

Designing for Health

// Investigating Strategies to Create Healthy People, Landscapes and Ecosystems

a Research Thesis by

Leann Andrews, RLA, ASLA, SEED

submitted in partial fulfillment of the requirements for the
Master's of Landscape Architecture Degree

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College of Built Environments
Department of Landscape Architecture

Committee Chair: Professor Daniel Winterbottom, RLA, FASLA

Committee Member: Associate Professor Nancy Rottle, RLA, ASLA

many thanks to the following for their comments, insights and support:

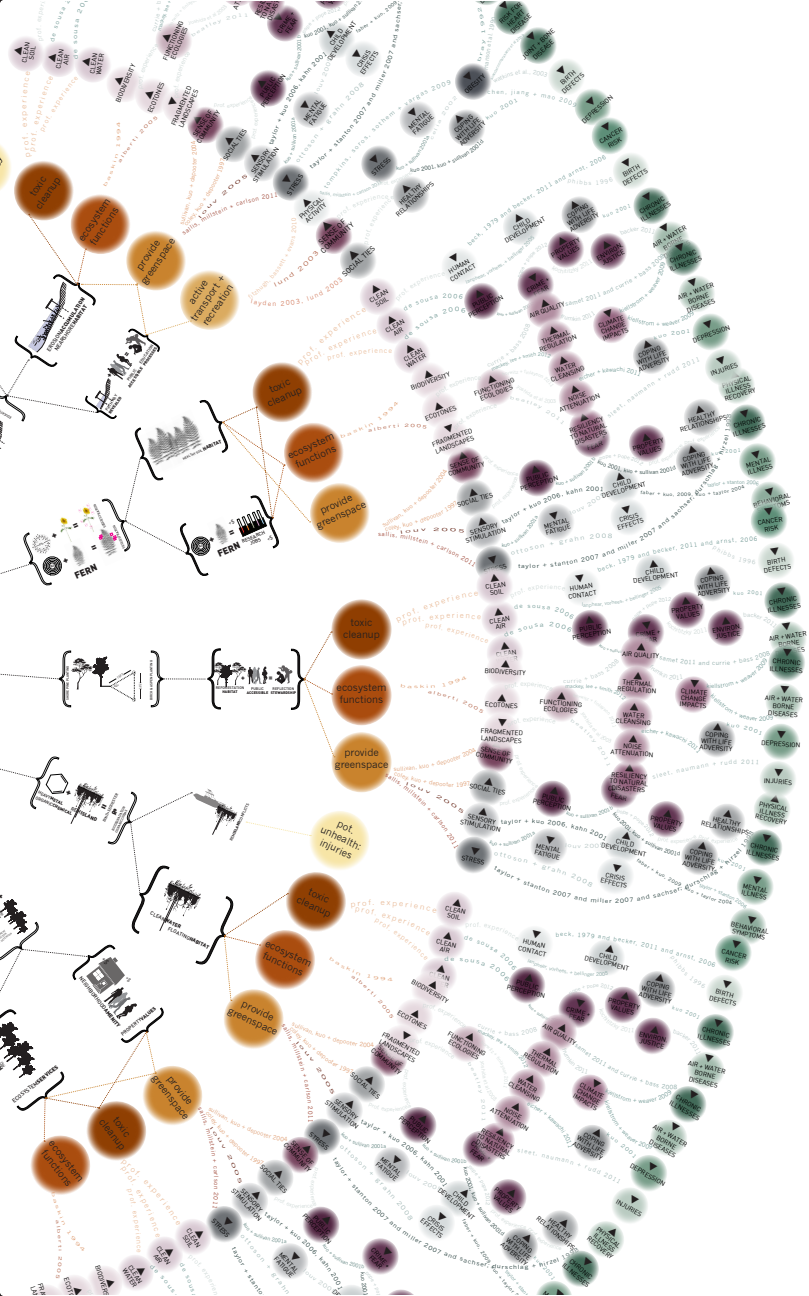
Jonathan Childers, Dr. Andy Dannenberg, Dr. Howard Frumkin, Julie Johnson, Karen Larsen, Ben Spencer, Dr. Bob Mugerauer, Dr. Fritz Wagner, Julia Walton, Dr. Thaisa Way, Barbara Wright, Dr. Ken Yocom

Abstract

This thesis explores the relationship between health and the built environment and the capacity and challenges faced by the designer to positively affect this relationship. Health is viewed in a holistic sense, understanding that economic structures, social fabrics, ecological systems, and general well-being are directly linked with physical and mental health. The hope is that an increased understanding of health consequences within the design process will achieve more comprehensive and salubrious results.

This research thesis gives a background of the relationship between health and design, identifies the potential need for a third party mediator, creates an evidence based design framework for designers to better understand the health implications of their design actions, and tests the framework on a group of landscape architecture graduate students doing their capstone project on a Superfund site outside of Portland Oregon.

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Prelude Project Abstract

This thesis explores the relationship between health and the built environment and the capacity and challenges faced by the designer to positively affect this relationship. Health is viewed in a holistic sense, understanding that economic structures, social fabrics, ecological systems and general well-being are directly linked with physical and mental health. The hope is that an increased understanding of health consequences within the design process will achieve more comprehensive and salubrious results.

This research thesis in combination with a capstone group design thesis, makes up DIG Studio. Together, DIG Studio identifies a need for design to adopt new approaches to create healthier landscapes, people and ecologies. DIG Studio is both exploring ways to embrace complexity and furthering an understanding of the health implications of design.



Abandoned brick factory, Darlington PA [Leann Andrews]

Acknowledgements

Thank you

This book was truly a collaborative effort and the input and patience of many have made this thesis possible.

