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Lean healthcare assets challenge FM performance measurement conventions

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ABSTRACT

Purpose;

To show how Lean Asset thinking can be applied to health care facilities using different measures to compare the estates contribution to the business of health care providers. The challenge to conventional wisdom matches that posed by Lean Production to Mass Manufacturing.

Methodology;

Data Envelope Analysis examines the income generated and patient occupied area as outputs from the Gross Area of a Trust's estate.

Findings;

The approach yield strategic comparisons that conventional FM measures of cost per m² hide. The annual cost of an excess estate is conservatively estimated at £600,000,000(in England alone)

Research limitations/implications;

Further research to understand the causes of the excess is needed and is in hand. Meanwhile the research illustrates the power of an alternative way of assessing facilities performance.

Practical implications

Have already been demonstrated in two trusts who have used such an analysis to define strategic estates targets,

Originality.

The author's are not aware of the Lean Asset perspective previously being applied to healthcare facilities. The research shows the underlying fallacy of relying on cost per m² as the primary measure of asset performance.

Keywords.

Lean Assets, Performance measures, strategic FM, business criticality, healthcare

Introduction

FM and related property professions / specialisms suffer from a concern with inputs to a business – the building and its services – rather than the outputs that the building contributes to (Price, 2002; 2004; Pinder and Price, 2005; Miller and May 2006; May and Pinder, 2007). The problem largely disappear in industries such as retail or hospitality and healthcare in the USA where the physical facility is an obvious component of a firm's servicescape (Bitner, 1992) but elsewhere it is acute. Attempts to classify FM as an input (Kaya and Alexander, 2006) perpetuate a facilities pushed rather than a business pulled view. An analogy can be drawn with Womack et al's (1990) distinction between mass and lean manufacturers. The former, having invested in large presses to stamp automotive body parts sought to optimise efficiency by maximising production runs between changes of dies. A build up of finished

goods inventory (unsold cars) was seen as an asset and valued accordingly. Apparent production line efficiency was maintained by a large stock of work-in-progress inventory (components).

Western executives were sceptical. As one Detroit vice president put it to Peter Senge after a visit to Japan in 1985 (quoted in Senge et al. 2005) *they didn't show us the real plant* however the concept proved exportable to North America and Europe. In a revealing comparison of a Toyota plant in the USA and a General Motors plant Womack et al. found the former producing the same volume of cars, at higher quality and lower overall cost, from 38% less physical space. FM needs to deliver equivalent savings. By way of example modern agile offices, open plan designs which work, can be shown to enhance perceived productivity, and in some case business outputs (Price, 2007; 2008) from typically 25 % less floor area (c.f. Bootle and Kalyan, 2002). Such cases do require a different managerial paradigm and a different business language about workspace: a challenge comparable to the switch to lean manufacturing hence the suggestion of the Lean Asset^[1] (Price, 2007). Part of the necessary challenge is to develop alternative measures of facilities performance.

This paper offers a brief summary of lean asset thinking applied to office environments but is primarily concerned with health facilities in the UK's National Health Service (NHS). There is now evidence suggesting that patients are aware of health facilities and do place importance on these services. The early research findings from patients exercising choice, suggests that patients will use factors such as ease of car parking, cleaning standards and food service when making their choice of hospital to attend (Taylor et al. 2004, Miller & May 2006 and Coulter et al. 2004).

Health care buildings, especially those concerned with in-patient treatments, are also physically and technologically complex compared to those in most other sectors where the facility is critical to the customers choice. It should be no surprise that it is especially in healthcare that an executive level role has developed for Facilities Directors (Kaya and Alexander, op cit.). In no other business is there the same combination of technological risk and customer criticality.

The Facilities Management Graduate Centre (FMGC) at Sheffield Hallam University has been conducting research into Facilities Management (FM) in the NHS for since 1994. In 2006 they were asked to re-examine the issues of value measurement and the route to achieve it. The question hides a dilemma. Value for money means something different to different stakeholder groups. For patients / taxpayers there is clear evidence of the impact of facilities on perceived value for money. For many, but not all clinical services facilities impact perception and increasingly patient choice. For the estates professions, and unfortunately for much governmental policy guidance on value for money still translates into low cost. Measures of cost per unit area/staff member/patient episode etc. still dominate performance guidelines. Meanwhile in the current climate, and expressed in admittedly crude commercial terms, for trusts value for money increasingly translates into income.

