Designing for a better experience
High-performance hospitals
High-performance hospitals attain excellence across multiple measures of performance and diverse clinical disciplines. From energy-efficient building systems to improved clinical outcomes, enhanced patient and staff well-being, this special breed of hospital delivers value across the board.

At WSP, we understand that the need for healthcare providers to secure value from their premises and their buildings’ infrastructure has never been greater. Across the globe, demand for healthcare services is increasing as populations age, while the costs of those services are rising as treatments advance.

Our aim as a specialist consultant is to add value at every stage of a project from conception to completion, and to contribute to the well-being of the building’s end-users. At Dell’s Children’s Medical Center of Central Texas, we engineered a building that optimises heat recovery, ventilation and lighting design, which resulted in a net cut of projected energy use greater than 40%. The hospital was the first in the world to achieve Platinum LEED for Healthcare accreditation. An energy plant replacement scheme with a focus on sustainability for Phoenix Children’s Hospital in Arizona saw the building’s utility bills reduce by a third per square meter in the existing hospital and provided regional energy efficiency for a new inpatient oncology expansion.

Our experts are taking Information Communication Technology (ICT) trends further than ever, creating converged secure networks and infrastructure that function together to drive excellence in workflow and patient care. We are at the forefront of smart hospital design, delivering intelligent building systems that facilitate the delivery of services, and improve communication between healthcare staff, patients and family members.

Whether the scheme is a large new build hospital or the complex renovation of a specialist unit, we create buildings that use space and resources efficiently across their life-cycle, reducing operational costs yet maximising results.

It is because of our holistic approach to healthcare design that we have earned the privilege of working on some of the most advanced hospitals in the world, creating future-ready buildings that perform at every level.
Mitigation
Hospitals are complex and highly serviced buildings that need to deliver services around the clock. Highly visible, they serve a key role in society. Mitigating the environmental impact of hospitals is now a moral imperative for health providers to meet their wider community health responsibilities. Creating a low carbon building with a focus on sustainability also delivers a multitude of direct operational benefits.

Our engineers’ attention to sustainability starts with a reciprocal understanding with the owner and facility staff on a viable level of sophistication that is viable for their vision, the design of the building and building systems, and continues through to the selection of responsibly sourced construction materials and ‘lean’ construction methods to help minimise waste.

From grand-scale new builds to small specialist units and renovation programmes, many of our schemes have won prestigious environmental awards including Platinum level LEED accreditation. Glasgow’s Queen Elizabeth University Hospital uses one of the largest concrete frames ever built in Europe and achieved a BREEAM rating of Excellent.

Efficiency
Achieving the best possible outcomes for patients is the definition of an efficient hospital. From intelligent building layouts that reduce staff walk times to the use of building-wide management and control systems, our expert engineers “design in” efficiency from the outset of every project.

Hospitals are renowned for being power-hungry, requiring a constant and infallible supply of energy. It follows that energy solutions are a cornerstone of a highly efficient healthcare facility. The lower their operating costs, the more annual capital there is available for the core task of providing patient care.

From design and construction techniques through to building services and clinical diagnostics, technology underpins efficient resource management. We harness technology in a myriad of ways to improve patients’ experiences. We use systems that enable patients to control their room’s temperature and ventilation, and deploy robotics where appropriate, including vehicles that pick up laundry, to free up nurses’ time for frontline care duties.

We use the latest Building Information Modelling (BIM) systems as standard to rigorously test and refine designs and build techniques from project inception onwards.

Resilience
Global populations are ageing as life expectancy increases and clinical treatments become more sophisticated. On every project we aim to future-proof each aspect of the building. This means creating flexible facilities that can adapt to increasing demands on health care services as well as withstanding the effects of climate change, and operating efficiently as energy costs rise.

Healthcare facilities must accommodate new technology and treatments that are only just emerging. This is especially challenging in long running projects such as the redevelopment of Hong Kong’s Kwong Wah Hospital, due for completion in 2025. By then a new generation of technology that does not currently exist will be standard. We are in the vanguard of driving improved hospital performance by applying intelligent technology to deliver operational improvements. Our work is spearheaded by the research and development of a single platform that connects all systems, from lighting controls and heating to nurse call, patient monitoring and asset management, all collaborating with minimal user input. This technology will form the infrastructure of the ‘smart’ hospitals of the 21st century.
High-performance hospital design

Every hospital is unique and presents new challenges to our teams. In every healthcare project, as well as delivering our services, we study the elements of design we can optimise to improve staff & patient wellbeing, ensure longevity of the facility and adaptability to future changes as well as minimising the buildings’ environmental impact and operational costs. Here we highlight aspects of healthcare design we can influence to deliver a high-performance hospital that exceeds client and end-user expectations.
Demand for healthcare is increasing yet costs are rising. This challenge, for healthcare providers, means effective resource management is more important than ever. Clients rely on our ability to reduce hospital operational costs by focussing on energy consumption and use of space. We produce sustainable buildings that minimise waste while maximising efficiency.