A huge thank you to my committee Daniel Winterbottom and Nancy Rottle, as well as my unofficial joint advisor Thaisa Way for their flexibility, patience and open minds in helping me navigate through a unique joint capstone-thesis project fairly unscathed. Collectively you've stretched my brain to the hurting point, and for that I'm grateful.

Thank you to the other half of DIG Studio, Jordan Bell, Tera Hatfield and David Tomlinson for being my guinea pigs and (seemingly) not getting sick of all my health lingo. Watching your curious minds unfold these past months has been a true pleasure.

I am very grateful for the many professional and academic perspectives from both the health and design worlds- Dr. Bob Mugerauer, Dr. Ken Yocom, Dr. Andy Dannenberg, Dr. Howard Frumkin, Barbara Wright, Karen Larsen, Julia Walton, Julie Johnson, and Dr. Fritz Wagner. Thank you to my student

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Thanks to Ben Spencer and Susan Bolton for getting me excited about health-design on a global scale and to the Green Futures Research and Design Lab for helping me understand the power of the research-design link.

Lastly, and most importantly, I am indebted to my personal chef / life coach / punching bag / sponsor / husband Josh Andrews for taking care of pretty much every other aspect of my life outside this thesis for six months. Your fresh perspective, humor and raw honesty has grounded this thesis and kept me (mostly) sane.

Executive Summary

Summary of Thesis

Topic of Inquiry

This thesis investigates the following questions:

- **Instead of static masterplanned 'objects' as the goal of a design, could 'health' be the goal?**
- **How might a health conversation be incorporated into the design process to increase understanding of the health consequences of design?**
- **How might research be incorporated in each successive stage of a project in order to build upon available health knowledge?**
- **How might the health dialogue continue through long-term evaluation informing insertions of adaptive interventions?**

Structure of Thesis

This research thesis works in tandem with a capstone design project by Jordan Bell, Tera Hatfield and David Tomlinson entitled DIG Studio. The capstone project is used as a tangible way to test the frameworks, research and theories investigated in this thesis. For this reason, many of the concepts explored in this thesis also appear in the DIG Studio publication and visa versa.

Summary of Thesis

Defining Health

Health is difficult to define and can be subjective. Health should be viewed in a holistic sense including economic, environmental, ecological, physical, mental, spiritual, social and civic health, implying a relationship between people, culture, landscapes and ecological systems, spanning multiple scales of personal, local and global and time frames from immediate to long term. Health is constantly evolving and difficult to predict. It requires constant evaluation and reflection against a pre-established standard best determined by all stakeholders and users of a project.

Landscapes Can Improve Health

Both the natural landscapes and the incorporation of nature and natural systems in the designed landscape are uniquely capable of providing multiple human health benefits. Through the strategic incorporation of designed nature and the preservation of naturally occurring landscapes, our landscapes have the capacity to heal.

The Built Environment and Health

The built environment greatly affects the health of people, landscapes and ecologies. It influences our exposure to harmful toxins and chemicals, our mental wellbeing and perception of the world, and impacts human behavior, choices and life opportunities that affect health. Understanding this great influence that the built environment has on health may lead to more healthful design, planning and policy-making. Evidence-based design techniques may help communicate health outcomes, while stimulating further research studies and educating those in the built environment professions of the potentials they have to influence widespread public health improvement.

Urgency and Interest

The renewed urgency and interest in health may open new market opportunities for landscape architects and other design professionals. Design, framed as preventive medicine, may be a solution to addressing the increasingly overwhelming health issues we face in today's society. Due to their combined social/ecological training, landscape architects may

be particularly situated to address these multifaceted health issues. The conversation is gaining momentum, however, and landscape architects will need to join the dialogue soon or their skills will be overlooked and replaced by other professionals.

A New Approach: Health as the Goal

Design, and particularly landscapes, have the capacity to affect health; however designers may not be fully aware of the extent their design decisions could have. These findings may identify a need for:

- **health to be (re)established as the goal of landscape design**
- **an increased understanding of health outcomes by designers**
- **a potential need for modified evidence-based research and practices in landscape design**
- **more interdisciplinary collaboration and innovation in design to address the growing health concerns**
- **more input from landscape architects in particular on health and the built environment issues and solutions**
- **a potential niche health-design profession to cross-pollinate disciplines and further results**

Health Dialogue

It is best to define health through the goals of the design project involving all stakeholders. A third party mediator may be a valuable tool to facilitate the health-design dialogue between designers, client and stakeholders, including the community. This third party 'Health Champion' could act as a translator and communicator through the design, health and community worlds, and should be knowledgeable in public health, design, policy, regulatory requirements and community engagement. This thesis explores the feasibility of such a position by acting as a Health Champion for a group of student designers working on their capstone project.

Developing a Health Framework

To explore the idea that an understanding of health can contribute to better design and more salubrious results, this thesis develops a framework that designers could move through to understand design-health consequences during the design process. This thesis develops and tests 3 frameworks on the capstone group, with the last one the most successful in stimulating a health dialogue.

Testing the Framework

The capstone group tested the design-health framework on a project they were developing on the contaminated McCormick and Baxter brownfield in the Port of Portland Superfund site, in Portland OR. The design explored ways to harness natural processes to improve the health of the landscape and greater ecological system, as well as the health and wellbeing of the people in the community. Because it is a theoretical project, many aspects of the framework were unable to be tested, however the framework was successful in instilling a health dialogue within the design process.