It is exceedingly doubtful whether a focus on cost per square metre in particular translates into best value for either trusts or patients, or indeed best use of built assets. In extreme cases low cost per square metre can be obtained by having a large estate in barely useable condition – the equivalent of an excessive inventory - when there is a growing body of evidence as to the influence of quality facilities on patients and staff. In simple terms the dilemma, which is common to many areas of FM that can be expressed by the alternatives in Figure 1.

Resolution depends on discovering better ways to assess 'value-for-money'. Without them the question about routes to achieving the same is not relevant.

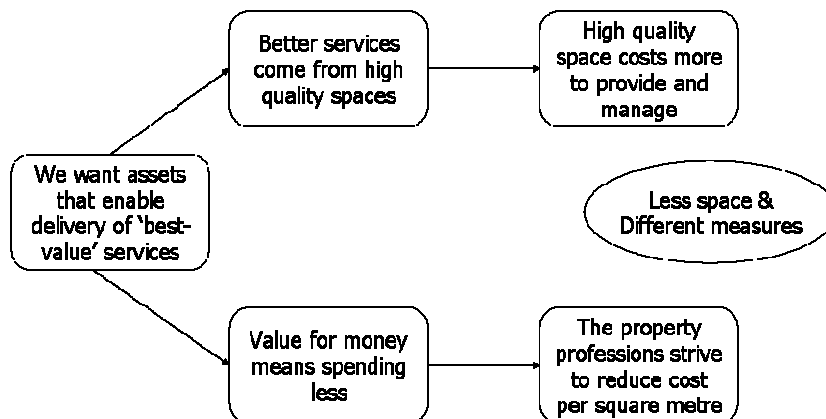


Figure 1 The lean asset dilemma (based on Price, 2007)

Benchmarking cost per unit area can conceal surplus, low cost space: the Asset equivalent of inventory and may explain why a study commissioned by the RICS (Bootle and Kaplan, 2002) estimated a total cost of £18 bn due to the typical UK office occupying ca 25% more space than the best performers. Benchmarks of outputs per unit area can reveal such inefficiencies (Pinder and Price, 2005). As their examples illustrate a search for 'value-for-money' should start by looking for indicators of how effectively a facility supports the goals of the organisation that uses it: the outputs realised from the space. We are not aware of prior research into healthcare facilities that has adopted such an output based stance. The investigation has accordingly focussed on the feasibility of finding such indicators using readily available data. In practice in the UK this means the annual *Estates Return Information Collection* (ERIC) data returns that all NHS trusts have to complete for the department of health. The ERIC data enables the analysis of estates and facilities information from NHS Trusts and PCTs in England. It is a compulsory requirement that Trusts submit a return.

Methodology

We were supplied^[2] with the following data from the ERIC returns for all trusts in the UK:

Trust type	PCT Income	Trust Income
Total capital investment - £	Estate services costs - £	Total FM (Hotel Services) costs - £
Investment to reduce Backlog Maintenance-£	Income from Leases -£	Cost of Leases -£
Total number of staff employed - WTE	Gross internal site floor area (m2)	Patient occupied floor area (m2)
Non-patient occupied floor area (m2)	Available beds (No)	Income from staff (£)
Income from visitors (£)	Income - Non patient trading activity (£)	Income from commercial businesses (£)

Table 1 Available data

The data derive from the 2006 returns (based on the 2005/2006 financial year). There are clearly issues of data consistency, especially in relation to Primary Care Trusts (PCTs)^[3] however the average figure for 'hard FM' (Estates costs + Capital) per m² at £172 is double

that for soft FM at £79. Given the fact that some soft FM costs are related to area the figures are compatible with those for other types of building. In business terms the space is however an input. It is there to earn an income and/or support the delivery of patient health. The questions should be:

1. How effectively is the space used to deliver care services?
2. How patient focussed is the asset?

As a surrogate for question 1, within the available data, we examined Trusts' total income^[4]. There is scope for argument about how effectively income mirrors health care delivery. We have however had to assume that income is, for similar groups of trusts, broadly proportional to the number of patients treated. We have therefore compared the ratio of income per unit area of the estate. As surrogate for question 2, (efficiency of the asset design) we have used the proportion of the total gross internal area (GIA) that is devoted to direct health provision: i.e. that is classified as patient occupied as a surrogate for the efficient use of the overall resource. For a first analysis therefore we chose two output measures the total and the 'patient occupied floor area' both in relation to the input measure; the GIA of the estate.

