Hospital Futures – Humanism Versus the Machine

Stephen Verderber

The hospital as a *machine for healing* has become an anachronism. As a building type, the hospital remains a curious amalgam, with medical technology often pitted against humanist concerns. Critical discourse on the need for new, humanistic paradigms has been fragmented thus far and, ironically, remains insufficiently supported by the very institutions and government organizations that have the most to gain from a redefinition of the hospital, in architectural as well as in experiential terms. This dilemma is compounded by the enormous capital investment countries around the globe expend annually to promote the health status of their citizens.[1] There is little doubt that architecture can, and should, play a crucial role in humanizing the hospital. At first glance, this seems rather unlikely. How can architecture contribute to revolutionizing healthcare? Isn't this quite presumptuous, considering the fact that the time and money invested in solid research has remained scant in comparison to the massive capital resources invested annually around the globe in the name of improving the level of health of societies worldwide? Architectural theory is gradually evolving from a traditional reliance on historical precedent to a position informed by critical analysis and, to some extent, scientific method. As Lang points out disciplinary activity in architecture remains, however, rather fractured and diffuse largely as a function of the continued, at times random, borrowing from allied fields in the social sciences, the humanities, and the engineering sciences.[2] In this article, we point out research on the subject of architecture for health in the context of an emerging science of architecture. Then we sketch some prognostications for the science and practice of architecture of architecture for health, and specifically, the future of the hospital for the year 2050.

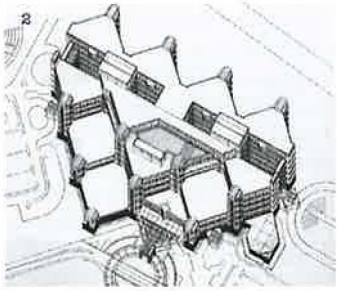
The present: megahospitals – machines for healing – and the first attempts to deconstruct the machine

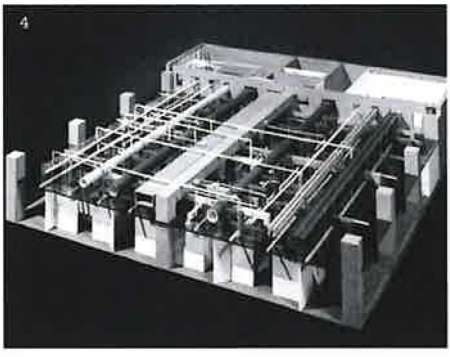
The science of architecture is about change brought about by decision making processes that, ideally, are based on rational insights and clear visions of the future. One of the qualities inherent in the science of architecture is its capacity to transcend history and paint a well-informed picture of the future. Rather than to analyze the methods involved

1. This article is based upon an earlier essay by the author 'Architecture for Health – 2050: An International Perspective' published in *The Journal of Architecture*, Vol. 8, Number 3, Autumn 2003.

2. Lang, J.T. (1987). *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design*. New York: Van Nostrand Reinhold.

1. Mainichi's Medical Union Hamilton Guards, opened in 1972
3. The Department of Veterans Affairs (DVA) in the United States constructed a number of gargantuan facilities during the 1960s and early 70s, such as the 900-bed replacement hospital in Houston (1984-89)
5. Rehabilitation Institute of Chicago (1974), designed by C.F. Murphy Associates
4. Tufts University Medical Center, Boston
6. A.H.I. Hospital, Aichi Prefecture, Japan





6. The Bear House Children's Hospice (2003), Manly, N.S.W.
7. George Mark Children's Hospice (2005), Inner San Francisco
8. Stained glass mural in the chapel at Christopher House in Austin, Texas

in the architectural processes of prognostication, we present a vision of healthcare in the middle of the twenty-first century. Naturally, we start with a short analysis of the present, which already contains the gems of the future even though it is only a passing stage in a never ending evolution. We started our argument by stressing the need for change. There is no better way to illustrate this need than the massive utopian megahospitals of the late 20th century. They represent the apotheosis of an unyielding belief in the power of medical science in the post-1945 era. Beginning in 1946, the race was on to construct ever larger and more complex hospitals and medical research centers, often occurring at the expense of long-established ethnic neighborhoods often disfigured in the name of urban renewal. Medical centers were transformed in a single decade (1946-56) into behemoths of unprecedented urban scale and complexity - as 'medievalist' enclaves. By the 1960s, critics assailed hospitals as frequently being obsolete from opening day. Chronic renovations, upheaval, and premature obsolescence in the face of dramatic advancements in medical science and technology gave rise to a new wave of thought.