Understanding the Framework

This thesis examined the results of the framework in the design outcome, displaying an application of the health dialogue theory on a design in a graphic and visual way.

A New Approach: Health Within the Design Conversation

By testing the health framework on a university design project, the role of the Health Champion, and the feasibility of the framework was explored. The findings have identified a need for:

- **health goals to be defined by all stakeholders**
- **a 3rd party Health Champion to help navigate and communicate between health and design professionals, as well as stakeholders and the public**
- **a framework to guide designers and help them understand the health consequences of their design actions**
- **further dialogue centered around health in design**

A Need for Health Research and Evaluation

The growing health-design interest may follow a similar pathway as the sustainability movement. Tools could be developed to help designers understand and predict potential health outcomes. Projects may incorporate monitoring and research to determine design-health results. Eventually, tools and frameworks may disappear and a health focus in design could become the new 'norm'.

Complete Health Research and Feedback

To maximize understanding of health outcomes, research should occur in every stage of the project, from existing conditions analysis to post construction monitoring. The value of full project research and evaluation lies in an honest design-research feedback loop.

Evaluation Precedents

There are many existing tactics and tools for predicting and determining outcomes in the built environment. This thesis lists a selection of methods for existing data collection, tools to predict potential outcomes during design, tools for evaluation of outcomes, and precedents for qualitative evaluation.

Testing the Health Research Process

Using the capstone project as a tangible example, this thesis runs through a scenario of evaluation in each successive step of the project. Visual complexity diagrams communicate the breadth of the research-design process. A health-design-research actor network diagram communicates the challenges in communication among the varying professionals.

A New Approach to Incorporate Complete Health Research

Research can be highly complementary to design practices, and a health-research-design feedback loop may be valuable in advancing both the health and design professions. These findings may identify a need for:

- **complete health research in each successive stage of the project**
- **the inclusion of non-quantifiable or even non-measurable factors such as emotion or creativity alongside logic and science**
- **professionally shared outcomes to expand the already growing body of research in health and the built environment**
- **funds to be allocated in every public design project for research for the full life of the project in order to maximize and prioritize understanding health outcomes**

Adaptive Interventions

This thesis explores how adaptive interventions could be utilized to steer a project towards previously established health outcomes, using the capstone project as a theoretical example of this long-term monitoring and adaptive management strategy.

Measuring Success

Adaptive interventions are only helpful if you first determine what would make the project, or outcome, successful. Parameters for success should be set based on goals established by stakeholders in the beginning of the project and revisited over time to reflect an inevitably changing community and their needs. There are various degrees of health effectiveness when it comes to decision making, balancing education and acknowledgement with actual actions taken. If monitoring results display unsuccessful results, the client/designer/site manager should intervene with a design intervention or policy to fix the issue.

A New Approach: Adaptive Interventions to Increase Health

Adaptive interventions may be an effective way to aim for successful health outcomes over time and maximize health. These findings may identify a need for:

- **defined health parameters to guide health evaluation**
- **ongoing dialogue and evaluation with client,**

community and users for periodic reexamination of health standards

- **periodic evaluation over the long-term for checkpoints on health status over time**
- **adaptive management strategies for projects involving health to intervene when outcomes steer outside the health parameters**

Summary of Concluding Thoughts

This thesis has merely brushed upon the health-design relationship, which merits significant further attention. A few concluding thoughts have emerged from the process of working with the capstone group of designers and examining the outcomes and conversations along the way:

- **today's designers don't really talk about health**
- **health is extremely complicated and there is not enough research available on health impacts of the built environment**
- **healthful design should occur beyond medical institutions; we all need health**
- **an interdisciplinary approach is needed however communication barriers between professions need to be addressed**
- **to appeal to the design market, health should be generative, inspirational, accessible, and enjoyable**

Terminology

Definitions + Abbreviations

Used in this Thesis

ADAPTIVE MANAGEMENT

The practice of allowing flexibility and growth in design, monitoring periodically, and intervening when necessary

ADHD

Attention Deficit Hyperactivity Disorder

BIOPHILIA

The instinctive bond between human beings and natural systems (Wilson, 1984)

BROWNFIELDS

Abandoned or underutilized industrial and commercial facilities often contaminated with toxins left over from prior industrial use (US EPA, 2006)

BUILT ENVIRONMENT

Consists of our surroundings that are designed, created and maintained by humans and includes buildings, neighborhoods, plazas, playgrounds, roadways, parks and their supporting infrastructure (Dannenberg et al., 2011)

CERCLA

Comprehensive Environmental Response, Compensation and Liability Act

COMBINED SEWER SYSTEMS

Single pipes that handle both sewage and urban runoff from streets and roofs

CSO

Combined Sewer Overflow; an event that occurs when combined sewer systems carry loads that exceed the maximum limits of wastewater treatment plants and discharge untreated storm and wastewater to nearby bodies of water (United States, 2004)

ECOLOGICAL DESIGN

Design practice that aims to improve upon biological integrity by proposing design interventions that address human needs while supporting the health of natural systems (Rottle + Yocom, 2011)

ECOPSYCHOLOGY

Examines the psychological, spiritual and therapeutic aspects of human-nature relationships (Doherty, 2010)

ECOSYSTEM SERVICES

The human benefits of ecological systems including economic, health, social, and cultural benefits

ECOTHERAPY

Also known as Nature Therapy; seeks to use human exposure to nature as a viable treatment strategy for mental, physical and behavioral health problems (Wolsko + Hoyt, 2012)

EBD

Evidence-Based Design; the process of basing decisions about the built environment on credible research to achieve the best possible outcomes (The Center for Health Design, 2008)