We used the same analytical method as was used by Pinder and Price (2005); an approach called data envelopment analysis or DEA. In brief it compares the efficiency of units in a sample on two or more performance measures, weighting the results to present each unit in the best possible relative position. Units whose efficiency cannot be bettered by others in the sample are assigned an efficiency of 100%. The relative efficiency of other units can then be computed. Pinder and Price (2005) describe the method in more detail and provide references to original textbooks. DEA can be used to contrast more than two ratios at a time. Unfortunately since the resulting 'envelope' is multi-dimensional we have restricted the analysis to two dimensions separately. There are inevitably potential errors in either ratio. We discuss them below.

The project was constrained by the time and available funding from the network members. The results presented here therefore describe an initial screening of the major trust categories. Further confidential analysis for network members is withheld from publication.

Results

Primary Care Trusts

The reported income for PCTs averages £2,497 per m²; a figure which hides a range from £178 to £106,921 per m². Two obvious explanations are errors reporting the estate and confusion of commissioning income and income in respect of services delivered.

Acute Trusts

Teaching hospitals were excluded from the analysis because of the possibility that their spatial configurations and income streams would differ. For the remaining trusts the reported income per m² ranges from £3,430 to £1,276 per m² with an average of £1,888. The range seems more realistic. Unfortunately a small number did not show patient occupied area figures so had to be excluded from the analysis. The distribution of the remainder (Figure 2) is similar. However the profile of relative efficiencies (Figure 3) suggests that only 4 other trusts are within 10% of the best performing units (the red envelope in Figure 2) with the

largest number being only 60 to 70% as efficient. Such a figure is low compared to other groups of public sector assets we have analysed in this way.

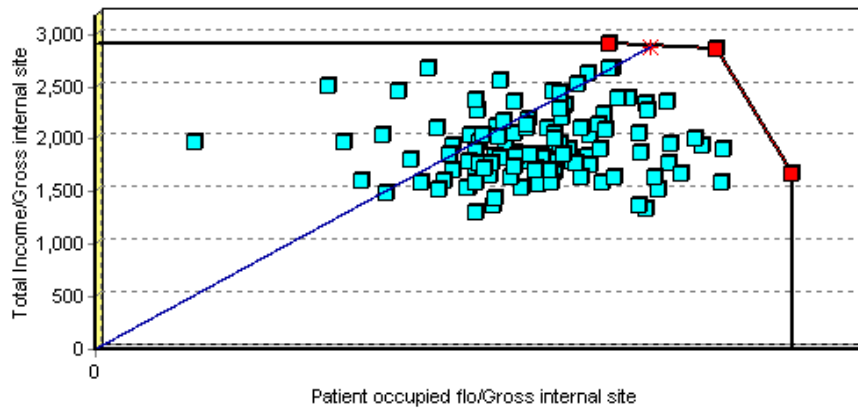


Figure 2 Income generation and Patient occupied area for Acute Trusts in England

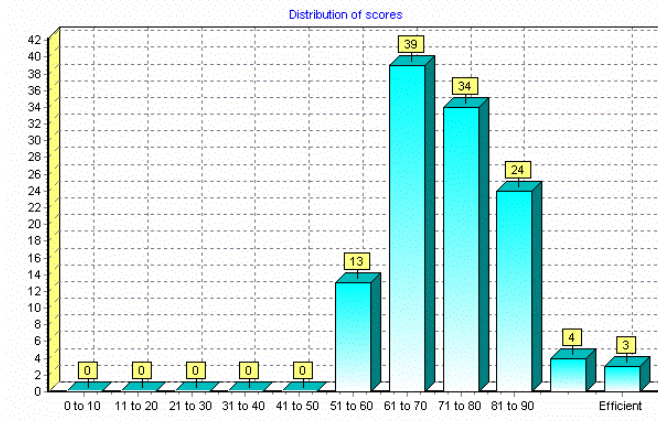


Figure 3 Histogram of the trusts in Figure 3 showing their efficiency relative to the three 'envelope' units.

