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Guest-Edited by
TERRI PETERS

DESIGN FOR HEALTH

Sustainable Approaches to Therapeutic Architecture

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TERRI PETERS

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Sustainable Approaches to Therapeutic Architecture

Profile
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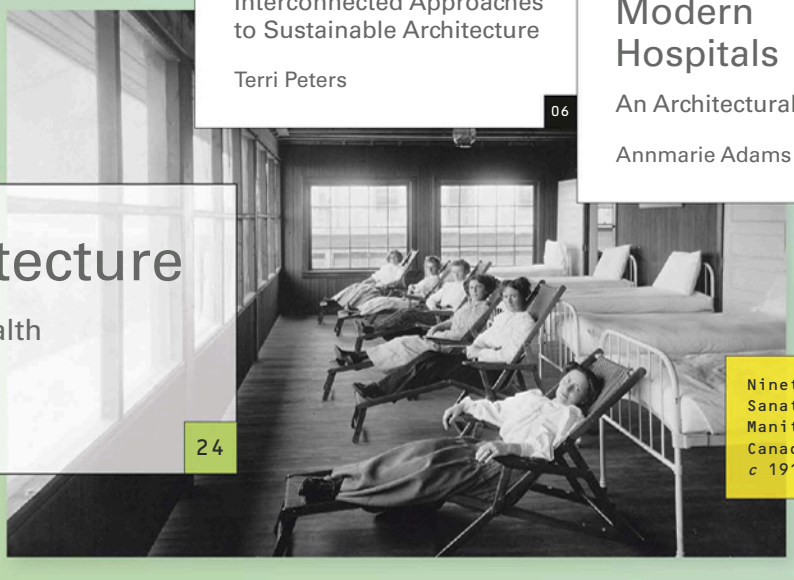
About the Guest-Editor
Terri Peters
05

Introduction
Interconnected Approaches to Sustainable Architecture
Terri Peters
06

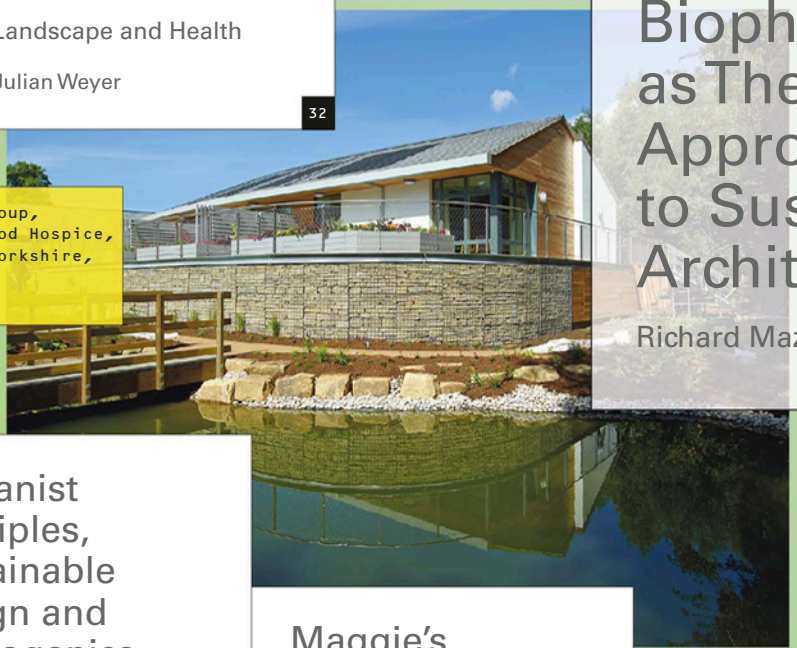
Decoding Modern Hospitals
An Architectural History
Annmarie Adams
16

Superarchitecture
Building for Better Health
Terri Peters
24



Ninette Sanatorium, Manitoba, Canada, *c* 1910

Lean, Green and Healthy
Landscape and Health
Julian Weyer
32



IBI Group, Kirkwood Hospice, West Yorkshire, UK, 2013

Salutogenic and Biophilic Design as Therapeutic Approaches to Sustainable Architecture
Richard Mazuch
42

Humanist Principles, Sustainable Design and Salutogenics
A New Form of Healthcare Architecture
Corbett Lyon
56

Maggie's Architecture
The Deep Affinities Between Architecture and Health
Charles Jencks
66

Environmentally Smart Design
Designing for Social Wellbeing Across the City and in the Workplace
Alisdair McGregor, Ann Marie Aguilar and Victoria Lockhart
48

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Guest-Edited by **Terri Peters**

Healthy Patient Rooms in Hospitals

Emotional Wellbeing Naturally

Sylvia Leydecker

76

Can Architecture Heal?