EBPH

Evidence-Based Public Health; the incorporation of scientific evidence in selecting and implementing large-scale programs and policies (Baker et al., 2011)

EBM

Evidence Based Medicine; the systematic process of evaluating scientific research that is used as the basis for clinical treatment choices (Claridge + Fabian, 2005)

EDRA

Environmental Design and Research Association

EIS

Environmental Impact Statement

EPA

Environmental Protection Agency

GFL

Green Futures Research and Design Lab; University of Washington

GREEN INFRASTRUCTURE

Term used to describe the layers or systems of designed

nature that have widespread environmental and public health benefits (Rottle + Maryman, 2012)

HEALTH

Definition is personal and subjective. Various formal definitions are below:

Webster Dictionary: free from illness, injury or pain

World Health Organization: state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity

Johannes Bircher: a dynamic state of wellbeing characterized by a physical, mental and social potential, which satisfies the demands of a life commensurate with age, culture and personal responsibility

Working Thesis Definition: health should be viewed in a holistic sense including economic, environmental, ecological, physical, mental, spiritual, social and civic health, implying a relationship between people, culture, landscapes and ecological systems and spanning multiple scales of personal, local and global.

HEALTH CHAMPION

A third party mediator (either one person or a neutral organization) that acts as a translator and communicator through the design, health and community worlds. Ideally a designer who is knowledgeable in public health, policy and regulatory requirements or visa versa

HEALTH FRAMEWORK

A guide that a design team moves through to make the connections between their design interventions and their effects on both individual and community health

HERL

Human Environment Research Laboratory; later became the Landscape and Human Health Laboratory; University of Illinois

HIA

Health Impact Assessment

HINTS

Human Interaction with Nature and Technological Systems Lab; University of Washington

INDUSTRIALLY-MODIFIED SITES

Sites characterized by instances of "other" where conventional ecological disturbances have been coupled with industrial disturbances, producing new ecologies, indeterminate boundaries and unreferenced geographies, often resulting in noxious, insalubrious economic and social epidemics (DIG Studio, 2012)

LAF

Landscape Architecture Foundation

LEED

Leadership in Energy and Environmental Design

LEED-ND

LEED Neighborhood Development

MIASMATIC THEORY

The idea that unhealth emerges from the landscape; practiced from about 1840 to the 1880s by sanitarians and planners (Tesh, 1995)

MYCOREMEDIATION

The use of fungi to remove contaminants (Stamets, 2005)

NATURE DEFICIT DISORDER

Describing the human costs of alienation from nature (Louv, 2009)

NEPA

National Environmental Policy Act

NO CHILD LEFT INSIDE ACT OF 2008 AND 2009

Legislative movement advocating for funding and curriculum changes to include environmental education in school systems (Benbow and Camphire, 2008)

PREVENTIVE MEDICINE

A branch of medical science dealing with methods of preventing the occurrence of disease (Merriam-Webster). Because of its enormous influence on human health, design

could be viewed as a form of preventive medicine (Frumkin, 2011)

PHYTOREMEDIATION

The use of plants to remove contaminants (Arthur et al., 2005)

RUSTBELT

The geographic and cultural area extending from Chicago to Pittsburgh and swinging up to Buffalo which has been in continual economic decline over the past 30 years due to globalization of the steel and automotive industries ("Rustbelt", 2003)

SEED

Social Economic Environmental Design

SGF

Seattle Green Factor

SITES

Sustainable Sites Initiative

SUPERFUND PROGRAM

Prioritized brownfields that are particularly hazardous to human health; a cleanup fund established by CERCLA in 1980 (US EPA, 2012a)

UNHEALTH

Lacking health. See definition of 'health'.

VIBI

Vegetated Index of Biological Integrity

WHO

World Health Organization



Author's Note

Project Background

It is important to note, that this thesis exploration was not conceived because of a familiarity with concepts of health, but rather an intimate understanding of unhealth and its damaging intertwined relationship with the built and natural environment.

It sprung from witnessing the destruction of neighborhood identity and family relationships caused by foreclosed houses, and a degraded community-wide attitude from living in landscapes full of toxic economic graveyards. It spurs from feeling powerless and heartbroken watching mountain top removal and fracking transform a hometown beyond the recognizable, and experiencing fear trigger survival instincts when trying to fall asleep next to crime ridden junk yards and abandoned factory buildings. It developed from the realization that environmental degradation and pollution disproportionately affect the poor and voiceless all around the globe. It comes from the unsettling disconnect between the physical and emotional 'home', from navigating through the designed world harboring a chronic illness, and witnessing friends, family and coworkers slip into depression, addictions, physical and mental illnesses, and even suicides from being trapped in their circumstances.

We all have our complex issues to deal with on a daily basis. This thesis argues that our surroundings shouldn't make those worse. In fact, our environment should help us navigate through these tough circumstances, offering resilience and inspiration, so we can thrive as healthy and happy human beings and inhabitants of this earth.

HEALTH AS THE GOAL
DEFINING AND AIMING FOR HEALTH IN DESIGN

Introduction

“Health is not just a term to be defined. Intuitively, if we have lived at all, it is something we seek and value”

~Daniel Callahan

Health as the Goal

Why is health so important? A deep biological yearning for survival drives our need to be healthy as a species. But this instinct does not always overrule our desire or ability to be healthy, regardless of our genetic predispositions.

Health is often misunderstood as being a direct result of genes and behavior choices. We often believe that our everyday actions will directly correlate with health outcomes.

If you eat your carrots, you will have good eyesight.