Erring on the side of caution we recalculated the relative efficiencies excluding the three trusts that were 100% efficient in the first analysis. The revised frontier plot and histogram are shown in Figures 4 and 5. Four trusts now achieve 100 % efficiency; that is on some weighted combination of the two ratios their performance cannot be bettered by the remaining trusts left in the sample. The modal inefficiency changes to the 70 to 80 % range and the overall pattern is more consistent with other sectors. The result merits further scrutiny. It suggests that 92 of the 115 trusts for which the analysis could be completed are at least 10 % less efficient than the best in terms of the overall portion of their estate devoted to patient care and or in respect of the income earned from that estate. A majority, 63, are more than 20% less efficient. To the extent that income reflects the throughput of patients - an assumption that is admittedly a generalisation at - the results suggest that either trusts are using their space less effectively or are handicapped by having too much non-productive space. To put the figure into perspective the total estate in the sample is 11,708,831 m² operated at an average hard FM cost of £176 (estates charges plus capital) per m². Using the same method of calculation as Bootle and Kalyan (2002) employed on behalf of the RICS that space is costing £412,023,689 per annum The figure is an estimate but does, as explained, err on the side of caution. In contrast the ERIC data indicate a total spend on soft FM in the same year of only £1,072,266,163. Best value might be obtained by focussing on

the apparently wasted space rather than either benchmarking or market testing soft FM services.

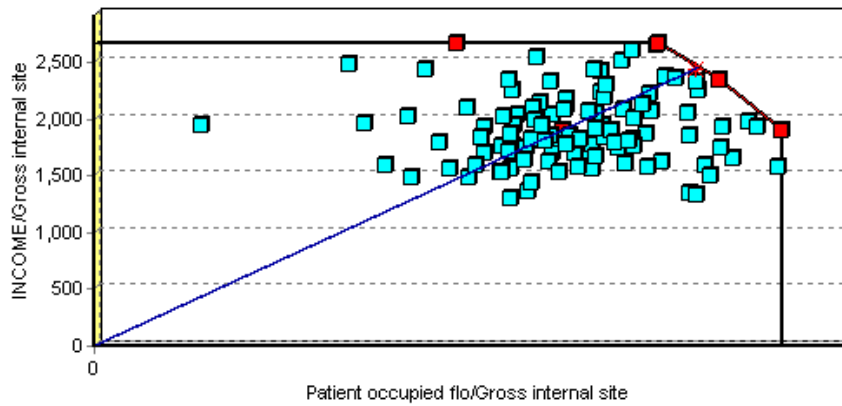


Figure 4 recalculation of the plot from Figure 3 excluding the three best performing units

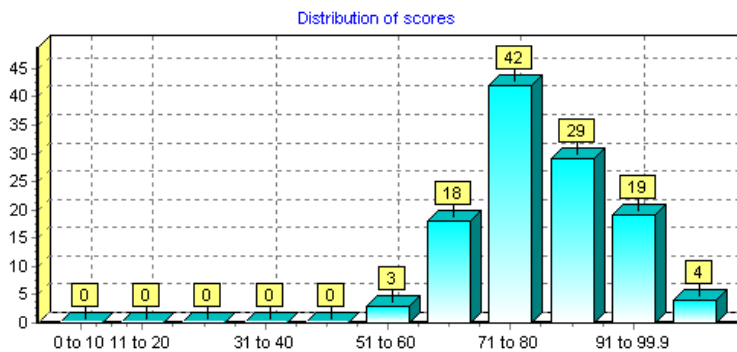


Figure 5 Histogram of the data presented in Figure 5

Mental Health Trusts

The income figures for Mental Health trusts are comparable to the Acute sector with income ranging from £3,120 to £1160 per m2 and averaging £1,803. The same analytical procedure was followed.

