MOTT MACDONALD

Adaptable, affordable, digital, outcome-focused: new entries in the healthcare lexicon

Why NHS Velindre is writing data sharing into procurement of its new cancer centre

Design healthier buildings for better results

Financing the next generation of facilities

Why 'back of house' should be front of mind

Fit for the future?

Adaptive thinking for new clinical needs

Redefining healthcare buildings, with people in mind

Right across the globe, healthcare provision and the challenges associated with it sit high on the political agenda. Many factors contribute to failure or success in the prevention, treatment and management of illness, disease, infirmity and disability. But having the right infrastructure and buildings is most certainly a big factor.

Whether it's improving access to healthcare in developing countries, or reacting to new clinical practice and technology in developed countries, the effects are felt in the healthcare estate, which can either hinder or help the change.

We need to create environments where the most important people in this process – individuals, families and communities – get healthier, quicker.

As a proportion of global healthcare spend, investment needed in healthcare buildings is small. But in the context of the construction market, the level of investment is enormous. The investment absolutely has to deliver good value for money. The best measure: faster, better clinical outcomes.

The construction industry's role is to create environments where doctors and nurses can achieve uncompromised clinical excellence, and where the most important people in this process – individuals, families and communities – get healthier, quicker.

This magazine lays out some thoughts and opinions from our healthcare experts and those of associated external colleagues. Our team from across healthcare consulting, design, construction, planning, finance, international development and sustainability share thoughts on the latest challenges and opportunities in the sector. Our collective aim is to present the context for building facilities and infrastructure, helping customers recognise the right moment to make an investment, in the right area, to get the right outcomes. In certain cases, that doesn't mean building at all.

Looking ahead, the healthcare sector faces some fundamental questions that will need the combined attention of many different problem solvers. For example, how does society build hospitals today that will keep pace with the rapid rate of change in medicine, society and technology? How can estates change the fabric and layout of facilities to make patients feel more comfortable, and so aid their recovery? How can government departments target better use of technology and primary care to meet the growing needs of an aging population? How do economies pay for the necessary improvements, against a climate of financial uncertainty?

Addressing these challenges is vital for the future of healthcare in developed and developing countries alike. Converting our solutions into adaptive facilities, connected systems, more accessible care, properly supported clinicians and healthier lives is how we can all make a difference. They're challenges we all relish and are working to resolve.

We would be delighted to discuss more with you – and hear about your challenges.

Richard Cantlay
Global head of healthcare buildings, Mott MacDonald

The quickest route is A to A

Global buildings leader Richard Shennan provides two watchwords for the future of functional healthcare buildings.

What makes a building functional? There are plenty of considerations, but for healthcare I believe it comes down to two key factors: affordability and adaptability. In plain terms: making the money work and preparing for change.

Let's start with affordability. This brings in both physical and human elements. The human aspects of affordability are centred around quicker recovery and reduced re-entry for those with health problems, and happier, healthier staff. Both have a huge impact on cost and are affected by the buildings in which they receive or deliver care.

The physical element is the effective performance of the built estate over its lifecycle, in terms of value and contribution to health outcomes. Whether for new build or refurbishment, through-life modelling of cost for capital investment, operation, maintenance and adaptation is essential.

Estate owners need to harness the potential of the digital revolution in design, construction and operation to reduce consumption and waste, cut risk and improve certainty; and provide for future change.

This leads into the next pressing requirement: adaptability. Energy and carbon, noise, air quality, vibration, fire resilience, and waste – they're just some of the performance criteria tightened by regulation. Add new healthcare technology, changing work practices and space uses, better employee health and welfare, and the only certainty is that tomorrow's requirements won't be the same as today's.

New legislation, tougher standards, technological advances, social and economic trends and climate change are firmly on the radar. Estates and governments need to find ways of putting planning for adaptability at the centre of their strategy to accommodate changes over the horizon.

Get these two pillars in place, and health facilities can look forward to delivering enhanced outcomes in a resource-constrained world.

Five become one

Project
Manchester Joint Hospitals

Location
Manchester, UK

Client
Catalyst Healthcare

Expertise
Structural, civil and geotechnical engineering

Given the challenge of combining five separate hospitals on a single city centre site, we responded with a flexible design and meticulous planning. Central Manchester University Hospitals is one of the largest hospital projects anywhere in Europe, treating 1M patients a year. Structural and logistical flexibility were fundamental. Flat slabs allow complete flexibility in the way internal spaces are divided up, giving future freedom to reconfigure floor plans over the hospital's 60 year design life. Water, power, and medical gas and air services can be similarly reconfigured. Our structural design limited noise and vibration during construction, while maximising speed and safety.

Project
Pioneer Family Healthcare Centre

Location
Singapore

Client
Ministry of Health

Expertise
Design of mechanical and electrical services including air conditioning and mechanical ventilation, plumbing, sanitation, fire protection, electrical, extra low voltage power supply and lift and escalator systems, plus construction supervision

Expansion minus growing pains

The facility is designed with the growing and aging local population in mind, expandable from 272,300 attendances a year when operations start in 2017. By 2030, the clinic will serve up to 385,000 people per year.

Project
Wagga Wagga Base Hospital

Location
NSW, Australia

Client
Health Infrastructure
New South Wales

Expertise
Structural, civil and façade engineering

Foundations for success

This new AU$300M acute care facility contains some highly sensitive equipment. Vibration performance of the suspended floor slabs was a key design issue. We used BIM to co-ordinate structural, architectural and services models, improving spatial and engineering efficiency, and streamlining construction. We also carried out earthquake analysis to optimise pile design.

Project
Pok Oi Hospital redevelopment

Location
Hong Kong

Client
Hong Kong Hospital Authority

Expertise
Structural, civil and geotechnical engineering

Surgical precision

This 600 bed hospital consists of three towers on a large podium with a two level car park basement. Its wholesale modernisation involved alteration and refurbishment of existing buildings whilst maintaining ongoing hospital operations throughout the project period.