Unfortunately, health is much more complex than a simple “do this and get that” philosophy. It is true that carrots contain Vitamin A which strengthens eye tissue and is important in eyesight maintenance, however you could eat carrots every day, but if your job forces you to stare at a computer screen for 8 hours straight, or you are always driving at night because of your family schedule, your eyesight

might still degrade. Furthermore, if you have a low socioeconomic status, or do not have convenient access to healthy food stores, you are not able to buy the carrots or other food options necessary to strengthen your eyes. For these reasons, health can often be seen as a symbol of control, power and accomplishment, which is evident in the physical environment we live in.

The effect of the built environment on health is just as complex, if not more, than dietary choices. Just because your neighborhood has a sidewalk and tree lined streets does not mean that you are necessarily going to walk every day and maintain a healthy weight, thwarting off diabetes and heart disease. It might, however, mean that the environment is not getting in the way of desires or abilities to be healthy, and in fact might help to inspire healthy choices.

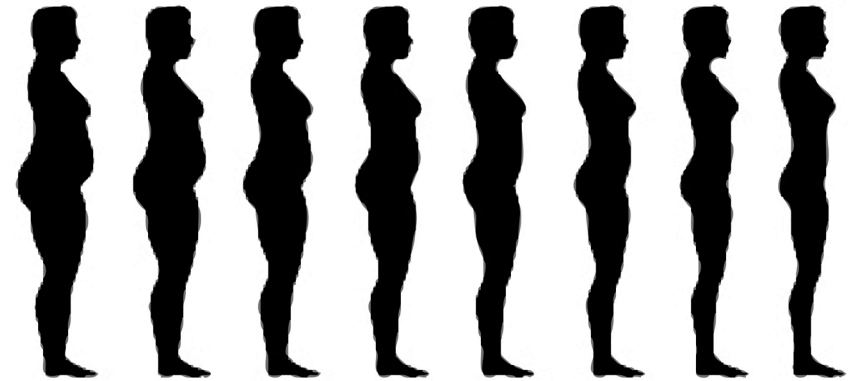
The following pages explore what health is, the relationship between health and the physical environment and how this relationship fits into design practices. This section asks the question:

Instead of static masterplanned ‘objects’ as the goal of a design, could ‘health’ be the goal?

Defining Health

Varying Perspectives

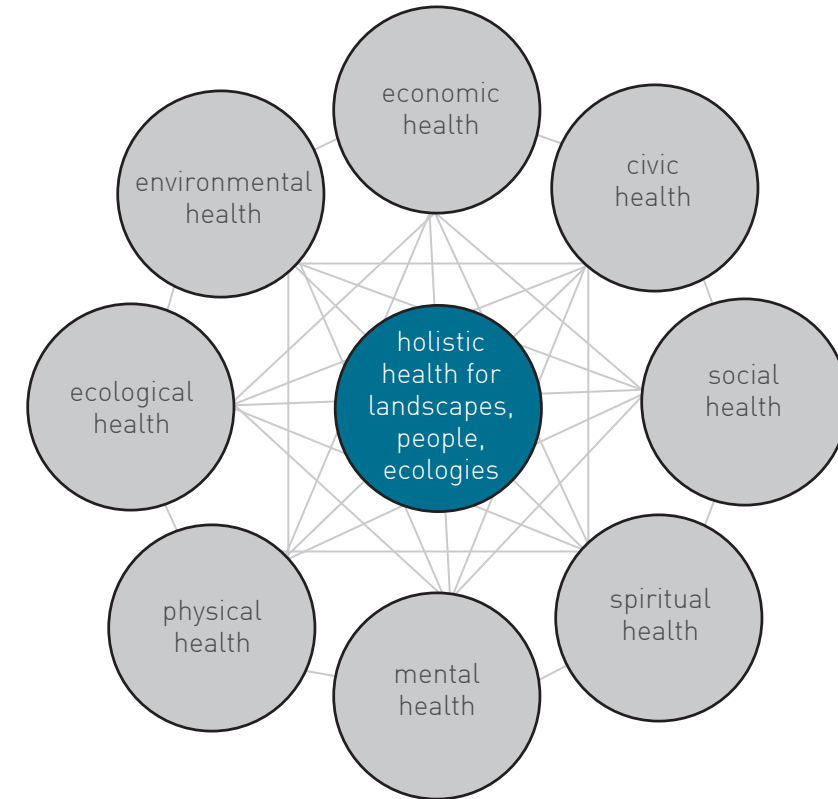
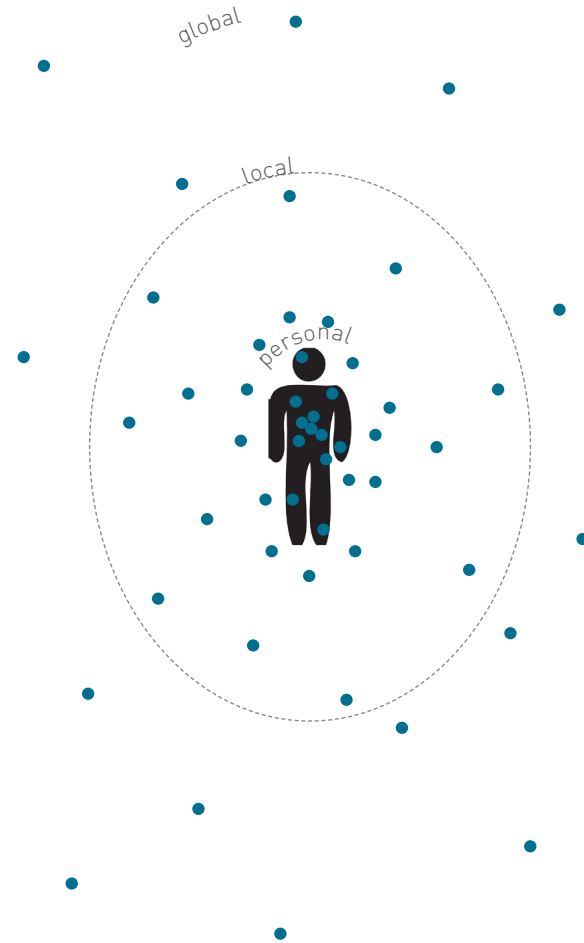
Webster defines *health* as “free from illness, injury or pain.” The World Health Organization (WHO) expands this definition to the “state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (WHO, 1946), implying a relationship between a functioning body and personal happiness. Johannes Bircher, in response to global health practices, allows for an individual health value system based on culture, age, and life values in his definition “a dynamic state of wellbeing characterized by a physical, mental and social potential, which satisfies the demands of a life commensurate with age, culture and personal responsibility” (Bircher, 2005). As the definition of health continues to evolve it becomes clear that health can be subjective. Cultural acceptance, geographic conditions, personal standards, and clinical diagnoses may all influence how one views his or her health and wellbeing.