From design conception to delivery and future development, our approach to creating buildings that perform across their whole life-cycle. This approach takes into account everything from the design of the building envelope to the use of low embodied carbon building materials ensuring minimal travel distance. We also have methods that include user input during design and result in improvements such as technologies to ensure buildings meet functional demands, through the use of technologies such as chilled beams with mixed mode natural ventilation to cool and ventilate patient rooms.

With each project, the aim is to produce a project that is better from design to completion, we always take the opportunity to improve efficiency at every stage of the project. From evoking technology and changing patient demographics, to climate change and extreme weather, we consider the threats and opportunities that the future may hold.

Our overall aim is to minimise the carbon footprint of a complex and highly demanding building that never has 'down time'. By doing so, we deliver key amenities to the community, the reduction in environmental harm is of vital importance. The benefits not only to the end-user but also extend across the whole community. This contributes not only to our environmental and user experience, but the promotion of wellbeing across the whole community.
Sustainable design

Leading doctors and scientists agree that climate change is one of the greatest threats to our health and wellbeing. It follows that an increasing number of healthcare providers consider it vital to reduce hospitals’ impact on the environment, minimising carbon emissions.

This presents designers and consultants with a challenge. Hospitals are amongst the highest users of utilities. Providing services around the clock, they are energy intensive buildings that require fail-safe supplies of water, light and power.

To mitigate hospitals’ impact on local and global resources, our designers source building materials locally wherever possible and take care to minimise waste and reduce site traffic. One way in which we cut site waste and expedite build programmes, is the use of off-site fabrication where appropriate which increases efficiency of the supply, use and recycling of materials. Using modular structures helps to minimise disruption to working hospitals, especially where a site is tight on space.

Through engagement with the community, we also promote employment and training opportunities to local labour forces. At Queen Elizabeth University Hospital (QEUH) in Glasgow, 10% of the workforce were local entrants to the construction industry.

All healthcare projects, whether large or small, new build or refurbishment, can result in a minimal carbon footprint with thoughtful planning and technical expertise. We look at the whole life-cycle of a hospital and how we can optimise every stage of its life, including its future.

Fit for the future defines a sustainable hospital. We design with one eye on the opportunities that the future holds, creating flexible space to accommodate technologies and support clinical methods that are only just emerging. We build in resilience too by considering future challenges such as disaster management, extreme weather and ageing demographics.

Future proof design features range from removable façades and flexible, movable walls, to areas that can be zoned off in the event that further refurbishment work is required or machinery needs upgrading. We design multi-use rooms that can be upgraded to operating rooms, or downgraded to office space. The benefits of building in flexibility are carefully balanced against the costs to maximise a hospital’s whole life value.

Glasgow’s 14-storey QEUH was designed with the environment in mind from the outset. Targets included diverting 98% of waste from landfill during the construction process, and carbon emissions of no greater than 80kg/m² per year. Our specialist teams helped achieve these goals and more to create a low carbon facility that covers over 175,000 m² (including Glasgow’s Royal Hospital for Children), making it one of the largest concrete structures in Europe.

Another scheme that demonstrates that size is no barrier to creating a sustainable building is the Centre hospitalier de l’Université de Montréal (CHUM) in Québec, Canada. This multi-billion dollar scheme will deliver one of the largest health complexes in North America over the next 20 years.

Green features include efficient plumbing fixtures that will help reduce fresh water consumption by 30% compared to a similar, standard building. A unique HVAC design will use an exhaust air heat pump, making the CHUM the only hospital in its continent to supply 100% fresh air throughout the building. The first building in the development programme to be completed, the CHUM Research Centre, has already been awarded LEED Gold.

At Waxahachie, Texas, our engineers were tasked with delivering a future-fit facility for Baylor Scott & White Health with every effort made to save precious resources. Energy saving designs include a heat recovery chiller system that has a projected net energy saving of 342,000 kWh per year. The system harnesses the heat generated from the hospital’s chilled water systems and utilises it to generate domestic hot water and building reheat needed for high air change areas.