The future wants an open mind

Healthcare needs to absorb lessons from other industries, says Steve McGuire, CEO of Essentia, the non-clinical directorate at Guy's and St Thomas' in London. Learn quickly, or get left behind.

This time next year, there will be driverless cars in San Francisco. Now, using just my smartphone, I can book a flight to Shanghai, reserve a hotel room, and measure how many calories I burn on a morning run. But I can't book an appointment in a hospital.

As we move towards a more digital future, we need to be designing systems around the convenience and needs of people. The digital revolution has as much to offer healthcare as any other sector. It's time for politicians, health professionals and the industries that support them – construction included – to think of alternatives to conventional care provision.

If we could act more like the airline industry we might quickly cut waste and gain smaller, more cost-effective facilities. Real-time monitoring, data collection and analytics have transformed the design, maintenance and business economics of jet engines. Could the same techniques help us profoundly alter clinical and care practices? If healthcare embraced digital technology to better monitor patient health, could we rethink the sector's building needs fundamentally?

In China there is real political drive to make modern technology more adept, and to create a fully digital health system. Digital is where the really groundbreaking stuff is going to happen.

Unless healthcare in the UK follows the same rigorous transformation as the hotel, manufacturing, aviation and logistics industries, then the NHS, as we know it, faces a fair degree of risk.

Do the right thing

One way to solve the healthcare problems of tomorrow is commercial altruism. It's beholden on companies to deliver not just systems for now, but also for future generations. We need to help the industry better understand itself, and get people thinking differently about tomorrow.

The UK has a pressing need to move forward. At the moment, the National Health Service is still reeling from the impact of the 2008 financial crisis. Yet we, the beneficiaries of the care it provides, have become accustomed to a high standard of quality and accessibility in the last decades. Unless healthcare in the UK follows the same rigorous transformation as the hotel, manufacturing, aviation and logistics industries, then the NHS, as we know it, faces a fair degree of risk. Equally there is everything to play for. The societal advantages of creating a more effective and sustainable health system are vast. Business must play a key role in articulating that ambition and finding ways to realise it.

Because of the changes across the whole of the world since the recession, there is a loud call for business models to become very different. Organisations that share values need to work in partnership and genuinely co-operate, rather than working in competition.

Moving forward, we all need to be open to new ways. It's too late to do otherwise.

International care to meet national needs

Ken Grant, technical director for international health at Mott MacDonald, discusses latest challenges, future opportunities and why there's no place for pessimism in his line of work.

What's exciting right now?
We're going to be working on the Fleming Fund, an initiative by the UK Department of Health to help tackle the global problem of antimicrobial resistance in low- and middle-income countries. The threat of bugs developing resistances to drugs is well known, but not enough is yet being done. Drug resistant infections could kill an extra 10M people across the world every year by 2050 if they are not tackled. We're already seeing resistance to strains of tuberculosis and malaria. Sadly, there has been misuse for a long time, bringing real difficulties to overcome. Of course, it's not just in human medicine, but also veterinary, with farmers throwing sack loads of antibiotics into fish farms or injecting all their cows, whether sick or not. We'll be helping to plan laboratories and upgrade data, working with medical and veterinary staff in the UK and abroad to promote a holistic approach and provide appropriate training, lab work and epidemiology.

The most important next step is to use technology to apply what we know now. For example, we could eliminate 95% of child mortality if we only applied what we already know.

What trends are you seeing emerge in developing countries?
There is a real effort to match care with health needs, dependent on the burden of disease. Buildings are part of the solution. There's an emphasis on creating buildings that aid day cases – getting patients in and out quickly. Technology is key for this evolution. We're seeing an increase in mobile health clinics. The wide prevalence of smartphones in Africa is also encouraging people to take control of their own health. Apps for fitness tracking and antenatal care, as well as smart messaging are already making a big difference.

What's a good example of smart technology in action?
A lot of hospitals are now able to show patients how to hold their records on their phone and in the cloud, rather than a central database in the hospital itself. In South Africa, they struggle with huge problems of overcrowding. Often, people start queuing at 4am for repeat prescriptions of HIV or diabetes pills. Now, they can directly text the manufacturers, who are creating depots in townships, where patients simply present a barcode. Another example is Sri Lanka, where subscribers are now able to measure their blood pressure and heart rate so doctors can diagnose problems digitally and remotely. Certain clinics are linked to Harvard University, so you can now get a consultation in the States via video link-up.

What's the next big wave in healthcare?
The most important next step is to use technology to apply what we know now. For example, we could eliminate 95% of child mortality if we only applied what we already know.

And the next big challenge?
Appropriate care needs to be our focus moving forward. Continued mass migration to cities presents huge challenges around sanitation and water. With 70% of the world's population expected to live in cities by 2055, I fear there will be even bigger problems with slum districts, which are still largely unrepresented and passed over in care programmes. With no clean water and human waste simply slung over the fence, there's little point treating someone for an infection, if they are going straight back into that filthy environment. We need an integrated approach to tackle the huge burden of communicable diseases that will spread as a result of poor sanitation.

How did you first get into international health?
I started off my medical training as a paediatrician, and then went to work for a Save the Children bush hospital in East Africa. I thought it was great – I was basically paid to live in a Land Rover, which was my idea of heaven at the time. Initially, I was captivated by the fact I could cure 50 ill children a day. But then I realised that if I could teach my driver to inoculate, I could help cure thousands more. I was hooked. When I eventually came home, I retrained to work in tropical diseases and public health.

What achievements are you most proud of to date in your career?
I think the way my teams have worked closely with governments has made a difference. The old US model was to bypass governments and send in the NGOs directly. I feel it's important to put governments in the driving seat. Embedding systems is the most sustainable way to meet long-term challenges. That will be one of the gains of the Fleming programme – how we create links with other nations and share knowledge to combat microbial resistance.