The *interstitial* hospital was conceived as a vehicle capable of responding to the period's hyper-accelerated rate of change in the healthcare landscape. Architecture was a delimiting force in the view of many an administrator and medical chief of staff. The hospital had to become anticipatory, no longer solely reactive to external determinants. Interstitialism was to promote 'infinite' internal flexibility - universality - achieved by intermittently stacking one layer of a, say, patient care floor, with technical support floor either directly above or below. One of the largest of the megahospitals, the massive McMaster's Medical Center in Hamilton Ontario, which opened in 1972. was to represent the ultimate response to the architect's curse of accelerated facility obsolescence. Its proponents asserted the interstitial hospital was to be reinventable one hundred years or more into the future. Soon it was learned, however, that it cost as much as 30-40% more in initial construction costs to incorporate interstitial systems. The prototype system developed for Tufts University Medical Center in Boston is shown. The Rehabilitation Institute of Chicago (1974), designed by C.F. Murphy Associates, was a high-rise machine hospital based on the theories of Mies van der Rohe. Mies had taught a number of the principles at C.F. Murphy (now Murphy/Jahn) while students at the Illinois Institute of technology. Compromises appeared such as partial interstitial systems where only one half or one third of the total floor areas per floor were served by an unoccupied support floor, such as at the St. Mary's Hospital on the Isle of Wright, in the UK. Many hospitals in developed nations which in 1980 operated 800-1000 beds by 2000 staffed hundreds fewer beds.

Most of the interstitialist machine hospitals built globally were designed and built for government client agencies. The Department of Veterans Affairs (DVA) in the United States constructed a number of gargantuan facilities during the 1980s and early 90s, such as the 900bed replacement hospital in Houston (1984-89). Here, a series of platforms supposedly would allow for future expansion. In many respects, this hospital was obsolete the day it opened. This was mainly due its emphasis on inpatient care, at a time when the widespread cultural (albeit economically-driven) shift was well underway towards outpatient care in the U.S. This trend would become pervasive in both the government and private sectors. The DVA is now contemplating demolishing a number of its 171 acute care facilities, as acute care overcapacity is a chronic problem throughout the system. Most interstitialist hospitals have become dinosaurs, to varying degrees.

A new period in the ontology of architectural movements in healthcare appeared at the end of the 20th century, synchronous with the advent of the Internet and World Wide Web. The Internet, functioning as the

primary source of global communications over the coming decades, will foster, if properly harnessed, myriad innovations in healthcare and in architecture for health. New developments will continue to profoundly influence medical science, leading to the advent of the *empowered patient*. This will influence all places where healthcare is dispensed, and care received. New sources of inspiration will be explored, including the postmodernist sensibilities expressed in the contemporary hospice. The inpatient room will be redefined, and it will appear not unlike progressively designed hospice bedrooms, such as at the George Mark Children's Hospice (2003), near San Francisco. Site planning principles based on human scale, sustained, therapeutic contact with nature, and green materials and building technologies are being innovatively expressed in hospices, such as at the A.H.I. Hospice in Aichi Prefecture, Japan. The Bear House Children's Hospice (2003) in Manly, N.S.W. Australia has a broad exterior deck for use by residents and their families, and overlooks a garden.

The spiritual dimensions of architecture for health will experience a renaissance. The chapel, once a prominent feature of a hospital, all but disappeared in the machine megahospital. It became next to impossible to locate the chapel, as it was often reduced in size to a small waiting room. The resources invested in these spaces will increase. Again, the hospice, among other allied healthcare types, will be a source of inspiration. The chapel at Christopher House in Austin, Texas is dominated by a large stained glass mural.

The future: hospital architecture in the year 2050

By 2050, for those fortunate enough to have one, the home, not the hospital, will be the center of one's healthcare 'universe' supplemented by anyplace where one has online access to health information. Health promotion, sickness prevention education, and self-empowerment is inhibited by a global discrepancy between high tech versus low tech societies and conflicting priorities between private and public agencies. Inequitable access and poor quality of healthcare for the poor and disenfranchised remains at critical levels on an increasingly populated planet.

The hospital and its successor institution will, as a building type, retain its timeless, essential role in the care of the most acutely ill. This is already occurring: online medical databanks and telemedicine practices are being formed in anticipation of the coming boom in home-based virtual healthcare. The dwelling is being rethought in support of its new function as a virtual *clinic*. Holographic 'consultation sessions' with one's caregiver will occur in one's family room or kitchen. The possibility exists, in theory at least, that the patient, if one has access to such resources, will have access to health information anywhere, anytime.