Other ‘green’ features at the 129-bed unit include the reuse of condensate from the air handling units to create an estimated potable water saving of over two million gallons a year. The hospital makes substantial use of sustainably harvested timber and has light coloured (cool) roofing to reduce the urban heat island caused by the warming of elements such as concrete and asphalt.

A new ten-storey extension to Box Hill Hospital in Melbourne, Australia integrated sustainable initiatives into every aspect of the building. Energy efficiency gains are made with the use of Combined Cooling Heat Power (CCHP), while four layers of glazing provide enhanced building insulation. Rain water is harvested for use as ‘grey water’ throughout the building and waste water from renal reverse osmosis dialysis plant water is recycled. This keen attention to detail helped Box Hill achieve a 4-star Green Star office design rating.

Baylor Scott & White Medical Center

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Baylor Scott & White Medical Center
Phoenix Children’s Hospital
A major renovation proves comfort and sustainability can go hand in hand

**Location:** Phoenix, Arizona, USA  
**Client:** Phoenix Children’s Hospital  
**Architect:** HKS, Inc.  
**Services:** Mechanical, Electrical and Plumbing, Fire Engineering, Urban Planning and Master Planning  
**Project status:** Completed in 2011

Recognised for its world-class paediatric medical facilities, Phoenix Children’s Hospital is Arizona’s only hospital dedicated to children and one of the ten largest children’s hospital in the USA. To secure the hospital’s future, leaders made the decision to renovate the facility in a $350 million scheme that would increase capacity to 377 beds. Our client’s vision was clear; to further enhance the experience of patients, staff and families, while minimising the environmental impact of the 140,000m² development. This major expansion is in response to a growing paediatric population that is expected to top 1.5 million by 2030.

Our design team provided masterplanning and mechanical and electrical design services with sustainability informing every aspect of the design process. The scheme’s wide remit involved creating a new patient tower, an ambulatory care building, main entrance, extended car parking and renovation work to the existing facility.

Building services were key to incorporating sustainable initiatives into the design. A new Central Utility Plant (CUP) and tunnel distribution system includes a unique 800-ton heat pump chiller. This allows heat from the building cooling cycle to be ‘injected’ into the water-heating system thereby ‘reusing’ the heat and saving around 5.5 million gallons of potable water per year in the desert setting. These are all backed-up by generators ensuring continuous running of the hospital in case of power outages.

This sustainable approach was combined with a focus on user comfort and wellbeing. The new tower is orientated to take full advantage of the sun and views of the surrounding landscape of desert and mountains. It is designed to respond to the Phoenix sun, minimising excess heat gain thanks to the exterior form of the building and to maintain a pleasant interior ambient temperature, to minimise loads on mechanical systems and to maximise daylight.

Rooftop gardens provide access to nature within a peaceful setting. And positive experiences are enhanced in the evening with the use of colourful lighting in the reception and other communal areas. The impact of sustainable features is demonstrated in the hospital’s utility bills which were down 30% in the first year after expansion.

5.5M gallons of water per year saved through reduced cooling tower use
Energy is the life force of a hospital, underpinning all functions. The uninterrupted flow of energy, which can cope with surges in demand, is fundamental to a high-performance hospital. And an energy-efficient hospital means that more resources are available for frontline, clinical services.

We excel at creating state-of-the-art hospitals that maximise building users’ comfort while performing to an exacting criterion of energy efficiency. We enhance the energy efficiency of existing hospitals too by installing systems that use the latest technologies to create significant cost savings.

We can tailor the design of a Combined Heat and Power (CHP) plant to the exact requirements of a healthcare provider to boost efficient energy generation and recycle waste products. The use of CHP has helped our designers cut some buildings’ net energy use by a third compared with similarly occupied buildings and can supply other buildings such as Birmingham Children’s Hospital, where the CHP developed for the hospital also feeds the University of Alabama as a specialised district provider.

We look into the detail to deliver energy savings wherever the potential arises, such as through the use of intelligent lighting systems that can respond to, and even predict, building users’ need for lights.

As well as constructing buildings using methods that minimise energy use and site waste, we continue to stay engaged with the owners, monitoring hospitals after client handover to ensure that energy savings remain on target.

Our ability to produce tangible energy savings has led many of our schemes to win prestigious environmental awards, such as LEED, BREEAM, Miljöbyggnad and Green Mark.
Energy solutions

Energy consumption in hospitals is growing steadily and the trend is global. This reflects increasing demand for healthcare and the more widespread use of specialist, power intense medical equipment.