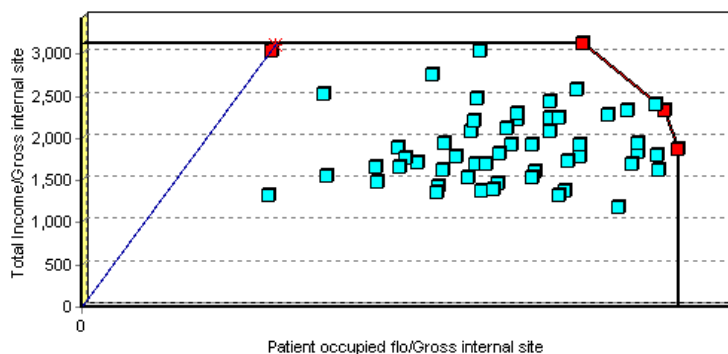


Figure 7: Comparative efficiency of Mental Health Trusts in England

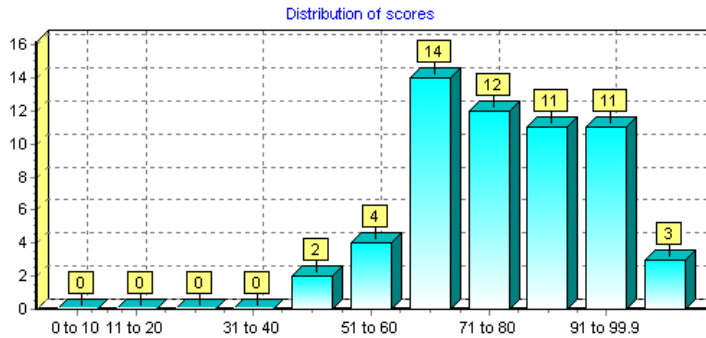


Figure 8: Histogram of data presented in Figure 9

Again the picture is similar. The tail of less efficient performers is perhaps longer and deserves more detailed examination. No immediate pattern was apparent from examining the identity, type and location of the more efficient performers. The average cost of space (hard FM) in these trusts is similar at £174 per m² however given the smaller estate the cost of a 20% inefficiency is only ca £122,000,000 per annum.

Network Discussion

Resources did not permit verification of the data at individual trusts. We did however intend to discuss the results under the [Chatham House rule](#)^[5] with network members. The members of FMGC's NHS networks are not necessarily randomly selected in that the act of membership may reflect a particular organisational culture^[6]. The networks did however offer permit a general validation of the data by examining the relative performance of individual trusts and discussing. The member's requested that we also examine two other groups of hospitals classified as either specialists (national or regional centres of a particular medical discipline) or teaching hospitals.

Specialist and Teaching Trusts

Figure 8 shows the results for both London based and none London based trusts. The three 'envelope' units are all specialist centres none of which is located in London. A London teaching hospital with an efficiency of over 99% is also effectively an envelope unit. At the opposite extreme another London Teaching hospital is apparently very inefficient (to the left of the diagram). No Teaching Trust outside London achieves an 80% relative efficiency and the majority are less than 70% as efficient. Such trusts have teaching and research activities that combine with one or more local universities. Their general relative efficiency does raise a question about how the space and income for such services is apportioned between trusts and universities.

Discussion

An admittedly preliminary analysis shows a considerable variation in the apparent efficiency of, and income generation from, the estates of different NHS trusts. The prospective cost of this inefficiency is large. A conservatively estimated 20% inefficiency could equate to a possible overspend of ca over £500,000,000 per annum on inefficient space.

Similar inefficiencies have been calculated for commercial offices (Bootle and Kalyan, 2002) and appear in work we are doing on universities and civic accommodation. What

explanations might there be and what proportion of the inefficiency might be recoverable. These are questions that deserve more detailed research given the sums involved.

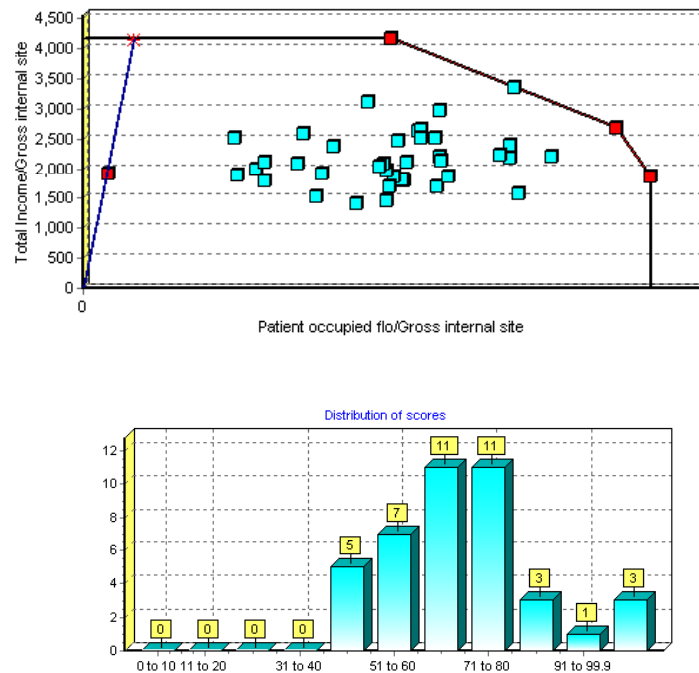


Figure 8 Comparative efficiency of specialist and teaching trusts

The following list explores possible options.

The **apparent inefficiency is inevitable** in that if you analyse any group of facilities in a search for relative efficiencies you will find differences. In one sense this is true but that is not a reason for understanding the possible causes and seeking to minimise them. To not do so is to duck the issue.