Buildings as Instruments of Health

Michael Murphy and Jeffrey Mansfield

82

Multisensory Architecture

The Dynamic Interplay of Environment, Movement and Social Function

Sean Ahlquist, Leah Ketcheson and Costanza Colombi

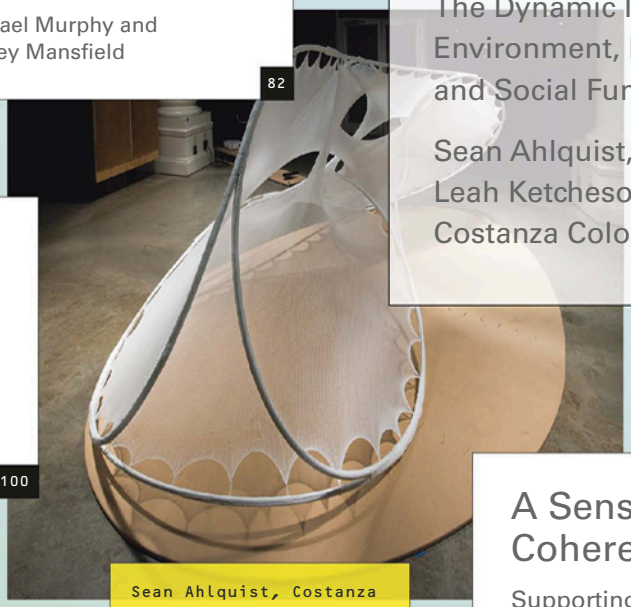
90

Architects as First Responders

Portable Healthcare Architecture in a Climate-Altered World

Stephen Verderber

100



Sean Ahlquist, Costanza Colombi, Leah Ketcheson, Oliver Popadich and Disha Sharmin, Sensory Playscape - textile hybrid structure, Southern Illinois University, Carbondale, Illinois, 2016

A Sense of Coherence

Supporting the Healing Process

Giuseppe Boscherini

108

Cultivating the 'In-Between'

Humanising the Modern Healthcare Experience

Terry Montgomery

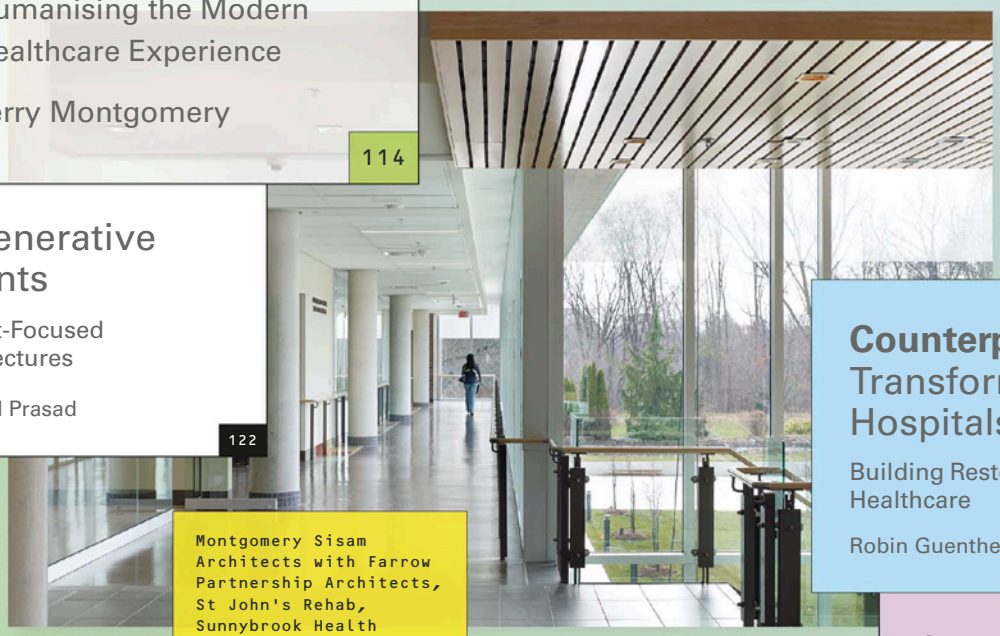
114

Regenerative Agents

Patient-Focused Architectures

Sunand Prasad

122



Montgomery Sisam Architects with Farrow Partnership Architects, St John's Rehab, Sunnybrook Health Sciences, Toronto, 2010