Artificial landscapes

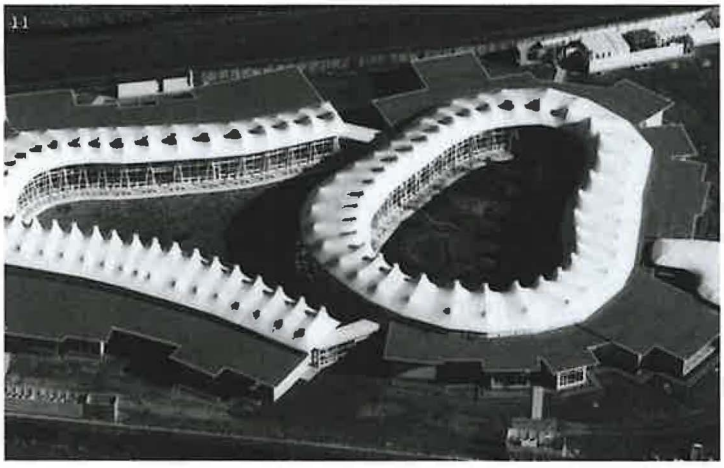
Sensory immersion environments will very closely duplicate real natural landscapes. Many hospices are currently employing these humanist technologies, with positive results. A new field, design therapeutics, will explore these person-environment transactions. Artificial terrain tools and software packages will make it possible to fuse transparent linkages between human sensory modalities and the content of the experience of natural environments. Immersion landscapes, many of which are already to be found in zoos and aquariums, combine various elements of such real and virtual natural landscapes, and are able to be geared to suppress any undesirable, i.e. counter-therapeutic, content. They are fully controllable and monitored to create a desired effect such as at the Lied Jungle at the Henry Doorly Zoo in Omaha.[3] The cultural critic Umberto Eco writes of 'hyperreality' – imitations intended to be better than the originals.

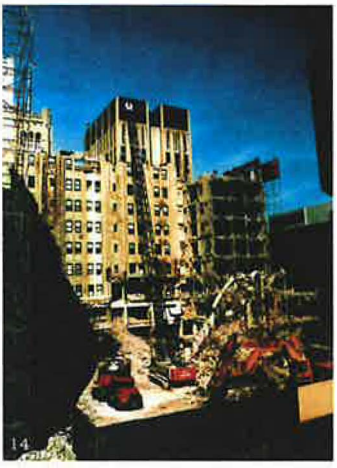
3. www.vterrain.org, 2003.

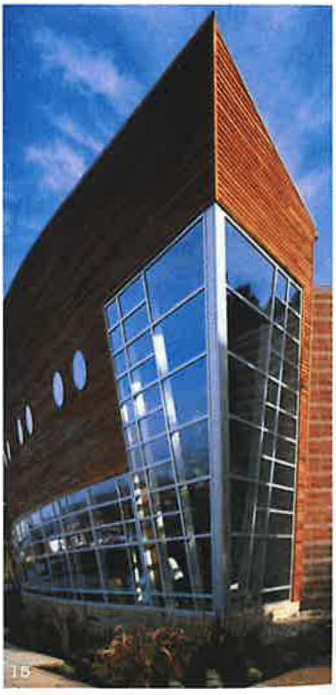
9/10. The Wellness Room

11. Community health and wellness center in Narita, Japan, Designed by I. Kazuhiro (2006)

12. Balloch Children's Hospital, Scotland (completed 2006)







13. Passavant Hospital, Chicago

14/15. Hospitals will express new formal languages that extend far beyond the rigid orthogonality of the modern machine metaphospital. Engaging, evocative vocabularies expressed in recent care settings designed for children should be expressed in care settings for persons of all ages

Artificial rain forests such as at the zoo in Omaha at present provide visitors a condensed version of world travel in which they experience only the most interesting and edifying features of natural places. Experiences such as this will be well integrated into the planning and design of hospital and related healthcare settings by 2050. The therapeutic effects of artificial landscape simulation in buildings will enhance the healing process. The natural environment itself will have by then been widely contaminated; all that is left will be faint recollections of the real thing, for simulations, sad as the truth is, will be the norm rather than the exception.[4]

Translucent, backlighted curvilinear wall panels replace the stoic traditional walls in the corridors of the Arizona Center for Health and Medicine. The panels transverse the color wheel, presenting a dawn to dusk panoramic progression.[5] In 2050, hospitals in dense urban settings will be able to tune out all undesirable, i.e. counter-therapeutic, stimuli (noisy traffic, smog, etc.). Active simulations will be supplemented by passive devices such as wall murals (a technique used at present in a number of institutions) and sophisticated lighting. One of the first modular patient rooms to incorporate active nature simulations is The Wellness Room. Walls and the ceiling can be specified with an aluminum lightbox housing photographic artwork. It is flush-mounted in a wood frame. Backlighting is used to activate the nature scene and to provide ambient lighting, controllable by the patient.[6] Form generative computer software will allow for these fluid form languages to be ubiquitous.