In the UK alone, according to the Carbon Trust, the healthcare sector spends upwards of £400 million per year on energy, with electricity accounting for over 50% of those costs. It follows that efficient energy solutions are a crucial measure of hospital performance, in order to reduce running costs and free up more resources for frontline clinical services.

A scheme to completely redevelop Alder Hey Children’s Hospital in Liverpool involved challenging targets to provide on-site energy generation as part of the client’s goal of attaining a BREEAM Excellent rating for the scheme. We helped design a Combined Heat and Power system (CHP) that used a blend of gas and biofuel engines to provide an efficient source of recovered heat. In addition a large, closed loop ground source heat pump under the landscaping provides heating and cooling, while roof-mounted photovoltaic panels provide renewable electricity. These are just a few of the features that help the hospital to generate 60% of its energy requirements on site, drastically reducing running costs. Alder Hey won the Prime Minister’s Better Public Building Award at the 2016 British Construction Industry Awards in recognition of its innovative design.

Children’s of Alabama is the largest healthcare building in Alabama, and its first hospital to be certified LEED Gold. The scheme to create the new 12-storey hospital building in Birmingham involved the construction of a remote Central Utility Plant (CUP), connected to the hospital via an underground pathway. A 6,000-ton chilled water plant utilises centrifugal chillers and an 800-ton heat pump chiller, which provides heat recovery features, while a pump scheme provides cooling services to the campus’ central air handling units.

To guarantee energy supply, three two-megawatt emergency standby diesel engine generators are contained within the CUP. Energy savings for the hospital are projected to be $650,000 per year, with annual water savings of over 500,000 gallons. Energy efficiency was a key feature of our work for Centre for the North, a world-class cancer care centre for residents of northern British Columbia (BC), Canada. We worked as a consultant mechanical and electrical engineer on this scheme that aimed to improve cancer treatment outcomes for this thinly populated area. Our client BC Cancer Agency also wanted to create a sustainable building that complemented its natural surroundings. Advanced energy technologies along with the use of a monitoring system to optimise room temperature, ventilation and humidity levels meant we were able to reduce overall energy consumption by 47% compared to a baseline design.

At Queen Silvia’s Children’s Hospital in Sweden we considered every detail to create an energy-efficient design. This includes the use of advanced lighting systems that automatically adjust depending on occupancy and ventilation that is tailored to the precise needs of each room, optimising efficiency.

A resource-efficient building was critical in the creation of a new eight-storey critical care tower for Surrey Memorial Hospital in British Columbia, Canada. As the province’s largest ever healthcare project, it was important to our client, Fraser Health Authority, that the new facility should minimise operating costs, freeing up funds for frontline acute services.

The use of state-of-the-art, energy-efficient technologies, along with extensive use of natural building materials helped the tower to secure LEED Gold certification. We also received an Award of Merit in Buildings from the Association of Consulting Engineering Companies British Columbia (ACEC-BC).

Whatever the size or scope of the project, we create efficient energy solutions that nevertheless guarantee 100% reliability.
Dell Children’s Medical Center of Central Texas
Cutting-edge care in the world’s greenest hospital

Location: Austin, Texas, USA
Client: Seton Family of Hospitals
Architect: Polkinghorn Group Architects & Kortzberger
Services: Mechanical, Electrical and Plumbing, Fire Engineering
Project status: Completed in 2007 & 2014

Dell Children’s Medical Center was designed and built to serve as a beacon of 21st century child-centred care, offering cutting-edge treatments in a positive and genuinely sustainable environment. Its owner, the Seton Family of Hospitals, wanted to create a model facility that met its responsibilities to patients, staff and the wider community, as well as minimising its carbon footprint. The result is a 44,130m², 170-bed building that uses energy and other resources so sparingly that the development became the first hospital in the world to achieve Platinum-level LEED certification.

Designs that maximised the energy efficiency of the building were key to the project team’s focus on sustainability. This included the design and installation of an on-site Combined Heat and Power (CHP) plant to help boost efficient energy generation and recycle waste products. The plant uses a 4.3MW combustion turbine generator, steam generator and absorption water chiller.

Our team collaborated with other organisations to help the owners outsource power, heating and chilled water needs to Austin Energy, which owns, runs and maintains the CHP plant. This move saved the Seton Family of Hospitals around $8 million in capital outlay.