Counterpoint Transforming Hospitals

Building Restorative Healthcare

Robin Guenther

128

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134

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Front cover and inside front cover: CF Møller, Hospice Djursland, Rønde, Denmark 2011.
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02/2017

ABOUT THE

GUEST-EDITOR

TERRI PETERS

Terri Peters is an architect, writer and researcher whose interdisciplinary work maps new trajectories of ecological design through contemporary practice, academic research and pop culture. She is an expert in sustainable architecture and her research focuses on the architectural and social implications of sustainable buildings, with a focus on qualitative parameters and wellbeing. She has a global perspective, having lived and worked in Vancouver, Tokyo, Paris, Copenhagen and London, which was her adopted home for eight years. After 12 years abroad she is currently back in her native Canada, as a post-doctoral researcher at the University of Toronto investigating the intersections of environmental design and wellbeing.

Her practice of architecture involves critical investigation and reflection from multiple angles. She has degrees in architectural history and environmental design, a professional degree in architecture, and a postgraduate diploma in professional practice. She has published more than 200 articles for specialist architecture and design magazines, and is a registered architect in the UK. She guest-edited the *Δ Experimental Green Strategies: Redefining Ecological Design Research* (November/December 2011) issue, which defined and examined an emerging trend in contemporary architectural practice relating to the formation of sustainable design research groups. These groups mark a shift in how environmental design is approached in practice, and how ecological research is coming to be valued within the profession.

From 2009 to 2015 she was a PhD Fellow at Aarhus School of Architecture in Denmark, researching the sustainable transformation of modern housing estates. She has written 10 recent peer-reviewed conference and journal articles relating to sustainable design and renovation for publications such as *Health Environments Research & Design* (*HERD*), *DOCOMOMO* and *Architectural Research Quarterly*. Her research expands the definition of sustainable architecture and the design of green buildings to encompass wellbeing and health with implications for research and practice.

Her current work engages with computation and new technologies, and intersections between sustainable design and health. Projects include utilising new technologies such as environmental, climatic and occupancy sensors and digital simulations to gain insights into experience and comfort and investigate architectural and behavioural conditions in interiors and exterior spaces. She is the co-editor of *Inside Smartgeometry: Expanding the Architectural Possibilities of Computational Design* (2013) and co-author of *Computing the Environment: Digital Design Tools for Simulation and Visualisation of Sustainable Architecture* (2017), both published by John Wiley & Sons.

With this title of Δ, she brings together her academic research, professional connections and publishing to explore the positive co-benefits of sustainable and healthy architecture in a range of settings. *Design for Health* examines emerging approaches in contemporary architectural practices relating to the conceptualisation and measurement of health and wellbeing in connection with changing notions of the environment.

Interconnected Approaches to Sustainable Architecture

INTRODUCTION

TERRI PETERS

Stantec and William McDonough + Partners,
UCSF Medical Center,
Mission Bay,
San Francisco,
2015

The interior of the University of California, San Francisco hospital was designed to focus on healthy materials and promote psychosocial health using strategies including daylight and views to the outdoors. Consultants McDonough Braungart Design Chemistry developed screening criteria for finishes and materials to minimise environmental toxins.

The challenges of integrating sustainable design into our buildings and cities, and improving our health and wellbeing, are interconnected. Our natural and built environments are an inextricable part of ourselves, and we influence – and are influenced by – a myriad of design decisions that impact the air we breathe, the water we drink, and the homes we live in. Priorities and design principles for concepts underlying sustainable design and health are culturally dependent and have changed dramatically over time, reflecting scientific knowledge, developments in building construction and architecture, and new trends and technologies for living and communicating with others. Health is tied to concepts of social connectedness, happiness and quality of life. This issue of Δ thus explores a range of innovative design responses for health-promoting, sustainable architecture.

The World Health Organization (WHO) defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.[1] The *Green Guide for Health Care*[2] defines the three key principles for healthy buildings as those that protect the immediate health of building occupants; the health of the local community; and the natural resources and health of the global community. The design details of therapeutic environments are culturally specific and depend on many factors, but essentially they need to support clinical excellence in the treatment of the physical body; support the psychosocial and spiritual needs of patients and their families as well as staff; and produce measurable positive effects on patients' clinical outcomes and staff effectiveness.[3] These are all positive criteria, but architectural quality could be made even more explicit, for example relating to the building's form and relationship to site, regarding choice of materials and interior finishes, and with respect to connection to the natural world – all of which are integral to therapeutic design.