Are you optimistic for healthcare in developing countries?
Absolutely! Yes, there is a rising burden of disease globally. Finding the solution at scale is a vast challenge. But the progress we are making in so many areas is heartening. Smallpox has been eradicated. Polio is all but gone, Guinea-worm likewise. We are making progress in tackling neglected diseases such as Visceral Leishmaniasis, which affects a million people worldwide. It's about putting money where it makes most impact. You can't be pessimistic in this role. You can only look forward.

Appropriate care needs to be our focus moving forward. Continued mass migration to cities presents huge challenges. We need an integrated approach to tackle the huge burden of communicable diseases that will spread as a result of poor sanitation.

Beyond bricks and mortar

Economic and political pressures, and advances in technology, mean the case for building needs to be considered very carefully, says Brian Niven, Mott MacDonald technical director for health consulting.

We have all read in the media about residents and politicians campaigning to save their local hospital from closure or downgrading. I'm sure that all of us would feel resentment, anger and loss to the community too, if it were to happen where we live. Indeed, public outcry has brought about the downfall of many proposed plans by NHS commissioners over the years, creating inertia in health service planning.

We've supported a number of high profile programmes to reconfigure provision of acute hospital services. Notable successes include the Greater Manchester 'Healthier together' and 'Making it better' programmes: changes have been agreed to the delivery of maternity, paediatrics, neonatal care, acute medicine and general surgery services. But equally, we have been involved in some which have faltered under local and national scrutiny.

The stalemate cannot continue if the NHS is to continue to provide a health service fit for the 21st century.

To achieve success takes time, commitment, planning wrapped within good communication, and sincere engagement with local residents and other stakeholders. Most programmes which succeed have strong clinical leadership, and champions who are passionate about making change happen.

Business as usual won't work

There are sound clinical planning arguments which, if articulated and presented in the right way, make a compelling case for implementing change. Not least of these are the clinical workforce challenges. Ensuring that minimum numbers of senior and junior medical staff are available seven days a week is central to maintaining patient safety and improving the quality of care.

The definition of clinical specialties is also changing and services like general surgery and general medicine are slowly being replaced by subspecialities. For example, general surgery is slowly being replaced by its subspecialties of vascular surgery, colorectal surgery, breast surgery and abdominal surgery. Why is this important? Because to achieve the clinical standards of care, each of these new subspecialties need to achieve its own minimum staffing levels and develop its own 24/7 rota.

Achieving these standards for staffing levels within each subspecialty level at every hospital site just cannot be done. Firstly, there aren't enough trained doctors in the UK. Second, if there were enough doctors the patient workload within each subspecialty at every local hospital site would not be enough to keep these medical staff busy. The wages bill would be uneconomical, and it would impact on the specialists' ability to maintain their skills and ensure patient safety.

Centralise, specialise

To improve patient safety and outcomes the answer for many local health leaders is to centralise services and consolidate staff in a lesser number of hospital sites.

There's a lot that happens in a hospital that really shouldn't happen in a hospital. Once people get stuck in the system, they tend to end up being there too long.

Taking control with technology

There are of course other pressures on district general hospitals including advances in medical technology and drugs, which continue apace. We only need to look back over the last 10-15 years to appreciate their impact on how we deliver care, affecting what we can treat, and how, by who and where treatment is delivered.

There are significant transformations happening across primary, community and social care. Their integration, together with treatment and technology innovations and new working practices, could be revolutionary by enabling care outside hospital settings and diverting patients away from emergency departments.

In the longer term, the impact of public health programmes should start to kick in with more people being encouraged to look after their own wellbeing and health needs. Technology will enable patients to measure their own health and send biometric and biostatistic data to their GP. Growing our individual knowledge of health with low cost apps will become commonplace. Adaptive technology is another key growth area, as there are obvious benefits to helping people stay at home longer. As a society, we need to break out of the cycle that dictates that old and frail people enter hospital or residential and nursing accommodation.

What will all this mean for our local district general hospital? Inevitably it means change, and in some areas radical change. The future of some existing hospitals will be as larger specialist centres of excellence offering a range of acute services to a wider catchment.

The writing's not necessarily on the wall for hospitals that do not achieve this designation. Instead of struggling to maintain patient safety across a wide range of clinical specialties, they might develop community service hubs providing integrated primary, community, social and mental health services.

Communication challenge

What is important is that the clinical arguments are sympathetically presented to local residents, in a style which is easily understood, to inform debate and discussion. The impacts of proposed plans need to be assessed, particularly when it involves travel and access to alternative sites. Patients' concerns need to be listened to and then acted on.

In addition, the wider picture of healthcare on offer to local communities needs to be convincing and articulated in detail. If the changes implemented help people access care at home, their local GP surgery or community clinic, the opportunities and benefits need to be widely understood.

Changes in train and on the near horizon have the potential to liberate significant elements of healthcare from traditional bricks and mortar. The future of healthcare will increasingly be about promoting and providing a local, holistic, better service.

“It’s all about the data”

Dennis O’Keeffe, infrastructure programme director at the Velindre NHS Trust in Wales, is looking to build a £200M+ specialist cancer treatment centre. He explains why he’ll be writing the transfer of BIM data into the contract, using Velindre’s ‘Enterprise BIM’ initiative that is being developed with Mott MacDonald.

Acres of words have been written about the efficiencies and advantages building information modelling (BIM) brings to design and construction. But, as a public service client, we feel there’s a certain amount of asymmetry in the industry. We haven’t seen the full benefit of BIM, especially in the operational phases of a project.

Public private partnership (PPP) has become a normal way of procuring new health facilities. A substantial part of a PPP service contract is taken up by the 25-year concessional period. During that stretch, the client – usually the NHS in the UK – doesn’t have the full apparatus of data to really monitor the performance of the building.

The construction industry’s at the point where it can create and capture data during design and construction. The capability exists to monitor operational performance, analyse data, and make decisions based on that. I want access to it all. To get it, we need to lay out the PPP contract with operation and ultimate handover back to the public sector in mind. Access to data will enable us, as client, to truly participate and collaborate in the operational phase, from a position of knowledge.