Health Entanglement

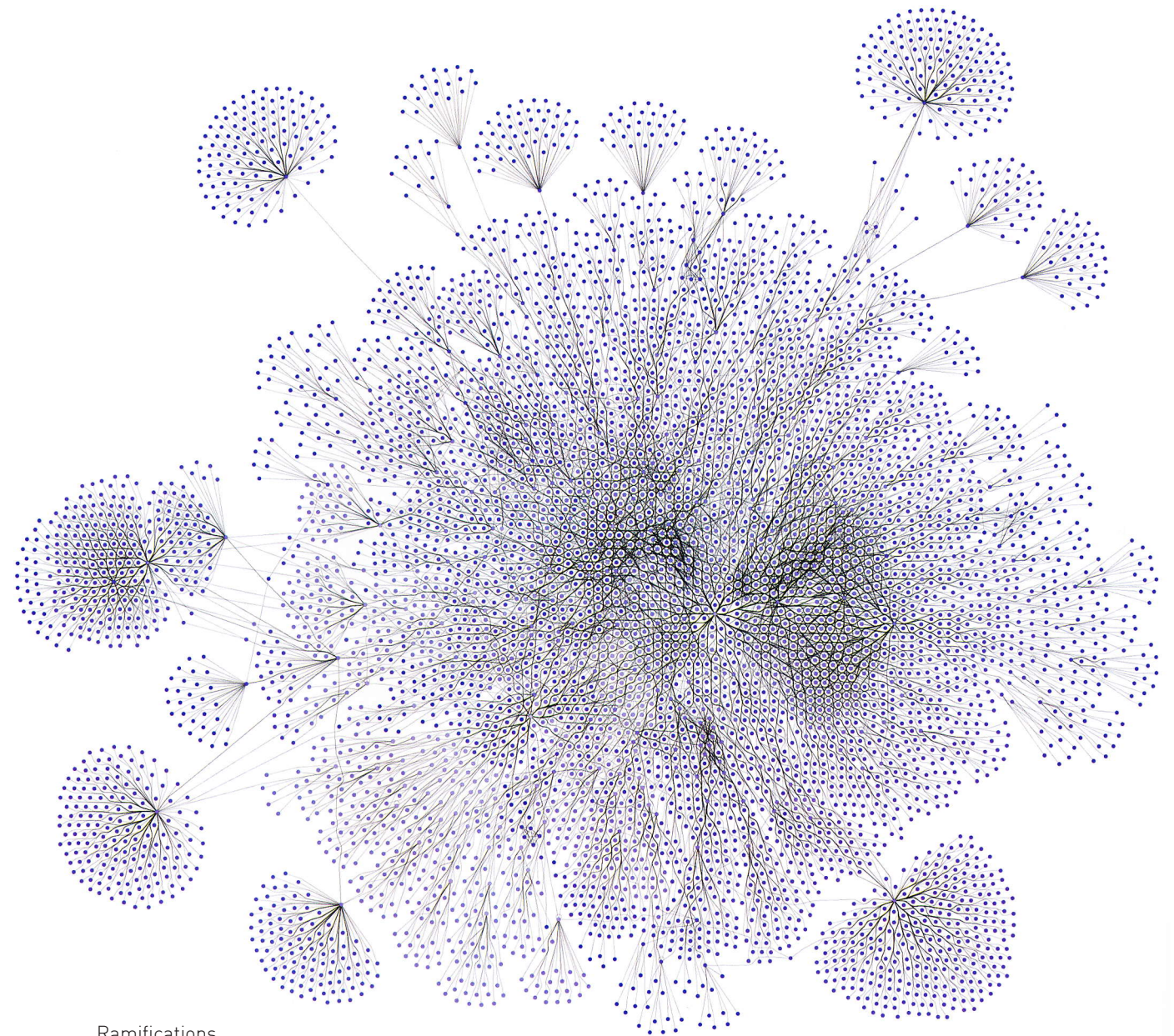
WHO's and Bircher's views of health magnify beyond one's personal state and imply a connectedness to external factors, such as social systems. Many, if not all aspects of life influence one's ability to be healthy. For example, a person's inability to afford medicine may transform a common illness into a long term battle for survival. The struggle with illness may affect relationships with family and friends, and in turn his or her financial and mental support system. If his or her house lacks tree cover protection or he or she cannot afford air conditioning in a heat wave, he or she may heal more slowly or develop further illnesses that may exacerbate his or her condition.