As for buildings designed for health, the 'CO_2,' building, its nickname derived from its plan configuration, is a community health and wellness center in Narita, Japan, near Tokyo. Designed by I. Kazuhiro (2000) this building provides one glimpse into the future as it intrinsically fuses nature and anthropomorphism in its parti. Today, hospital architects tend to think of the natural environment as itself therapeutic, yet still one step-removed form the formal language of architecture. In other words, the hospital can contain and relate to nature, but it itself is not inherently organic or biomorphic. In the CO_2 health center, however, nature provides more than symbolic inspiration, a backdrop, or a feature trumpeted in a slick marketing brochure. Here, actual trees from the site become part of the building's column structural system. These interior trees anchor a white fabric membrane roof system, beneath which rooms are deployed around a pair of courtyards shaped by the irregular curvature of the structure. In this manner, nature is brought into buildings as a means to protect it, to 'save' it, ironically, from 'destruction,' and to preserve its inherent beauty for future generations to admire and take cognizance of, at such a time when global deforestation will have done its irrevocable damage to the earth's forests.

Allied healthcare typologies, once again, will provide inspiration for the hospital architect. The cascading, wave-like formal vocabulary of the Balloch Children's Hospice, in Scotland (completed 2005), boldly reinterprets the relationship between the ground plane and the roof plane. Hospitals will express new formal languages that extend far beyond the rigid orthogonality of the modern machine mega-hospital. Engaging, evocative vocabularies expressed in recent care settings designed for children should be expressed in care settings for persons of all ages.

By 2050 the expert, empowered patient will have emerged only in those cultures wealthy enough to afford the technology to do so. In sharp contrast, the sheer volume of information available will elevate the patient and one's family to an unprecedented level of sophistication in richer societies. In poor societies the recipient (already widely referred to as the 'consumer' in rich countries) will be more acutely aware of one's plight and the available options, and therefore less (or more) empowered than at any time in history. An impediment to attaining political balance between the privileged and underprivileged in

4. Bentley, P.J. (2002). *Digital Biology: How Nature is Transforming Our Technology and Our Lives*. New York: Simon and Shuster.

5. Calmenson, D.W. (1999). 'Participatory Healing'. *ISdesignet Magazine*. March <http://www.isdesignet.com/magazine> (July 2002).

6. www.wellnessllc.com, 2002.

7. Ashton, J. (2002). 'From Sickness Treatment... to Sustainable Development'. *Green Futures*, Issue 34, May/June.
8. Green, E. and Wright, M. (2002). 'Healthy Bodies, Healthy Planet?' *Green Futures*, Issue 34, May/June.
9. Thurgood, M. (2002). 'Waste Future - 2030 Visions - and a Zero Waste World?' *Green Futures*, Issue 35, July/August.
10. Editorial (2001). 'Managing Biomedical Waste'. *Express Healthcare Management*, Issue 16, 31 April 2001.

societies will remain what is widely referred to as the *digital divide* - those with Internet access versus those without. This is no different than during the Middle Ages, where those who could afford to barter for privacy received a private room far from the hellish open ward.

Sustainability

Why is it that hospitals are often among the worst polluters in their communities? They generate excessive amounts of toxic waste, and the institution is nearly always planned and built with little regard to issues of environmental sustainability. The time has come when healthcare facilities must realize, accept, and appreciate the value of architectural sustainability.[7] At the very least they will be forced to awake to the public relations wisdom of being able to 'market' their institution from this perspective. By 2050, all healthcare providers will have been mandated to adopt 'zero waste' policies. Hospital incinerators will have been demolished, having outlived their original purpose. Where possible, site planning and building massing will be 'reinvented' in a reprise of traditional Nightingalian practices, such as in the 19th and early 20th centuries, in *microhospitals*.

The biggest problem will remain excessive resource consumption. By 2050 the notion of healthy bodies, healthy environment, will of necessity be widely accepted.[8] But by then it may be too late. In the latest *Global Environmental Outlook*, the UN Environment Program points out that one of the three pillars of sustainable development, the environment, is 'seriously listing' because of the distortions placed on it by excessively insensitive human actions. There is a paramount need to reduce the excessive consumption of the more affluent - 'as long as the richest 20% continue to account for 86% of consumption, sustainable development will never be achieved'.[9] Healthcare facilities globally will adopt the zero waste concept, following the lead taken by the manufacturing sector, where the initial objective was to simply reduce emission of wastewater and solid waste.