Expanding the Definition of Sustainable Design

The work featured in this issue expands the framework of sustainable architecture to include comfort, wellness, security and health, focusing on the positive co-benefits of sustainable design and wellbeing in hospitals and health environments. While these buildings represent an important opportunity to use architectural design to positively impact people's experiences and health outcomes, they also present particular challenges relating to environmental sustainability. For example, hospitals have an extremely high energy-use intensity due to specialist equipment and 24-hour operation; they tend to occupy large footprints and are often designed as campuses taking up large blocks of centrally located land; and they have high operating costs, making them expensive to run and maintain. They have proven difficult to adapt for reuse once built, and the architectural quality is often questionable.

Healthcare facilities use a large proportion of our shared resources including energy, materials and land. These building types also benefit from a wealth of expert opinions and consultants including design programmers, planners and other healthcare design specialists who collaborate on the project. Yet still they could be much improved in terms of architectural design and patient experience. Additionally, the current trends of rebuilding and renovating modern healthcare facilities now need to consider demographic shifts such as an ageing population living longer than ever before, and designing 'future-proof' buildings that can adapt to new and emerging technologies. Global waves of renovation and rebuilding schemes are presenting unprecedented financial challenges as there is pressure to accommodate more patients, and to design to higher environmental standards.This △D showcases high-quality architecture for health that aims to simultaneously achieve ambitious environmental, social and economic performance.

Throughout history, illness, and in particular communicable diseases, have plagued society, and this has been reflected in how we design for health. Today, however, it is non-communicable diseases such as heart attacks and strokes, cancer, chronic respiratory conditions and diabetes that present the greatest threats to life,[4] and depression is the leading cause of disability worldwide.[5] As buildings can influence our emotions and psychological wellbeing, they could therefore improve our mental health. How can good design and better connections to our environment enhance psychosocial health?

A look at recent and in-progress hospital projects reveals a variety of architectural approaches: some incorporating renewable energy and strategies for reducing carbon emissions; others testing ideas for integrating new technologies to better connect people with their health data and enable them to monitor the course of their care; as well as the siting of patient hotels and specialist clinics on local hospital campuses to improve community connectedness and encourage family support.

Ambitious Energy Performance and Patient-Oriented Care

Compared with innovations in 'low energy, low carbon' designs for other building types, there are relatively few environmentally sustainable hospital projects designed by high-profile architects. One pioneering example, however, is the new University of California, San Francisco (UCSF) Medical Center complex at Mission Bay in San Francisco (2015), designed by Stantec (formerly Anshen + Allen) and William McDonough + Partners as a health-promoting and architecturally innovative benchmark for sustainable architecture. Using half the energy of a typical hospital, its solar array aims to prevent 500 tonnes of carbon emissions yearly. Unique programmes for psychosocial health include facilities where children can make and record music or participate in broadcasts with other young patients in the hospital, and even continue school in a fully accredited classroom.[6] The project incorporates holistic sustainability principles such as maximising daylight, air quality and views outside; improving the natural habitat; designing for low emissions; expansive green roofs; strategies for water conservation; requirements for healthy materials; and offering educational and public services.

Another innovative project is the New Karolinska Solna University Hospital in Stockholm (due for completion in 2018), which illustrates global best practice in therapeutic hospital design. It will use about half the amount of energy as a typical hospital of this size, and will be certified using the Swedish third-party Miljobyggnad and LEED Gold. The aim of architects White Tengbom Team, a collaboration between two of Sweden's leading offices, is that 98 per cent of the building's energy needs will come from renewable sources including on-site geothermal. Temperature and air quality sensors will provide real-time feedback for environmental control systems. The interiors are based on the 'thematic care' concept where doctors and specialists visit the patients rather than the other way around. Natural light, integrated artwork, and connections to nature reflect the project's 'patients-first' approach. With high ceilings, robust joists, and the infrastructural and technical capacity to accommodate future needs, the architecture meets the requirement for a long-lasting building that can adapt over time.

The project includes 1.6 hectares (4 acres) of green space including 0.4 hectares (1.2 acres) of rooftop gardens, many of which are designed as therapeutic spaces for adjacent patient care areas. Butterfly- and bird-friendly plantings were chosen in certain areas to give patients something beautiful to look at.

Twenty-four separate gardens and outdoor areas of respite are included in the hospital project. Derek Parker from the Center for Health Design contributed evidence-based design principles that included the provision of a variety of green spaces to promote health and wellbeing.