Enterprise BIM

At the moment it feels like data is owned exclusively by the PPP contractors working for us. As an analogy, we’re like the kid with their nose pressed against the sweet shop window. We, the public sector clients, are looking in, but we can’t touch the sweeties. We want in on it. We need to write it into the contract, because experience shows that if it’s not in the contract it may not get done!

Why does this matter so much? In today’s increasingly digital age, I’m told supermarkets can now tell from shopping habits when couples are going to get divorced. And there’s almost no part of our lives that isn’t touched by the internet. That’s the power of data! The challenge to designers, builders and asset managers is to become digital natives and data scientists – far beyond ‘bricks, mortar and concrete’. We want, in our own modest way, with our new cancer centre project in Cardiff, to make BIM and data work for us.

It’s only when a building goes live that you know if you’re actually achieving the aims you had at the outset and put into the design and construction specifications. As clients we not only want to be able to use data to drive operational efficiencies; we want to learn from our experience as procurers, so that we can make each subsequent project better than the one before. Without performance data, we’re blind.

Hospitals are complicated buildings. I want the best design, and information and control during operation. There’s no point having a sports car if you’re going to drive it like a delivery van.

Let's be blunt: without 'Enterprise BIM', we will continue to operate at a relative disadvantage in the operational phase of the PPP concession, compared to suppliers who do use BIM effectively. It's to our advantage – or at least less to theirs – if we know what the energy performance is, when repair and maintenance are required and what the response time to call-outs is. Enterprise BIM also has the potential to make the evaluation of the bidder's designs and the procurement process more efficient and effective.

Live data would also help us influence better behaviours. One of the big problems in hospitals is energy wastage. From a facilities management perspective, getting people to change their culture and habits is the golden goose. Real-time data would help build consciousness of what's going on.

Above all other interests, data transparency and transfer is in the interests of those for whom health facilities exist: clinics and hospitals that are designed, built and operated better ultimately benefit people suffering from illness, by enabling better care and the redirection of precious capital from heating bills to treatment.

Operational gains

Hospitals are complicated buildings. I want the best design, and information and control during operation. There's no point having a sports car if you're going to drive it like a delivery van.

That's why I'm putting data sharing into the contract for the PPP that will deliver my new facility. If the industry responds as I hope, by 2022 we will have a fabulous new building, bringing world class cancer treatment, an exemplar not just for healthcare, but the whole public sector.

We'll have a sports car and the ability to drive it.

Drop-in centre

Project
Royal Victoria Hospital

Location
Edinburgh, UK

Client
NHS Lothian

Expertise
Civil and structural engineering

Royal Victoria Hospital needed specialist facilities for geriatric care, rheumatology and dermatology, with 147 single occupant bedrooms plus assessment and treatment centres. Its challenge was to create this adjacent to busy existing buildings on the main hospital campus: working space was restricted and construction-related noise had to be minimised. The campus itself was bounded on one side by a main traffic artery and on the other three by a one-way 'blue light' route used by ambulances. Construction traffic had to be kept to a minimum. Working with contractor Laing O'Rourke, our solution was to use BIM to design the facility for offsite manufacture.

- 55% of the building was made offsite under factory conditions and delivered just in time to be craned into place
- Construction required 25% fewer workers and was 20 weeks faster than traditional methods
- There were no reportable accidents and the project received a gold award from the Considerate Contractors
- Materials selection contributed to a BREEAM 'excellent' rating

Broken BREEAMs?

Built environment sustainability champion Gordon Hudson believes a new strategy is needed to incentivise sustainability design in healthcare, as the current BREEAM approach isn't matching progress in other sectors.

In 2008 the Department of Health embedded BREEAM (the Building Research Establishment's Environmental Assessment Method) into the design process for healthcare buildings to create better work places for doctors and their staff, better outcomes for patients, and better environmental performance – from transport to water and energy use. However, it isn't working.

Research undertaken by myself and John Holmes and Graham Capper, both from the School of the Built Environment at Northumbria University, showed only 15% of NHS buildings had achieved BREEAM certification. Why?

Of the 110 NHS buildings that were BREEAM certified, half received an 'excellent' rating and a third received a 'very good'. Not bad? Well, consider that over 150 UK office developments have received an 'outstanding' rating. Healthcare buildings seem to play in a lower league and we found that few of the BREEAM registered buildings went on to gain a final certification.

One explanation is a lack of value in the BREEAM labelling. In the office sector BREEAM has made a great deal of difference in normalising sustainability and eliminating false claims. But hospitals aren't competing to rent out floor space. The obvious commercial driver that's made BREEAM a success in the office sector isn't there.

I'd love to see the NHS and BRE get together and thrash out what the next 20 years needs to look like. There are big opportunities for the NHS estate to link social and economic benefit and outlay.

Case-by-case action

Or is it? What role does a building play in healing and recovery. There are design and engineering constraints determined by local context, type of hospital and clinical functionality. Operating theatres and many wards have to be mechanically ventilated. Urban locations often don't afford green, leafy window views. BREEAM doesn't really allow for these practicalities, it's true. But designers can specify healthy materials, combat noise and vibration, embrace natural light and pursue energy efficiency. All helping to get patients better quicker, freeing up bed space and cutting operational costs.

Encourage design creativity

The sector specific BREEAM healthcare credits introduced in 2008 were not mandatory and not universally used. Generic assessment criteria replaced them in 2011. With no healthcare-specific hoops to jump through, facilities have been designed to standards that only partially apply. In a sector with notoriously tight budgets, going beyond the minimum to obtain points when they will not contribute to improved patient care is a low priority. But it might also be that BREEAM has made design of buildings too prescriptive.
In our research we found many projects were doing just enough to pass the 70% banding for 'excellent', and not necessarily taking the very best steps for that project. It would be far better to take a holistic approach that encourages creativity and innovation.