In India there are more than 5,000 small and private hospitals and nursing homes. Increasing population has caused a rapid proliferation of health facilities. India alone generates 3 million tons of medical waste annually and this figure is growing by 8% each year. Waste segregation at the source remains the number one problem, a looming crisis by 2050, yet this concept is not ingrained whatsoever in the culture, and therefore remains a low priority for administrators.[10] Around the globe, ignorance, political malfeasance, and cultural indifference will continue to hinder progress. Architects, armed with the results drawn from successful case studies, in consort with physicians, can lead in these re-education efforts in the community. Architecture and the fields of community health and social ecology will merge into a single entity as a matter of necessity.

Current best practices in sustainable hospital construction are being articulated. Architectural research on this subject will need to identify ways in which healthier healthcare facilities can be integrated with *eco-parks* in towns and neighborhoods.[11] Improved on-site management of waste from the point of site preparation and construction onward, and the establishment of materials specs on a 'fitness for purpose' basis will be mandated by law. In addition, policies will require little or no waste is created from the demolition of old buildings (as all materials will have to be rechanneled). Buildings will be designed for ease of disassembly and redeployment, with recycled first generation building materials used only when absolutely necessary. Contractors will be daily participants in centralized waste exchanges in order to stream old waste to new 'wasteless' uses.

Decentralization

The process of functional deconstruction appeared in the U.S. in 1983 with the advent

11. Connor, S. (2003). 'Hospitals for a Healthier Planet'. *Green Futures*, Issue 34, May/June.
12. The Nuffield Trust (2003). *Building a 2030 Vision: Future Health Care Environments*. Report. London: South Bank University/Royal Institute of British Architects; Global University Programs in Healthcare Architecture (GUPHA), (2005). *Global Hospitals in the Year of 2050*. Tokyo: University of Tokyo/Japan Ministry of Health.

13. Verderber, S. and Refuerzo, B. (2006). *Innovations in Hospice Architecture*. London: Routledge/Taylor & Francis.
14. Verderber, S. and Fine D.J. (2000). *Healthcare Architecture in an Era of Radical Transformation*. New Haven and London: Yale University Press.

of federal healthcare cost containment legislation. It has more recently begun to occur in other highly developed countries. Immense hospitals have become too expensive to staff and operate. Hospitals are being forced to reexamine their mission, scope of services, and community role. The trend toward outpatient care has resulted in a precipitous drop in the demand for inpatient beds needed for overnight stays. This process is ongoing in the U.S. and is occurring in many countries, including the UK's recent *Best Buy* hospitals, and in Japan, both of which have been loath to accept a less than singular role of the highly centralized hospital in the total scheme of things.[13] The functionally deconstructed hospital will require architectural research on its future complexion and its civic function, public and patient perceptions of its role, and its very sustainability in a resource-starved world. The movement toward smaller *residentialist* patient focused care centers is deeply rooted.

Meanwhile, the global palliative care movement, and the health promotion movement, will embrace this rejection.[14] The palliative care dispensed in hospice is a reaction against the scale and hyper-institutionality of the megahospital. As for acute care, small scaled *Critical Care Centers* (CCCs) will emerge in the coming years although large teaching hospitals attached to medical schools will always be needed.[14] The best CCCs will strike a sound balance between the machine and humanism. In the microstitial hospital and larger facilities alike, every inpatient room will possess transformable step-up or step-down technological capability at a moment's notice: from the most intensive levels of care to its use as a pre-operative dormitory room. Due to cost constraints, small-scale wards will return. Older, architecturally inflexible institutions will simply be too costly to maintain. Architectural research will be called upon to examine viable, high care, cost effective options without sacrificing humanism. Obsolete hospitals, no longer justifiable on either a quality of care or economic basis, will be demolished by the hundreds such as the shuttered Passavant Hospital in Chicago, or adapted to new uses, such as housing for the underprivileged.

Collaboration denotes openness to the necessity of sharing, of collective problem solving. New coalitions will out of sheer necessity occur with global resource management, optical imaging and holography, human genetics and biomedical engineering, chaos theorists, nanotechnologists, community health agencies, public policy experts, gerontologists and other social scientists, and specialists in many other fields. Useful architectural and environmental design research will be needed on the issue of design intervention, scenario planning, and identification of effective community-based participatory planning protocol.