For these reasons, health should be viewed in a much more holistic sense, understanding that economic systems, social fabrics, ecological function and general well-being are directly linked with physical and mental health. This holistic view of health implies a relationship between people, landscapes and ecological systems, and understands that health spans multiple scales of personal, local, and global.



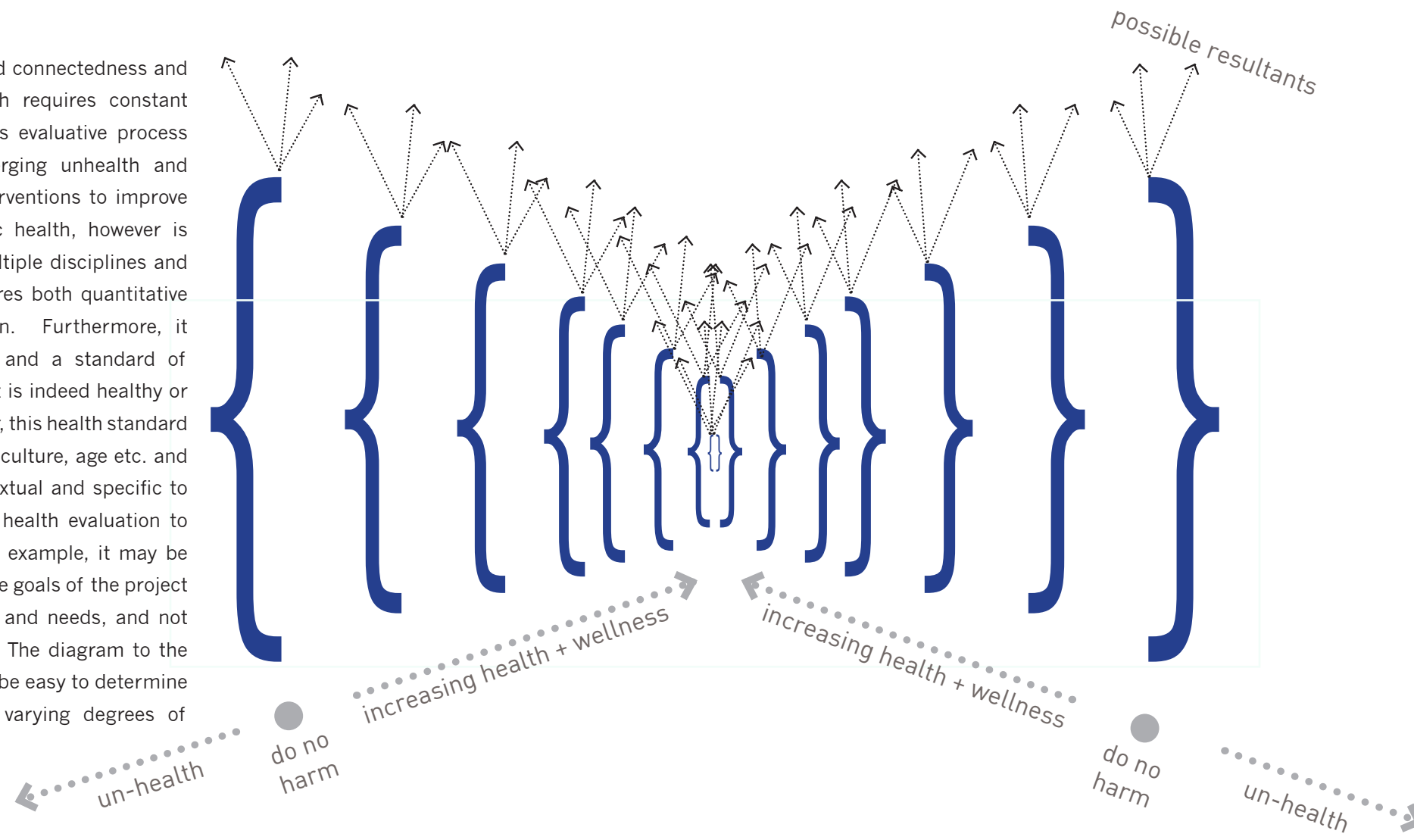
Health Complexity

Health is constantly evolving and is difficult to predict. Mapping out past health relationships is significantly easier than the current state due to the reliability of retrospective analysis. Nonetheless, a general understanding of how the various aspects of health are connected will help determine what solutions may have the greatest overall positive effects.



Ramifications
[yWorks, yFiles Visualization]

Because of its deep intertwined connectedness and expansive ramifications, health requires constant evaluation and reflection. This evaluative process is necessary to identify emerging unhealth and problem solve for positive interventions to improve health. Evaluation of holistic health, however is not an easy task. It spans multiple disciplines and bodies of knowledge. It requires both quantitative and qualitative data collection. Furthermore, it requires baseline perspective and a standard of comparison, to determine what is indeed healthy or unhealthy. As mentioned earlier, this health standard is often personalized based on culture, age etc. and so therefore needs to be contextual and specific to the situation. When applying health evaluation to the design of a landscape, for example, it may be best to define health through the goals of the project involving community desires and needs, and not simply a regulatory standard. The diagram to the right displays that while it may be easy to determine what is un-health, there are varying degrees of health standards.