The single rooms

Throughout the NKS project, the planning and design of the new university hospital has been based on the needs of the patients. One central component is that all the hospital rooms are single rooms. In total, there are 630 single rooms, 28 in each ward, and they are 19 square metres.

Less spreading of infection
The fact that patients have their own hygiene rooms and there are fewer bed transports means the risk of infection spreading is reduced. The wash-basin in the single rooms also means care staff can wash their hands in close proximity to the patient.

Involvement
Patients have increased possibilities to be involved in their own care process and staff have more opportunities to adapt their care even further to the patients' needs.

Patient safety
The short distance between hospital bed and hygiene room reduces the risk of falls. The night light next to the hygiene room also improves patient safety since the patient can see where to walk in the night.

Design
The single rooms have an airy atmosphere and modern design. From the bed, patients can see out through the window and also adjust the blinds and control the TV. The end wall has a care panel and a cupboard for the patient's belongings.

Security and integrity
The patients can talk undisturbed with relatives and care staff. Relatives are also able to stay overnight in the room. The door leading into the room has a window so care staff can monitor the patient without unnecessary disturbance.

Choice of materials
The walls and ceiling are white with the exception of one feature wall which has a light shade of colour. The windows and care panels are framed with light wood. All the surface areas and materials are easy to keep clean.

Collaboration
Care staff can collaborate in work teams more easily and adapt their care to each individual patient. Collaboration between care, research and education is also facilitated.

Sustainability
Renewable electricity, resource-saving and environmentally-friendly materials, pleasant acoustic environment and presence-controlled lighting are examples of sustainable solutions in the single rooms which create an excellent indoor environment.

White Tengbom Team, New Karolinska Solna University Hospital, Stockholm, due for completion 2018

The entrance hall of the 730-bed facility will feature natural materials, energy-efficient LED lighting, and connections to the outdoors via skylights, windows and atriums.

New Communications Technologies

Advances in technologies for the design and operation of building systems as well as for record keeping and interactions with patients are changing the physical and social environments of hospitals. HOK's Humber River Hospital in Toronto (2015) is a 'fully digital hospital', where interactive technology allows for a new approach to resource use (less paper and paperwork), more space for patient care, and better communication between patients and staff. Each of the 650 patient rooms has a variety of digital screens: outside the door, on the wall and attached to the bed. Here, Wi-Fi can almost be considered a therapeutic amenity, providing ill and distressed patients with access to entertainment, communication with family, and information about their course of treatment from their bedside. The 'lean, green and digital' method employed in HOK's design aims to reduce energy use by 50 per cent of that of a typical facility, save more than $3 million a year in operating costs, offer better coordination between the hospital's different specialities and departments that support the various stages of patient care, including outpatient rehabilitation, and virtually engage with local community health partners beyond the hospital setting. It is hoped that these initiatives will contribute to the emotional and physical wellbeing of Humber River Hospital patients.

Emotionally Supportive Spaces

There is also a need for emotionally supportive environments on hospital campuses that provide care but are not clinical. Family-oriented spaces on hospital campuses such as those run by the Ronald McDonald House Charities (RMHC) provide short-term accommodation for families at little or sometimes no cost that allows them access to specialised medical treatment. The new Ronald McDonald House at BC Women's and Children's Hospital in Vancouver, designed by Michael Green Architects (MGA) in 2015, is a home-like setting where families can enjoy common spaces, kitchen and dining areas, fitness areas and library resources. It provides a healthy environment for children with compromised immune systems via daylighting, the use of natural materials throughout, and natural ventilation. It features an innovative tilt-up cross-laminated timber structure that is lightweight and environmentally friendly, a key strategy for the facility's expected LEED Gold rating. Though not a patient-care facility per se, MGA's focus on sustainable materials, architectural quality, and design for comfort and wellbeing nevertheless offers emotionally supportive and spiritual spaces for patients' families.

Architecture as Therapy

Single rooms and private bathrooms for all patients have been proven to offer health benefits, in particular relating to the containment of infection. Single rooms also provide improved comfort, a sense of privacy and security. Each has a place for family to sit or sleep overnight.

The essays in this issue address three broad, often interconnected themes: the potential of architecture to encourage a sense of wellbeing and offer therapeutic benefits; the need for multiple scales of integrated health-promoting interventions; and how salutogenic design can enhance sensory experiences for patients, visitors and staff. In each case, how the design of emotionally and physically supportive buildings can limit harm to their specific environments is also explored.