The battle for healthcare

With the proliferation of HIV/AIDs and the outbreak of unforeseen plaques and epidemics in the coming decades, newly formed patients' rights groups will by default adopt extremist tactics. In a wave of anti-globalism, certain hospitals and clinics may be burned by patient care anarchists, while other factions will seek subtler means of change to the healthcare systems in their countries. Although much of this anger will be focused on the government-based systems of care around the globe, dysfunctional hospital architecture will come to represent an easy symbolic target, not dissimilar from how Middle Eastern extremists saw the World Trade Center in New York prior to 9/11. Sustainable provider-recipient partnerships will by definition be explicitly democratic, with proponents taking the view that people cannot be persuaded to care for themselves when they haven't had a voice in their own fate. Healthcare autocracies, for the less fortunate, will issue decrees as to who will live and who will die, as cost will emerge as the overarching factor in the age of (God forbid) human cloning.

15. Tuxworth, B. (2002). 'Sit Still While I Empower You...' *Green Futures* Issue 35, July/August.
16. Kramer S. (1997). 'Agelessness'. *Self Help Magazine* August; Kramer, S. (2001). *The Continuance of Existence*. Santa Barbara, CA: Creations in Consciousness.
17. More, M. (2001). 'On Becoming Posthuman'. <http://www.maxmore.com> (July 2002).
18. Uldrich, J. (2002). 'Eleven Reasons Why Nanotechnology Will Arrive Sooner than Expected'. *Futures Research Quarterly* Vol. 18(1).

Community development professionals have known for years that in order to engage effectively with disadvantaged groups one first must address the power imbalances that persist between them and the provider entity, i.e. the governmental agency, head-on. This practice is widely referred to as 'linking social capital'.[15] However, the digital divide will persist as a major political and practical barrier in the coming decades within the informational cognoscenti in the effective dissemination of health-related knowledge.

Superhuman

Aside from geopolitical interventions, advances in biomedical science will result in what will become known as the *agelessness* movement. The debates are already reaching a feverish pitch.[16] In an essay 'On Becoming Posthuman,' Max More describes the science of extrophy, a state attainable in, in his view, the aftermath of sweeping advancements in neurophysiology, neurochemistry, and human genetics.[17] He asserts that we have taken our first steps along this road by altering our species genetic structure to remedy nature's failures, and will soon develop a cure for cancer. We can now use Prozac, Piracetam, Hydergine, and Deprenyl to modify our physiology, enhance our concentration, and to slow brain aging. Research into more specific and powerful modifiers will accelerate as we apply new tools from molecular biology, computer assisted molecular design, and brain imaging. Health-monitoring machines are becoming more organic, self-modifying, and intelligent. Artificial life, neural networks, fuzzy logic are trends which signify the human race is beginning to incorporate its technology into ourselves. Computers and their interfaces will rapidly evolve to fit us: from mainframes and text-based interfaces to PCs and GUIs, PDAs, voice-recognition, and knowbots. How long before *nanocomputers* are implanted? We have embarked upon the road toward transmutation of the elements themselves in a bizarre quest for immortality.

Molecular nanotechnology will eventually afford total control over the structure of matter, allowing us to build anything, perfectly, atom by atom, even the reconstructed body. Some futurists believe that the abolition of aging and most involuntary death will be one result.[18] Machine intelligence researchers, roboticists, and cognitive scientists foresee even more radical possibilities. We may be able to 'upload' ourselves, our psychological outlook, memories, emotional responses, and values. This will occur just as we now do with software, only from our biological brain to our synthetic brain. Powered by these devices our cognitive mental processes could function hundreds of thousands of times faster (God forbid) than at present. This is the epochal world depicted in Steven Spielberg's futurist film *A/I* (2000). More attainable at a much earlier date will be the discovery of spinal cord regenerative medicine and of fusing the robotics with the design of the built environment, including the application of robotic personal assistants, or RPAs, for residents in long term care setting.[19] This is already occurring in Japan on a pilot case basis.[20]

Evidence Based Design

Greater diversity will be essential to the success of future research endeavors in architecture for health. This will require the broad participation of 'end user' constituencies previously shut out of the planning and design process. Evidence Based Design (EBD), initially a humanist movement, must not be allowed to be subverted or undermined by narrow, profit-driven corporate interests. It must empower those who are at present marginalized by public policy as it shapes global healthcare.

EBD originated in the United States in the 1980s as an alternative to the status quo. It was a reaction to the harsh, cold, dehumanizing atmosphere of the modern machine hospital. It sought, first and foremost, to place the patient at the center of the equation, not

19. Vikhanski, L. (2001). *In Search of the Lost Cord: Solving the Mystery of Spinal Cord Regeneration*. Washington: Joseph Henry Press; Mulhall, D. (2002). *Our Molecular Future: How Nanotechnology, Robotics, Genetics and Artificial Intelligence will Transform Our World*. New York: Prometheus Books.
20. Stewart, A. (2002). 'A Silver Lining?' *Japan Inc.* 265, 6-8.
21. Bingman, A. Sanders, L and Zorach, R., Eds. (2002). *Embedded Utopias: Gender, Social Change, and the Modern Metropolis*. London: Routledge.