What are we trying to achieve? I'd love to see the NHS and BRE get together and thrash out what the next 20 years need to look like. There are big opportunities for the NHS estate to link social and economic benefit and outlay.

We're not advocating that BRE make things easier. In fact, we're asking for them to be more challenging by looking harder at each site and harder at the use of each building to say: 'what's the best thing we can do with the capital that we have?'

Living, breathing, outstanding

Project
Houghton-le-Spring Primary Care Centre

Location
County Durham, UK

Client
NHS South of Tyne & Wear

Expertise
Building services engineering

The primary care centre in Houghton-le-Spring is the first healthcare building to achieve a BREEAM Outstanding score of 85.31%. The 4650sq m building's energy solution is a combination of ground source heating and cooling, photovoltaics, natural ventilation with night cooling and solar thermal technology.

BREEAM Outstanding building services – at a glance

- Unique thermal wall maintains constant temperature, avoiding need for air conditioning for all but the equivalent of four days per year
- Renewable energy including photovoltaic panels, ground source heat pumps and a wind turbine
- 'A' rated energy performance against UK Building Regs Part L 2006
- Light pollution mitigated by the selection of fittings
- Annual energy bills 38% lower than a standard health building
- Lifecycle analysis addressing maintenance and replacement used to inform design and construction

"Although there was a capital cost to achieving the 'outstanding' rating, we set this against the wider financial and health costs of not reducing the impact of our activities and our estate."

Stephen Naylor
Head of estates, NHS South of Tyne and Wear

Material gains in healthier hospitals

Few would deny the merits of healthy buildings, but momentum is slow, says sustainable materials leader Eszter Gulacsy. By identifying the challenges, we can get this stone rolling.

In recent years, we've seen a growing realisation among healthcare providers that although a building won't cure you, it could contribute to the healing process. Or, at least, the building shouldn't hinder the healing process. If we're being honest, then that's where we're starting from: buildings shouldn't get in the way of recovery.

Healthcare trusts are understandably keen to improve their environments, whether it's air quality, access to daylight or setting temperatures and artificial lighting that suits both patients and clinicians. But they also have other factors to consider, most notably energy efficiency. 40% of energy production in the European Union is directed to the building sector. It's little wonder that energy efficiency is therefore the primary focus of regulators and voluntary schemes in healthcare facilities.

The upshot of concentrating on energy efficiency is increased air tightness: eliminating leakiness reduces heat loss and improves energy efficiency, which again is a good thing. However, it also means that any air pollutants coming into the building or generated inside the building have less chance of escaping.

Balancing opposing priorities

Of course, in cities with poor outdoor air quality, opening the windows is not the healthy option anyway. It is proven the world over that a 'bad air day' will raise mortality inside as well as out. But using forced or recirculating ventilation systems instead of natural air supply presents an equal challenge – the risk of pollutants accumulating in the building.

With attention so fixed on vehicle pollution it may surprise you that in hospitals the most likely source of pollutants is the chemicals that occur throughout surgery rooms, operating theatres, and laboratories. In this indoor environment, even everyday disinfectants such as rubbing alcohol can react with other chemicals inside the building to produce gases such as ozone, a common component in smog. Tests find the same compounds inside the building as you would in an outdoor traffic environment. Indeed, recent studies have shown that healthcare workers reported more indoor-related symptoms than people working in office buildings.

The fabric of buildings themselves, and their fittings and furnishings, are another major source of compounds that can make us ill. Designing and specifying healthier buildings is still a niche skill, and more prevalent in the office sector than healthcare, at the moment. There is an increasing number of office owners who are determined to protect the wellbeing (and productivity) of their staff by minimising the use of construction materials that contain potentially harmful chemicals.

90% of our time is spent indoors and 90% of business costs are for staff salaries. However, the effect of the indoor environment on productivity is not considered in the same way as other aspects of the building, such as energy performance.

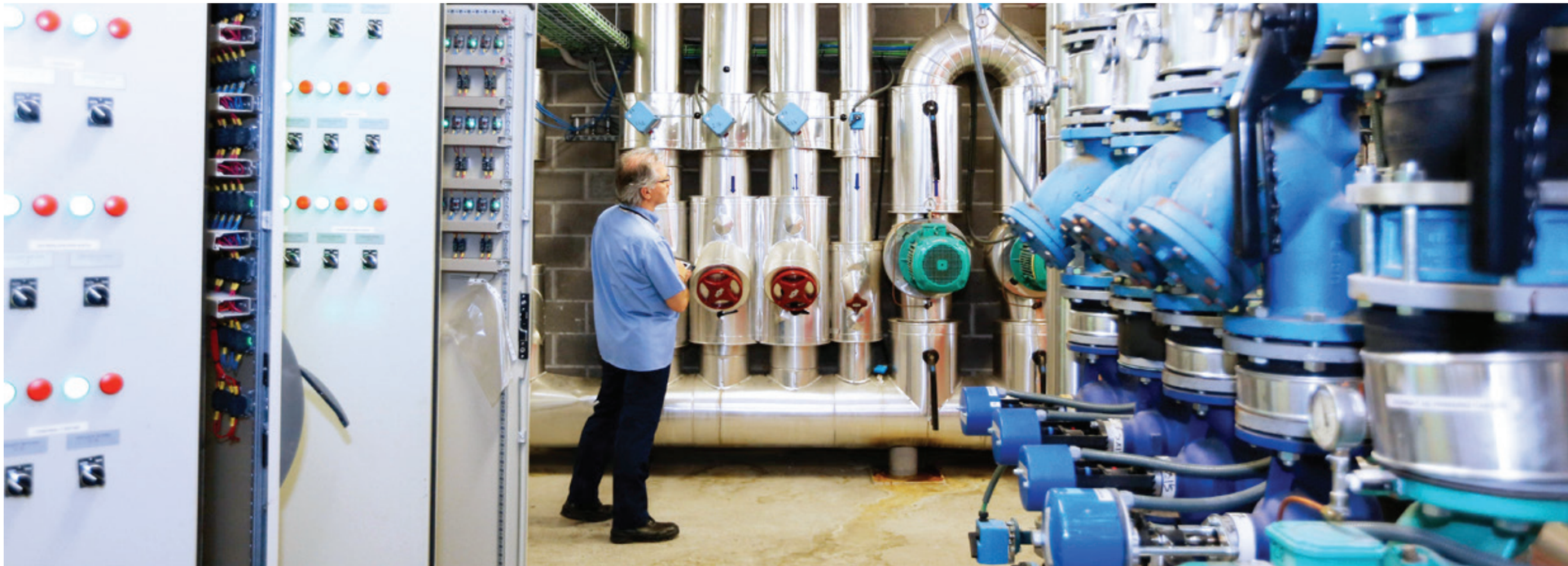
The challenge for designers is finding healthier materials, and then verifying these new products have been used in construction, with no substitutions made. It asks for a totally new tactical approach, backed by education of suppliers. But the more projects that ask these questions, the less they become a novelty and the quicker the markets will emerge.