Charles Jencks writes about Maggie's Centres, an experimental programme of inspirational building projects spearheaded by Jencks and his late wife Margaret 'Maggie' Keswick Jencks in the late 1990s to provide supportive care for cancer patients through great architecture (see pp 66–75). The inspiring and provocative buildings, by high-profile designers, focus on wellbeing, the experience of nature and views outdoors, and fostering a sense of community.

In their essay 'Can Architecture Heal?' (pp 82–89), Michael Murphy and Jeffrey Mansfield of Mass Design Group connect to locally specific social and climatic conditions. The practice's recent projects include the Maternity Waiting Village in Malawi (2010), which aims to reduce maternal mortality rates by drawing on the principles of vernacular architecture to create highly desirable, comfortable and safe environments to care for expectant mothers.

Melbourne-based Lyons's daring and colourful attitude to healthcare architecture is illustrated in founding director Corbett Lyon's discussion (pp 56–65) of the evolution of the practice's thinking in creating new typologies for hospital design. Projects featured include the Lady Cilento Children's Hospital in South Brisbane, Queensland (2014). Comprehensible, manageable and meaningful, it was designed to reduce stress with features such as terraced roof gardens, bold exterior and interior colour and textures for wayfinding, and a high-performance bioclimatic facade.

Sunand Prasad's article on 'Regenerative Agents' (pp 122–7) describes Penoyre & Prasad's search for the architectural equivalent of 'patient-focused medicine'. The office's award-winning projects here outline three key strategies: creating flexible designs that can adapt to changing needs; connecting public and private spaces to produce a civic building 'of great social purpose'; and embodying regenerative, zero-waste and ecological design principles.

In 'Decoding Modern Hospitals' (pp 16–23), architect and architectural historian Annmarie Adams looks at how hospital design has transformed over the years in response to societal changes and architectural trends and movements. She concludes that hospitals should be both works of architecture, integrating novelty and inspiring design, as well as places for treatment.

Scales of Intervention
Multiple scales of intervention and a continuum of care are explored by designer Sylvia Leydecker (pp 76–81), who specialises in health-promoting interiors for emotional wellbeing. Her designs for a maternity unit and private patient rooms at a hospital in Germany use natural materials, daylight, colour and texture to create a sense of intimacy and comfort.

'In-between' spaces such as courtyards, porches and galleries are the focus of Terry Montgomery's contribution to the issue (pp 114–21). He argues that these threshold spaces can make or break a healthcare experience. Illustrated with recent projects by his practice Montgomery Sisam Architects, he reveals how the studio successfully elevates such spaces to a therapeutic role.

Salutogenic and Sensory Architecture
Julian Weyer's study (pp 32–41) of the healing environment at the CF Møller-designed Hospice Djursland in Rønde, Denmark (featured on the cover of this issue) has shown that the emphasis 'needs to be on the individual, his or her healing and access to daylight and green surroundings', as implied in the article's title: 'Lean, Green and Healthy'.

Advances in technologies are changing the physical and social environments of hospitals.

HOK,
Humber River Hospital,
Toronto,
2015

Each room has a display screen at the entrance to display data about the patient and their care, such as allergies, risk of falls and care updates. Inside the rooms, every bed has its own computer terminal so patients can access their medical chart, adjust the room lighting and temperature, order meals, watch a movie and use the Internet.

Architect Giuseppe Boscherini's 'A Sense of Coherence' (pp 108–13) begins with insights from his own patient experience, presenting a spatial framework for salutogenic design in his discussion of architecture and the senses. This theme is also picked up by Richard Mazuch of IBI Group (pp 42–7), who explores sense-sensitive healing environments as an aspect of therapeutic design.

Sensory design is explored in a different way by Sean Ahlquist, Leah Ketcheson and Costanza Colombi at the University of Michigan (pp 90–99), who illustrate a series of material and spatial installations as interactive environments for children with autism. The authors use their interdisciplinary collaboration and expertise in architecture, kinesiology and psychiatry to offer a rich theoretical discussion of designing for multisensory experience. They conclude that architecture can itself be a communicative device, and their approaches to customised metrics and therapeutic design propose new ways of thinking about social support and sustainability.

New Roles for Architects

The need for therapeutic and sustainable architecture can present new roles for designers, and not just in the field of healthcare facilities. Arup's Alisdair McGregor, Ann Marie Aguilar and Victoria Lockhart (pp 48–55) explore designing for health at the urban, neighbourhood, building and human scales in a variety of health-promoting, but not specifically healthcare,