Attention was also given to energy saving measures for lighting and HVAC systems. The hospital’s LED lights are connected to lighting controls, which were integrated into building controls and the hospital’s patient bed tracking system. Rooms are set to ‘unoccupied mode’ when staff check patients out through the bed tracking system, dimming the lights and bringing the HVAC system to minimum levels until the next person arrives. Solar panels on the roof are used for heating hot water, reducing the amount of natural gas required.

The addition of a 1.2 hectare multi-level healing garden, to the hospital’s 13 hectare campus provides a pleasant and easily accessible space to promote healing and enhance wellbeing for patients and staff.

After this new build scheme was completed in 2007, we were appointed to a further $25 million project to extend the existing building. Serving as mechanical, electrical and plumbing engineer, we helped this extension to also secure LEED Platinum certification.

40% lower net energy use compared with similarly occupied building in same climate
Communications technology is revolutionising hospital design and we are at the forefront of this trend. We understand that technology is the key to managing increasing demand for health services with scarce resources.

Healthcare buildings typically contain multiple systems spanning everything from lighting control and fire alarms, to record keeping, nurse call and blood pressure monitoring. By uniting all these systems on a single platform, the exchange of information between medical staff, patients and facilities managers is sped up dramatically, creating a plethora of potential efficiency gains. Hospital staff spend less time on administration, while resources are freed up to re-direct to core services. Patients are also given access to smartphone applications which provide information, from their medication schedule to the doctors on duty.

Our research teams are designing interfaces that can cope with the vast volume of data that single ICT platform trends demand. Already, at Dell Children’s Medical Center in Texas, we have connected the patient check-in system with the energy management and lighting control systems to deliver efficiency gains to the client while maintaining security for patient privacy.

The opportunities presented by technology for efficiency savings are extensive and range from more automated processes and improved patient monitoring fuelled by data management, to minimising wait and walking times, and building energy usage. Smart technology also has the potential to enable remote healthcare, reducing patient visits to hospitals and empowering people to influence their treatment.

Predicting how buildings and their resources will be used over time is another key trend in healthcare that is informing our approach to the design and development of future-fit ICT systems.

At WSP, we also harness technology to streamline our design and construction methods. Our team made extensive use of the latest Building Information Modelling (BIM) systems to create a high performance building for Queen Elizabeth University Hospital in Glasgow which uses one of the largest reinforced concrete frames ever made in Europe. BIM is also an important tool for better collaboration and increased efficiency between the different stakeholders.
Technology

All healthcare providers face the conundrum of providing more and improved care with fewer resources. A quick consideration of the trend in global demographics reveals why.

Most societies are ageing; yet birth rates are falling. In the future, a much smaller global workforce will have to support a larger elderly population. Health and social care will be on the frontline.

Technology is proving to be the key solution with ICT systems, an inherent part of modern healthcare. But the full benefits of the digital revolution are only just starting to be felt.

Hospitals contain a myriad of data systems for different purposes ranging from lighting controls to nurse call and heart monitoring. At projected growth rates, the volume of healthcare data is expected to reach zettabyte and yottabyte scale. Our engineers are working towards the use of a single platform in a healthcare context, that will bring the CHUM’s three teaching facilities onto a single 37,000m² site. The result will be one of the largest healthcare districts in North America with 772 private rooms and 39 operating theatres.

The potential benefits of a single platform in a healthcare context are hard to overstate. A wholly integrated data network for a hospital optimises the interaction between building automation, risk management, medical technology and as well as ICT. To hint at the potential scope of this approach, wearable technology connected via Wi-Fi to a ‘smart hospital’ could enable patients to receive Virtual visits at home and be monitored, by remote care professionals, reducing the need for hospital visits and saving time spent on travel and waiting.

We are already using advanced system platforms in our schemes to create energy efficiency gains so that, for example, lighting systems are integrated with HVAC systems to respond to room occupancy. The concept of integrated systems can directly benefit patient care too. At Dell Children’s Medical Center, the lighting system is also connected to the nurse call system; when a patient room’s Code Blue button is activated, all lighting within the room and the corridors is turned up to maximum brightness to aid the emergency response. We are further developing the concept of integrating systems at the University of Texas Hospital in Austin.

We have a team of medical equipment experts who understand the environment required for hospital equipment to function at its maximum potential. These specialists ensure that the structure of hospital rooms, electricity supply, room temperature and location of equipment are all optimised. At the Sahlgrenska University Hospital in Sweden, radiation and X-ray machinery are placed in close proximity, which is very unusual due to the risk of interference. The use of lead walls allow the hospital to accommodate these technologies so that patients can be moved swiftly from one area to another.