If you buy a bottle of shampoo in the EU, all the ingredients are listed on it. But not so in construction materials. Like a parent of an asthmatic child, who will be acutely aware of finishes and textiles, designers will need to act like 'mom' for their clients in the building process. In a recent office fit-out project, we developed a list of more than 300 products, with an assured ingredients list for each.

No perfect solutions

Designing with human-friendly materials and avoiding volatile compounds as far as practical in facilities management and clinical treatments helps solve the dichotomy of opposing outcomes for energy efficiency and air quality.

This is a complex area, and demonstrating quantitative metrics is hard. But when you consider the office environment, there's an obvious business case for proactively safeguarding employee health: greater alertness, improved wellbeing, less absenteeism. In the life or death situations of healthcare, a positive indoor environment that affects productivity and improves performance also makes a lot of sense.



Where are the shovel-ready projects?

Critical healthcare infrastructure is badly needed in many countries across the world and globally investors want to invest in such infrastructure projects. But the PPP machine for healthcare is sitting idle. Surely something has to give, says John Seed, Mott MacDonald's global sector leader for advisory services.

The case for PPP in healthcare remains strong, especially in low-income Asian, African and South American countries with an urgent need for sustainable infrastructure. Yet, aside from expansion in Turkey, there are no big programmes for healthcare on the horizon. One or two countries are talking about doing it, but the truth is that we face a real shortage of shovel-ready projects.

Too transparent?

It's frustrating. Governments all around the world are screaming out for critical infrastructure. And investors are saying: we've got all this cash and with interest rates being as low as they are – or non existent – we can't give the returns we want to our investors. They're also screaming out – for infrastructure to invest in.
So, we've got the two ends of the equation. What's going on in the middle that's not working? Where's the disconnect that's holding back healthcare provision?

In this uncertain environment, the need for viable, well-drawn-up business cases is greater than ever to get budget holder sign-off.

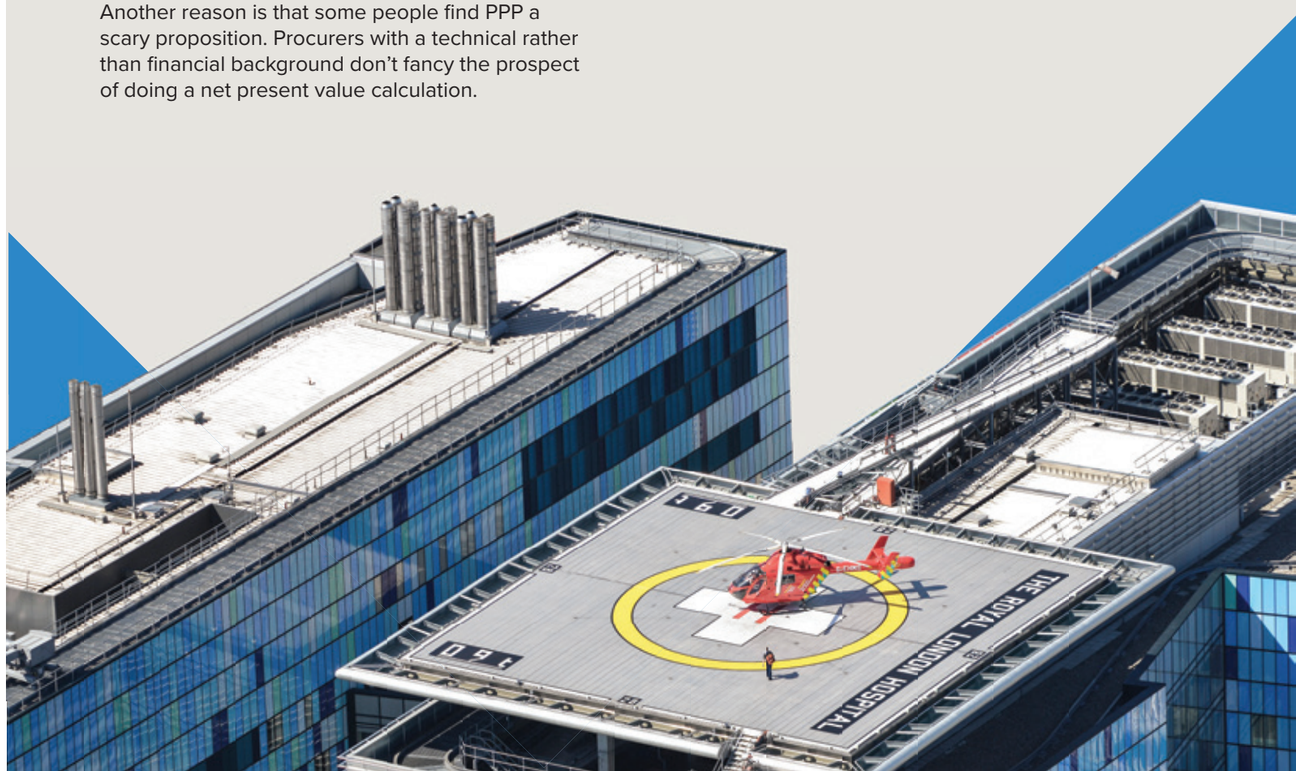
Short termism is one reason. PPPs are 30-year commitments and governments need to look beyond the end of a concession period to consider what the public sector will inherit. In an environment where political and investment cycles are typically five yearly, that's off the scale. And PPPs are new, they involve change, and for many that spells 'too difficult'. Then there is transparency: for a lot of governments that's not the way they like to operate. They prefer not to invite scrutiny from the international financial institutions and commercial banks that demand it.