The **data is bad / inconsistent** and compares apples and oranges. Again the argument can always be made. The existing data on PCT income in particular and perhaps on PCT estates appears very confused. The analysis of the specialist and teaching trusts suggests special cases meriting further research. There are two other sources of potential bias in the data which cannot be eliminated. We understand that the GIA figures captured in the ERIC returns, at least as supplied to us, include residencies and built car parks. Both would tend to distort the ratios especially the patient occupied space. Outdoor parking, on the other hand can produce an income without appearing as space. That said the comparisons appear to give a consistent picture and we have erred on the side of caution in excluding the apparently very good performers. We have used total income including any income from staff or visitors however the extra is on average only 0.4% of all trust income and is nowhere more than 2%. It seems unlikely that data inaccuracies are the major explanation.

1. Site **specific constraints on designs** make some inefficiency inevitable and not all designs can achieve the same efficiency. Case studies and comparisons of plans would be needed to test the potential influence of design.

2. The **data has been analysed at Trust level only**. The data presented above have only been analysed at the aggregate Trust level and not at the level of specific hospitals or sites. To analyse the data at this level we would need the income allocation per site.
3. **Older buildings** were less efficiently designed. Again site specific analysis would be needed. The data we had, and the resource available did not allow such a comparison.
4. As **functionality changes with time** efficiency decays because local accommodation solutions have to be patched in. Again this could not be tested and it is a subject meriting further research. Indeed it might be a more generic issue in Facilities Management. In the specific NHS context the possibility merits research if only to anticipate potential changes in demand on PFI sites.
5. Changes to space cannot match **changes to clinical practice**. This issue, while real is a sub set of 5) and 6)
6. The inefficiency is an inevitable **price of political decisions** to keep traditional DGHs running in the face of changing clinical practice and demand. Yet again more research is needed however the variations in relative efficiency occur in all types of trust and the first overview of the acute trusts does not suggest particular categories are more or less efficient. Eye-balling of the data would say no, but more comparison by trust type could be done.
7. Different **non clinical needs** introduce variations. Possible sources have been described above. Others could occur where for example trusts have invested in shared facilities but the GIA figure is listed against one Trust or site. Again this is a possible cause whose influence would need more specific research if its magnitude were to be determined. The obvious cases of teaching and specialised trusts have been excluded. Training suites, cafeterias, laboratories, meeting spaces etc might also increase the space but bring in less income than patient occupied space however a comparison of output measures should focus attention on such space. In contrast a traditional cost per m² measure would tend to be improved by any excessive, but cheap space.
8. There are **local power games with space** such as a tendency to hoard or a demand for executive offices. Comparisons with other sectors would suggest a potentially strong influence. Again the output measures bring such inefficiency into sharper focus.
9. The inefficiency is a result of **over reliance on measures of cost per m²**. Cost per square metre benchmarking makes portfolios with a relatively large proportion of poor quality, poorly serviced and maintained space appear relatively efficient while concealing underlying inefficiencies in the total use of the built resource. To the extent that this is true it represents the wastage induced by the dilemma illustrated in Figure 2.

Above all perhaps the guidelines by which new facilities are designed and spatial norms are calculated need to be scrutinised. It is not yet clear whether the excess space is designed in or accumulates with use. If the former there is the added risk that extra capital and embodied energy is being wasted. Current research is being undertaken to further understand these issues and examine, efficiency versus age of facilities, whether facilities constructed under the Private Finance Initiative are more efficient than others, whether teaching trusts are indeed special cases and the feasibility of achieving reduction in space in less efficient

buildings. Meanwhile the approach has proved capable of placing a discussion of Estates Strategies on board agendas in a way that traditional building condition data did not achieve. We are researching the particular consumption of space by different service areas and developing means to further describe the estate in service and business language. Two Trusts have specifically adopted **Lean Asset**TM Strategies.

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2 By Michael Bellas, Senior Estate Analysis Manager, Estates & Facilities Division Department of Health

3 Under current UK policy PCTs are responsible for commissioning health care, that is they contract for delivery from other forms of NHS Trust. They also provide certain health facilities.

4 For completeness other income streams are included. They represent on average only 0.4% of the total figure.

5 <http://www.chathamhouse.org.uk/index.php?id=14>

6 In the comparable Local Authority network 74% of the good and excellent Councils in the first round of the Comprehensive Performance Assessment were members.