Always ahead of the curve, our engineers are using cutting edge technology to create direct resource savings for clients. The Centre hospitalier de l’Université de Montréal (CHUM) in Quebec is an evolving healthcare complex that will bring the CHUM’s three teaching facilities onto a single 37,000m² site. The result will be one of the largest healthcare districts in North America with 772 private rooms and 39 operating theatres.

Innovative technological features include the use of self-guided vehicles to carry equipment around the hospital – these ‘robots’ are expected to make 3,500 journeys a day, saving staff considerable time. Automated Guided Vehicles (AGVs) are a unique feature of Toronto’s Humber River Hospital. The vehicles transport food, linen, medications and other supplies and are capable of handling loads of up to 600 kilograms.

Our consultants exploit the full potential of technology as design tools too. We use the latest Building Information Modelling (BIM) techniques to create rich data models for the development to visualise designs, manage project time lines.

BIM was an integral part of the design and build process for Glasgow’s 14-storey Queen Elizabeth University Hospital (QEUH). One of Europe’s largest buildings and the UK’s largest hospital, the development covers some 75,000m² and contains a children’s hospital, paediatric and adult Accident and Emergency (A&E) departments, a maternity hospital and laboratory services.

Our technical teams used the latest BIM software to deal with the project’s complexities, communicating design intent, detecting problems and analysing the future flexibility of the buildings. We created a series of rich data models for the development to visualise designs, manage change, quantify and procure materials, and produce project time lines.

Accommodating the technology of tomorrow is another important focus for our designers. In Kowloon, Hong Kong, we are part of a team that is delivering a 12-year project to redevelop Kwong Wah Hospital (KWH) as a ‘future proof’ clinical facility. Founded in 1911, KWH has a long history of serving its local community. Our client aims to secure KWH’s future by providing for technological advances and clinical methods that are at an embryonic stage today. It also means providing for the unexpected and we design flexible building engineering services that can support spaces for disaster contingency.
Queen Silvia’s Children’s Hospital

BIM and virtual reality help manage and visualise the hospital’s complex systems

Location: Gothenburg, Sweden
Client: Västfastigheter
Services: Mechanical, Electrical and Plumbing, Structural Engineering, Building Information Modelling, Logistics
Project status: Due for completion in 2020

Queen Silvia’s Children’s Hospital in Sweden is a bold scheme to replace Gothenburg’s existing children’s hospital with a state-of-the-art facility centred around the needs of children and their families. The eight-storey hospital will cover 33,000m² and serve a diverse range of medical functions including outpatients, intensive care, operating theatres, equipment sterilisation unit and wards. A rehabilitation pool, helipad and library will further enhance the hospital’s offering to patients and staff.

Every effort is being made to stimulate children’s imaginations and help them think beyond their illness. Special facilities will include a music studio, play areas for younger children, ‘break-out’ space for teenagers and places for activities such as table tennis and video games. With such a broad range of clinical services to house under one roof, our engineers are using sophisticated Building Information Modelling (BIM) systems to manage the detail and complexity of the scheme. BIM was used to keep the user and technical requirement specifications in a database connected to the different CAD tools. Furthermore, BIM and Virtual Reality (VR) technologies have enabled the project team to visualise the final design of the hospital and allow for ‘walk through’ checks.

We are using advanced technology to create sophisticated systems for a range of building services at Queen Silvia’s. Our engineers designed specially adapted control panels for the operating theatres that allow lighting, heating and ventilation to be very precisely managed. Patients can also control lighting and ventilation in their rooms to create the most comfortable environment possible.

Technology has helped to create a flexible and responsive building that can adapt to different users’ needs. Queen Silvia’s swimming pool has a moving floor so it can be made shallower for young children and deeper for stronger swimmers, while the pool’s lighting adjusts to the time of day, helping to use energy efficiently.

Queen Silvia’s is also intending to capitalise on children’s familiarity with smart devices to empower them during their stay. Each patient will have their own page on a dedicated platform with information about the day’s events, details of their medication and treatment and the means to contact doctors with any questions.

From the use of cutting-edge BIM at the design stage and project delivery through to systems that optimise the day-to-day running of the facility and patient experience, technology infuses every aspect of Queen Silvia. Through this intelligent and creative use of technology, coupled with close collaborative working with the entire project team, we are helping to deliver one of Europe’s most advanced children’s hospital buildings.
Ultimately, the aim of any high-performance hospital is to promote wellbeing. We use the latest technologies and work to demanding sustainability agendas not as ends in themselves, but to achieve the best outcomes for patients and clinicians.