Too intimidating?

Another reason is that some people find PPP a scary proposition. Procurers with a technical rather than financial background don't fancy the prospect of doing a net present value calculation.

I think we're also up against a growing stigma around PPP that it costs more than traditional procurement. It is true in certain sectors, if you do a bad deal. But it can offer good value when you follow best practice.

In this uncertain environment, the need for strong, well-drawn-up business cases, offering robust risk management and stable investor returns, is greater than ever to get budget holder sign-off. Health service procurers and their PPP providers need to be adding that capability to their arsenal.



While I am tremendously disappointed how the numbers of PPPs have dropped, I'm optimistic that a new wave of infrastructure investment is coming. In recent months, we've seen encouraging signs from the EU, with its pledge to increase the amount available to leverage private sector investment from €315bn to €500bn, which is a phenomenal amount of money. The EU, fund managers and major investment banks have drawn up two major new standards for managing risk and providing sustainable social and economic infrastructure through PPP (we're involved in both – the Sustainable and Resilient 'SuRe' standard and the International Infrastructure Support System).

The UK government has likewise signalled its intention to make the most of PPP for building infrastructure to meet social needs and stimulate the economy. The bottom line is that PPP has come a long way since its introduction a quarter century ago. PPP can be a much-needed tonic for healthier health systems worldwide.

How to kick-start the PPP machine?
Our team at Mott MacDonald is drawing on 20+ years of experience of privately financed healthcare to help fill this gap in the middle. This involves the following:

- Proactively driving forwards the development of international standards, guidelines and tools that will help governments around the world to develop bankable healthcare PPP projects faster and more efficiently
- Working to support the international finance institutions with government capacity building and training such that they have the right teams to be able to make these PPP projects happen
- Acting as a matchmaker in our markets to help make sponsors, lenders and investors aware of new bankable PPP projects wherever these may arise

Advancing the global goals

As part of our longstanding relationship with the United Nations Economic Commission for Europe (UNECE), Mott MacDonald is investigating how public private partnerships (PPP) might act as a catalyst to help achieve the United Nations' 17 Sustainable Development Goals.

In particular, the UNECE has identified the potential importance of PPP in the pursuit of good health and wellbeing, clean water and sanitation, and sustainable cities and communities.

There is currently no way of measuring how well individual PPP projects around the world contribute to these goals. So, our finance experts are helping them to answer the following questions:

1. What framework could be developed to objectively assess PPP projects for their contribution to achieving the goals?
2. Given that PPP involves the private sector partner making a profit from the deal, can PPP be justified as the best procurement methodology for critical global infrastructure from the goals' perspective?
3. Does the lack of ready cash in government treasuries and the critical social and economic need for infrastructure justify sufficiently the use of PPP?

Alongside attendance at UNECE events, we are sponsoring a team of MBA students from Manchester University to research this area. UNECE is providing full support. Mott MacDonald has been assisting the UNECE for two years in drafting the new standards for PPP procurement, including zero-tolerance of corruption.

Project
Centre Hospitalier de l'Université de Montréal (CHUM)

Location
Quebec, Canada

Client
CHUM, Collectif Santé Montréal, Fiera-Axium, Acciona, HSBC Infrastructure Consortium

Expertise
Lenders' technical advisory services and construction management

Friend in need, friend in deed

The biggest PPP hospital project in Canadian history, CHUM consolidates three existing teaching, research, and healthcare facilities onto a single site. It's being built in a tight city centre location, on a rolling handover programme, to exceptionally high standards. As any experienced constructor will testify, it's no small challenge! We're involved in keeping the project on schedule and cost, with the aim of achieving 'Silver' accreditation under the LEED energy and environmental performance rating system.

Healthcare by numbers

Project
Health PPP

Location
Turkey

Client
International lenders and development banks

Expertise
Lenders' technical advisory (LTA), providing due diligence

Opportunity

The Turkish Ministry of Health is building some of the world's largest hospitals to meet increasing healthcare demands as a result of a fast-growing population. The programme will renovate healthcare infrastructure throughout Turkey, bring together smaller hospitals under 38 integrated health campuses, and increase the quality and efficiency of the health service. The key challenge of these projects was liaising with the Ministry of Health and sponsors in a country new to PPP projects, to arrive at a contractual agreement (in particular, the service specifications and payment mechanism) that was in line with international PPP best practice for risk allocation, and therefore bankable for the international lenders.

Solution

Our infrastructure finance, investment transaction and health specialists from the UK collaborated closely with our team on the ground in Istanbul and really went the extra mile to meet every client's expectations for face-to-face support. We worked with the Ministry, sponsors and their advisors to develop a commercial solution where the risk profile would be acceptable to the lending community. We advised sponsors on their environmental and social due diligence, which was essential to meet the standards, public disclosure and consultation requirements of lenders such as the International Finance Corporation, the European Bank for Reconstruction & Development and the Overseas Private Investment Corporation.