16/17. Transportable hospitals will be essential to serve the needs of disaster victims, globally. The accompanying illustrations depict modular systems that are transported via intermodal shipping containers via truck, rail, or plane. They can be deployed and erected in a matter of days and will in the coming years afford far more flexibility than standard fixed site, conventional hospitals.
18. An International Red Cross deployable special needs shelter that been developed for use in New Orleans, as part of the work of

the machine. It was therefore humanist in its origins and aims. If EBD is to flourish internationally, it must do so in a way that truly reaches persons of all walks of life and socio-economic strata, not only the wealthy and the well connected. The vast majority of work in EBD in the U.S. has occurred in private, for-profit hospitals. The present U.S. healthcare system, however, is on the verge of collapse. Nearly 47 million Americans lack comprehensive health insurance, and this number is rising. The U.S. federal government appears to have little interest in this movement. For EBD, the danger exists that it will therefore be 'taken over' by special interests in the private sector of the U.S. healthcare industry. As a result, and tragically, the probability is great that many millions of persons in the U.S. will be left out of EBD initiatives in the coming years. Despite this, a far broader spectrum of participation in EBD will be needed, including individuals and groups affected by issues of racial inequity, gender inequity, and economic and political marginalization, than at present. Others echo this theme as well.[31]

It no longer suffices for the evidence-based researcher or designer to speak only with the top decision makers of an institution or organization, or only be asked to justify its worth on the basis of how much money can be saved in hospital operational expenses. What of the poor residents of the local community? Who will represent their views? The distance between the end user, usually at the bottom of the decision making pyramid, and the leadership of an organization, usually at the top, will have to be compressed, and, in extreme cases, inverted. This emerging movement has been centered in the U.S. almost exclusively in the for-profit sector. As the EBD movement becomes more widely known beyond the U.S. it will need to be *adapted* to diverse micro-cultural contexts. For this reason, EBD may be difficult to blithely cross-culturally transfer from American case studies to universal health coverage system case studies in other countries, unless cross-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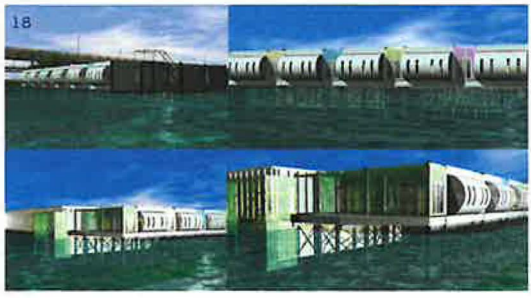
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a group of architecture students at Tulane University, intended to be set up before a major hurricane event, or in the immediate aftermath of a major disaster event.

These shelters were developed long before hurricane Katrina hit New Orleans.
19. Mobile clinics also in the future, if properly funded by government sponsor agencies, will afford many transprofessionals opportunities in the provision of post-disaster healthcare in the coming decades.

[23] Verderber, S. (2008). *Compassion in Architecture: Evidence-based Design for Health in Louisiana*. Lafayette, Louisiana: The Center for Louisiana Studies.

World Health Organization (1998). *District Health Facilities: Guidelines for Development and Operations*, and World Health Organization (2000). *Global Water Supply and Sanitation Assessment 2000 Report*. Geneva, World Health Organization

cultural, political, economic, legal, and regulatory differences are taken into consideration. In countries with national health programs for all citizens, these pitfalls are unavoidable without built-in safeguards. An alternative EBD paradigm in the not-for-profit, governmental sector, which may be of particular interest in Europe, does exist, however. In Louisiana, a fifteen-year (and ongoing) project in EBD is perhaps the longest of its kind in the world in the not for profit governmental health sector.[23]

The open architectural design competition is a second, closely allied, knowledge-generative vehicle that is being underutilized at present. Through history, architects, no strangers to making future-oriented prognostications, have often worked in isolation, adopting an aloof, heroic stance. The vehicle of the design competition has fostered this predilection to a large extent. Many building proposals, in the context of competitions or otherwise, have been linked to polemical manifestos. Regardless, healthcare clients in the U.S. have generally been loath to use the design competition as a means to award commissions for their buildings.