A pleasant, light and airy indoor environment is critical to patient and staff satisfaction. Evidence shows that access to fresh air and greenery aids the healing process. Contact and closeness to loved ones is a key contributor to patients’ overall wellbeing, as well as privacy and reduced noise levels, especially at night. We consider all these factors to create rooms and treatment areas that aim to make people’s experience of healthcare as positive as possible.

Creating a tranquil environment was the guiding design principle for our work at the Olivia Newton-John Cancer and Wellness Centre at the Austin Hospital in Melbourne. Building systems were created to maximise comfort levels, such as the use of passive chilled beams over air conditioning, while natural light fills the rooms.

It is necessary to balance designing an open and welcoming space for the public as well as a controlled environment to reduce the spread of infection. Effective airborne infection control is a vital element to achieving good clinical outcomes.

We also understand the importance to patients of accessing information about their treatment and controlling their immediate environment, such as room lighting and room temperature. By harnessing advances in ICT, we are helping to create software systems that provide patients with more control over their hospital stay and care givers better insight and immediacy into patient conditions for improved outcomes.

The welfare and wellbeing of care staff are likewise of paramount concern in a high performance hospital. A positive environment will help attract and retain the best staff and medical experts, while a hospital design that responds to care givers’ needs delivers a better work environment. Elements like reduced walking distances for nurses and doctors, free up time to spend with patients and administer care.
Sustainability, efficiency and technology in hospitals all combine towards delivering the ultimate measure of any performance facility; patients’ wellbeing.

This means considering how every aspect of a hospital can promote a healing environment; from cleanliness, security and infection control, to pleasant surroundings and access to green space.

Improving patient experience was the guiding design principle in the creation of Singapore's healthcare hub of Ng Teng Fong General Hospital (NTFGH) and Jurong Community Hospital, which cover a total floor area of 169,000m² and accommodate 986 beds.

Wellbeing

The University of Hawaii Cancer Center was built with collaboration in mind with additional meeting and conference rooms to encourage conversation between colleagues, as well as host community and educational events.

The aim of these next-generation hospitals was to offer patients a continuum of support from acute to step-down care, resulting in a truly integrated healthcare facility. This approach also called for a highly sophisticated bed management system to minimise transfer times for patients.

Providing optimum conditions for patients and staff was core to the design brief for the Oncology Institute of Nîmes in Southern France. The 16,000m² site provides a clean and safe care environment. Our engineers assess how robots and /or pneumatic systems could enhance a hospital’s processes.

A careful approach to logistics in hospitals also means staff can better track medicine provenance and require less time to manage stock. Nurses in standard hospitals spend around 40% of their time stockcoping cupboards and walking between rooms. Improved hospital layout, coupled with better processes for handling stock, frees up nurses to attend to their frontline care duties and spend more time with patients. Another benefit of improved stock handling procedures is that specifically trained staff can take on jobs such as supply checks. Ultimately, a hospital with well-considered logistics lowers the overall cost of healthcare.

Our team also looked at the wider experience of people visiting the institute. By upgrading transport networks such as Purpan Hospital’s Tramway in Toulouse, France, our engineers have helped to make this centre easily accessible to its patients and their families. They have also provided approximately 400 car parking spaces.

Privacy is an important element of patient wellbeing. The Sanford Fargo Medical Center in Fargo, North Dakota is an 11-storey, 384-bed facility offering a wide range of medical services design that minimises unwanted disruptions. A spacious 10th floor birthing centre aims to give new mothers the best possible experience. As well as striking views of surrounding countryside to facilitating direct access to nature thanks to intensive care-ready outdoor areas. The University of Hawaii Cancer Center, Hawaii, USA

Particular attention was given to the layout of the institute to allow for a well-organised flow of rooms, enabling staff efficiency and satisfaction, and improving links and relationships between facilities, specialists and physicians. This focus on flow between rooms and people directly benefits the patient's experience by reducing transfer times.

A focus on logistics is an important area for our designers to consider. At Sanford Fargo, a pneumatic tube system was installed to transport waste and dirty linen around the site quickly and hygienically. This benefits staff by reducing walk times, and patients by helping to ensure a clean and safe care environment. Our engineers assess how robots and /or pneumatic systems could enhance a hospital’s processes.

We are integrating advanced technology into building services systems to reduce wait times. Enabling patients to control the heating and ventilation in their room in another way in which we are using technology to empower them, anxiety levels or fear of the hospital experience. Reducing stress levels is primary in promoting the healing process.