Outcome

We have been instrumental in assisting sponsors and the Ministry of Health to move forward towards a commercial solution that will meet the expectations of international and Turkish lenders alike. To date, six of our 12 projects have successfully reached financial close. In 2015, building began on the Bilkent Integrated Healthcare Campus, the world's largest greenfield healthcare scheme covering over 1.2M sq m, providing 3804 beds and parking for 7209 vehicles. It will include over 100 operating theatres and is expected to treat around 35,000 patients per day and employ approximately 8000 staff. Early in 2016, the Etlik Integrated Healthcare Campus, also one of the world's largest hospitals with 3577 beds across more than 1M sq m, received the green light for construction to start.

95,000
Beds by 2023

£9.5bn
Private investment

Presenting the full picture

Social and economic research team leader Kerry Scott explains why the question of access and transport is often the most emotive in the major reconfiguration of acute services.

Transport, in theory, is only a small part of the argument. Decisions about reconfiguration are driven by the need to deliver improved clinical outcomes, better patient care and more sustainable services. However, it is often access to services and journey times that cause the most concern when plans go out to public consultation.

As reconfiguration usually requires the delivery of acute services from fewer locations, travel analysis findings alone rarely tell a good story. Inevitably, the more journey times are forecast to increase the more sensitive the issue becomes.

Travel and access figures frequently face challenge so it is critical to present data as transparently and as early as possible in the optioneering process. It is also vital to identify those patient and community groups who are going to experience travel time increases, compared to the current situation. Analysis at an overall population level is often not enough to withstand the political, public and judicial scrutiny that most reconfigurations are subject to.

Travel and access figures frequently face challenge so it is critical to present data as transparently and as early as possible in the optioneering process.

Patients' impatience?

It is only natural that personal access is the first thought in people's minds when health services are under review. Many see it as essential to be close to a hospital delivering acute services. However, at the same time health providers have a responsibility to enhance quality of care across the whole system and enhance equality of outcomes as well as access.

There is, therefore, a delicate balancing act to be struck to ensure services are high quality, sustainable, cost-efficient and provide easy access to those who have highest need. Being armed with robust, detailed and transparent evidence, as early as possible in the process, is vital for those making a case for change.

How does your data flow?

We use Mott MacDonald-developed proprietary software to collate, analyse and compare healthcare access data across a number of different metrics. Here are some of the key benefits:

- It presents a picture of access now, providing a baseline against which potential options can be measured – siting services in different locations and connecting to them via different transport modes.
- Clients gain an overview of the quickest route from any address point to the locations of required services, as proposed in the various options.
- Data can highlight the impact on different communities, whether the elderly, disabled or different ethnic groups that are more likely to use different forms of transport and require access to different services.
- Findings are presented in map form, with geographical ranges for the different options and thresholds of journey times: 0-10 minutes, 10-20 minutes, over 30 minutes etc.
- It shows the changes in access via different types of transport, whether public, private or ambulance.
- This is supported by data tables that identify the percentage of population that will need to increase their journey times, as well as the percentage that will need to go to a different hospital in the future.

“FM needs to be aligned to clinical goals”

Head of facilities management Kenneth Birrell argues that proactive FM will result in better clinical outcomes.

Appropriate facilities management (FM) in a healthcare context means doing all the non-core services – cleaning, portering, linen, security and maintenance – in a way that enables clinicians to get on with delivering core services, without distraction. It’s vital that buildings incorporate an FM point of view early in design. All too often, it is done too late.

Spatial planning needs to segregate public, clinical and ‘back of house’ services and circulation routes in order to avoid contamination, and keep unclean or unsightly substances and activities out of view of patients and visitors. Food waste or used linen should never move through multiple clinical departments, whilst clean materials and goods should be kept separate until they reach the correct department.

Future is now

Robotics is a fascinating area of FM development. It’s important to have dedicated travel routes, which means introducing a ‘robotics strategy’ as part of space planning to improve operational efficiency. Mixing robots and people doesn’t work well. We’re not talking disaster film scenarios! But operationally, robots are programmed to slow down and stop if a human comes close. Therefore, mixed-use corridors will affect the efficiency of service, which counteracts the benefits of the robotic solution. Likewise, it’s important they have specific drop-off rooms, rather than obstructing corridors.

One of the biggest FM opportunities is in better harnessing and understanding buildings’ operational data. New facilities are now frequently built with the provision to capture useful data, but systems are not set up to interrogate it. The ability to adjust systems based on analysis of facts, in order to get the best from assets, will result in better value for money.

By the same token, it’s important to share data across different sites. That’s where the private finance market has traditionally done well, as it brings a whole-life focus to cost assessments, backed by maintenance obligations. Applying lessons learnt about whole-life performance more widely would be hugely beneficial. In assessing not just capital investment, but maintenance and utilities costing, we would be able to incentivise value for money in the operational phase. This would go some way towards reducing taxpayers’ financial burden. We therefore need to consider pricing models which incentivise procurement of the best, most efficient and low maintenance assets.

Seamlessness needed

How can FM and clinical services work closer together? Improved visibility of clinical and FM needs is one answer – for example, technology that notifies FM when a patient is discharged, so the bedroom is turned around as quickly as possible. This happens in housekeeping for hotels and could easily work in hospitals. Going the other way, FM needs to be aware of the business drivers of the clinical team, and align its operation to help them achieve their goals. An efficient and effective portering service, for example, can play a vital role in ensuring clinical procedures are carried out on time, as well as boosting patient morale through reduced waiting times.

There are plenty of other ways FM provision can change the patient experience, whether it be TV on demand or à la carte meals. The private sector is very proactive in this way. A backlog of maintenance demands in the public sector has led to more reactive service.

Proactive or reactive aren’t hardwired into healthcare, depending on whether it’s private or public. Change is possible. But it is a huge help when FM isn’t an obstacle. The opportunity to improve operational comfort, cost and efficiency is offered by addressing FM when design first gets under way.

Robotics is a fascinating area of FM development. It’s important to have dedicated travel routes, which means introducing a robotics strategy to designs at a very early stage to improve operational efficiency.

Opening opportunities with connected thinking.

mottmac.com

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