawson and others shows that new facilities compared to previous ones make savings in performance that outweigh the entire cost of the space. Faster patient recovery and lower drug use can reduce operating costs by more than the construction cost expressed as an annual charge. These findings support other research which shows that staff and operating costs greatly outweigh capital costs over a building's life.

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6.8 Physical flexibility in the built facility is a good investment for long-term cost effectiveness. Tightly fitted layouts with constrained structure and services soon become obsolete. Remodelling is especially disruptive in hospitals and creates additional cleanliness problems. Generic frame patterns with perimeter service risers are seen as particularly strong. Toilets on the window-wall of wards are welcome as this can provide perimeter routeways for all services to the floor. Separation of the primary movement and service infrastructure of a hospital into a street or harness is (still) seen as a strong idea, for flexibility, orientation and social space.





## 7.0 Further Research suggested

- 7.1 **Collaborative Working** Work between designers and contractors should focus on process improvement and lifetime cost understanding. A UK approach is needed involving the supply chain in detail design to achieve standardisation and capital economies with low operating costs. PFI and ProCure21 should be able to provide suitable vehicles.
- 7.2 **Single-bed rooms** The economics of the single-bed room are a key subject. Understanding of the relationship between population served and bed numbers needed on the single versus multi-bed basis would illuminate the cost-benefit analysis.
- 7.3 **Building Servicing standards and sustainability** The accusation that the UK gold-plates its engineering services specification needs to be understood in relation to all the risks which have to be managed. Is there scope to meet performance outcomes rather than technical input standards? Can the drive to environmental sustainability be reconciled with previous performance requirements?
- 7.4 **Supportive Staff and Patient Environment** In addition to the single-bed room issue, what are the costs and benefits of other supportive features noted in 6.6 above? What case can be made for features not necessarily in the initial UK customer requirement list? Picking up the work of Professor Bryan Lawson and others on the link between environment and patient outcomes and the divergent motives of patients, clinical staff and estates managers would be part of this. Clinical staff recruitment and retention levels should be linked to facility quality. (BDP is currently involved in the ASPECT research programme with Professor Lawson's team).
- 7.5 **Design Quality Indicators (DQI's)** The AEDET approach to DQIs is useful but currently being upgraded by Professor Lawson's team to incorporate ASPECT. BDP should continue to contribute to this development, feeding in the learning from France.
- 7.6 **Labour saving** Automation of ancillary functions in healthcare proceeds apace. BDP should be ready to suggest and adopt proven automation technologies, as we have with pneumatic laundry collection at Causeway Hospital. Our shell design should anticipate the need to add to and replace systems after initial build.
- 7.7 **1:5:200** The whole lifetime cost basis of critical healthcare needs to be understood. The office building ratio model of 1:5:200 (capital: operating:staffing) is certainly inappropriate but the right ratios for healthcare work need to be derived. A net-present-value cost library needs to be developed for built elements. The NPV of staffing saved by plan efficiency or automated features also needs to be understood.
- 7.8 **Interactive brief-making** There are significant barriers to making use of ideas from outside current UK practice. Responses from design and construction professionals are usually sought after the clinical brief is set and dialogue is inhibited by procurement processes, especially PFI. Development work is needed at high level to open up the potential for ideas from the design and construction team to be considered in setting the brief, as they would be in many other building types. Opportunities exist under ProCure21.



This report is a concise starter for future interaction.

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