Whether it is the use of pneumatic systems and electric carts to transport dirty laundry, or carefully planned rooms that offer patient privacy and space for loved ones to stay over, we are clear that our designs have one over-arching goal; to give patients the best possible experience of being in hospital.
Olivia Newton-John Cancer Wellness & Research Centre
A holistic design approach combining high-quality sustainability and wellbeing

Location: Heidelberg, Victoria, Australia
Client: Austin Health, Department of Health
Architect: Jackson Architecture + McConnell Smith and Johnson Architects
Services: Mechanical, Electrical and Plumbing, Security Consulting, Fire Engineering, Vertical Transportation
Project status: Completed in 2013

Victoria’s Olivia Newton John Cancer Wellness & Research Centre (ONJ Centre) was built around a philosophy of wellness that encompasses both body and mind.

In addition to creating a centre that places people’s wellbeing at the fore, our client wanted a sustainable building that met its wider environmental and community health responsibilities.

Created by a partnership between Austin Health and the Olivia Newton John Cancer Research Institute, this unique 92-bed centre not only treats cancer but also carries out internationally acclaimed research and cutting edge clinical trials.

What makes the ONJ Centre particularly special is its commitment to incorporating individualised wellness programmes into cancer care, supporting patients in their recovery. Championed by the actress and singer Olivia Newton-John, who believes that positive thinking played a vital role in her own recovery from cancer, the ONJ Centre offers a full range of complementary therapies to help patients throughout their treatment.

As a key consultant providing all engineering building services, our goal was to help deliver this new breed of hospital and house a diverse multitude of functions all under one roof. We needed to design a light-filled, welcoming centre that also accommodated state-of-the-art radiotherapy bunkers; ambulatory oncology; in-patient wards; three floors of research laboratories, including a physical containment biosafety level 3 laboratory suite, a facility for work with indigenous or exotic agents that may cause serious or potentially lethal disease via inhalation; high acuity areas; and negative and positive pressure isolation suites for airborne infection control.

A quality indoor environment is vital to patient welfare and for managing airborne pathogens. Our designs for ventilation at the ONJ Centre includes chilled beam technology and uses 100% air from outdoors, with no air recirculated. Rainwater is harvested for grey water usage, while solar panels provide water heating with future capacity for cogeneration.

Careful consideration was taken in designing the building layout. Certain wards sit in close proximity to the research laboratories so that patients can benefit from cutting edge treatments, while care staff can move easily from one part of the facility to another. Our task was to ensure that building services supported this integrated approach to patient care, while the HVAC systems minimised any risks of cross-contamination.

Opening its doors to patients in 2012, the ONJ Centre builds on Austin Health’s long legacy of delivering pioneering and world-class cancer treatment in the State of Victoria. In the 1920s, Austin was one of the first organisations to use X-ray in cancer care in Australia.

The ONJ Centre continues this tradition of pioneering treatments for cancer, offering patients hope and positivity. Thanks to its commitment to sustainability, the ONJ Centre is also the first building in Victoria, and the largest to date in Australia, to achieve the Green Star Healthcare sustainability accreditation.
Contacts

Africa
William Johnston
t. +27 11 361 1527
e. William.Johnston@wsp.com

Australia
Damien Kenny
t. +61 2 8907 0926
e. Damien.Kenny@wsp.com

Canada
Kevin Cassidy
t. +1 905 475 7270
e. Kevin.Cassidy@wsp.com

China and Rest of Asia
Thomas Chan
t. +852 2579 8659
e. Thomas.Chan@wsp.com

France
Denia Toumi
t. +33 1 44 04 54 13
e. Denia.Toumi@wsp.com

Germany
Michaela Artus-Kraft
t. +49 69 71377647
e. Michaela.Artus-Kraft@wsp.com

Middle East
Frank Lang
t. +91 56 505 5521
e. Frank.Lang@wsp.com

Sweden
Gunnar Linder
t. +46 10 7227198
e. Gunnar.Linder@wsp.com

UK
Simon Kydd
t. +44 121 332 4708
e. Simon.Kydd@wsp.com

USA
Rick Rome
t. +1 214 321 1661 ext: 6702
e. Rick.Rome@wsp.com

Global
Tom Smith
t. +44 20 7314 5180
e. Tom.Smith@wsp.com
Can we trace horizons, hold true to our ambitions, and hold ourselves accountable?

What if we can?