In search of the future

Healthcare architecture, EBD program notwithstanding, must proactively anticipate new challenges in the coming decades. First, facility transprogramism defined here as ecologically sustainable, multi and poly functional buildings and typologies, will become a far more viable design strategy. Healthcare buildings in the future will have to adapt and flex, both in real and in symbolic terms. Single-use buildings for healthcare in crowded, land-starved urban landscapes will become obsolete. Westerners, in a world of high construction costs and diminishing natural resources, will be forced to learn useful lessons from the Japanese, who have mastered transprogramism, far beyond the static concept of fixed site 'mixed use' buildings in their densely packed cities. Similarly, anticipatory 'flex' properties of hospitals+ on a single site will allow for readily reconfigurable permutations in response to occupants' evolving daily and long term needs and aspirations.

Second, new forms of *person nature transactions* in the healthcare milieu need to be developed: The tectonics of nature transportation and assimilation into the healthcare setting has barely been explored. Therapeutic views of nature from hospital room windows have been proven to have a positive impact on well being. This work, however, has been centered largely on the patient's access to *authentic* nature content. Much more work is needed on this facet of person-nature transactions as well as on artificial landscape representations from a multi sensory standpoint. Third, *architectural tectonicism* research will be needed on the increasing blurring of the lines intrinsically, traditionally, separating humans from buildings. Advanced technologies will enable humans to attain a far greater level of interactivity with one's setting.

From the epochal events of 11 September 2001 to the inability of a mother in Ethiopia to obtain life-saving immunizations for her infant, complex global issues loom larger than ever before. Geopolitical and population issues demand attention. The world's 6.1 billion population increases by nearly 9,000 persons each hour. Several worldwide population institutes estimate that, by 2050, between 9 and 9.5 billion people will be living on the planet.[24] Populations in need of global architectural intervention will include communities ravaged by HIV/AIDs, malaria, tuberculosis, plagues such as the virulent Ebola virus in Africa, and new strains of yellow fever. Add to this the profound pain caused by new settlements built in places where they should not, such as in low-lying coastal zones, earthquake-prone regions, and in the midst of notorious hurricane 'alleys'.

Bionics, robotic engineering, transprogramism, and anthropomorphism must be

balanced with humanist concerns. New, sustainable building materials, assembly systems, and anatomical-operational systems will have a profound influence on human well being in post-disaster situations. Transportable hospitals will be essential to serve the needs of disaster victims, globally. The accompanying illustrations depict modular systems that are transported via intermodal shipping containers via truck, rail, or plane. They can be deployed and erected in a matter of days and will in the coming years afford far more flexibility than standard fixed site, conventional hospitals. An International Red Cross deployable special needs shelter has been developed for use in New Orleans, to be set up before a major hurricane event. Mobile clinics also will afford many transprogramatic opportunities in the provision of post-disaster healthcare in the coming years. The needs of the homeless remain unmet in many parts of the world. Homelessness will increase unless architects rise to the challenge. A National Guard armory in New York City was in fact a gigantic hospital ward, as many in this overnight shelter were infected with TB. This disease runs rampant in open settings such as this makeshift, wholly inadequate, inhumane facility.

Summary

The intent of this discussion has not been to present a manifesto of any sort. It is merely a sketch of some of the many events which are unfolding now and just beyond the immediate horizon. Dismissal would be premature and unfortunate, as there is a curious, at times dismissive, attitude toward the acceptance of new research-based knowledge by the mainstream profession. Robinson (2001) writes: *'Today it is insufficient to simply assert expertise. Expertise must be backed up by a clearly defined, visible, usually linguistically described, coherent body of knowledge. Lacking this, the profession of architecture has found itself at a disadvantage relative to other fields and with questionable status as a profession... Before, the architect was simply trusted to know about building... the architect (now) must provide verbal evidence and justification for one's decisions... the existing structure of this knowledge base and of theory within architecture, however, does not easily incorporate... new forms of explicit knowledge... Rather than simply being (put) in the responsive mode, architects will have to become proactive, generating full discussion of (the) issues'.*

Futurist perspectives always run the risk of didacticism and will be viewed skeptically by some. At the very least, it is hoped, it will be of some value to specialists working in its central subject area. It is also hoped that this conceptualization and others like it can serve as stimulants for an expanded, far more generously funded set of new initiatives. The private and the public sectors need to work in tandem, becoming more active sponsors of such work. Future research must fuse all this with the timeless, enduring qualities of architecture. Humanistic qualities center on the importance of place, hierarchy, appropriate scale, harmony with context, enclosure, appropriate materiality, appropriate ornamentation, the importance of art, the need to control the trend toward excessive commercialism in architecture, and the timeless importance of community. The future of scientific discourse in healthcare architecture deserves no less. It is time to fully recognize that humanist-based research in architecture for health has so much to offer societies around the globe.