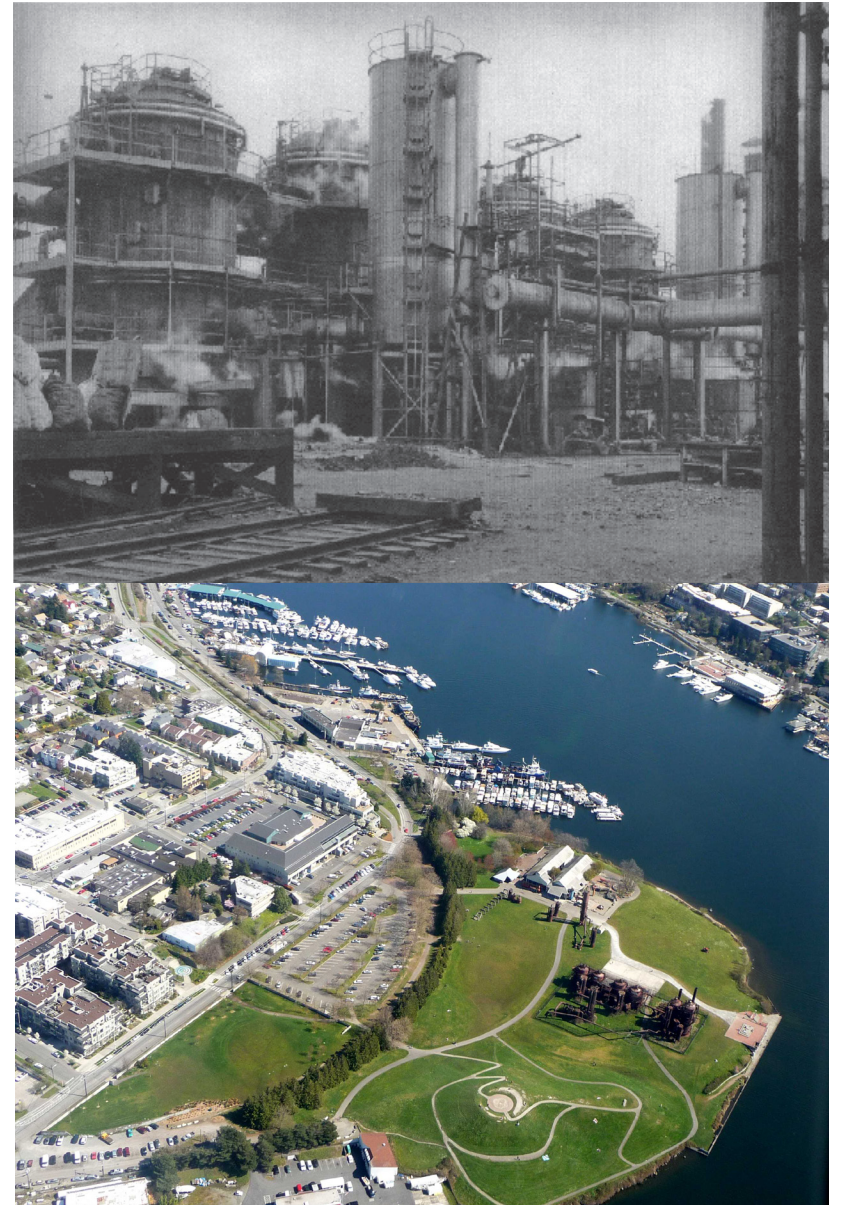
Defining Health in Landscape Design

Landscapes can be indicators of health. Because they are imprinted by cultural desires, economic conditions, natural processes and human impact throughout history, they are both time capsules and barcodes suggesting health and unhealth. Landscapes can also influence health. They can regulate local climate and property values. They can provide resilience or hazard to natural disasters and can facilitate social bonding. They can provide clean air, water, soil and food, and can inspire mental wellbeing and positive perception.

Because of this, design of our landscapes may be particularly influential to holistic health. A goal of health can only be reached with a clear definition, specific to local needs, in order to maximize health outcomes. Health should be defined by all stakeholders in a project, including the surrounding community, users, the client, operations and staff, and supported by applicable laws, policies or regulations.

Defining Health in Industrially-Modified Sites

Those sites and people that have been affected by industrial processes exemplify particularly dramatic health conditions. These industrially-modified sites are damaged. The damage transcends boundaries and professions through plumes of economic, social, political and environmental destruction. Toxic to itself, its surroundings and its global neighbors, industrially-modified sites often have numerous health impacts to landscapes, people and ecosystems. These residuals are often measured as isolated issues by specialized experts, causing conflicting strategies or prioritization. Unless regulated, often times the breadth of health impacts go uncalculated due to lack of funding or concern. Even if regulated, health brackets are often set to minimal lawful standards, responding to population and statistical health, and not necessarily neighborhood or individual health needs.



Gas Works Park in Seattle is an example of how a redesigned post industrial landscape along the waterfront can improve health. [Friends of Gas Works Park]

Community perception plays a big role in industrially-modified areas. Even if a site has been decontaminated, perception of unhealth reduces real estate values, increases crime, and lessens neighborhood pride, all of which affect individual and community resilience to life challenges.

Post industrial sites leave incinerating holes in the community fabric. These holes are visual reminders of economic prosperity, collapse and failure. They are cultural graveyards of past everyday life and often create physical boundaries that reduce current opportunities.

The potentials for improving industrially-modified sites and public health are great. Many post industrial sites lie along urban waterfronts, hogging prime real estate. As our cities continue to expand we are running out of land, and post industrial sites may provide inspiring opportunities for urban infill, particularly with creating publicly accessible waterfronts.



Industrially-modified sites, such as these found in downtown Cleveland, can be very damaging to holistic health [Leann Andrews]

Landscapes Can Improve Health

Health As the Goal of Designed Landscapes

Health was the motivating factor in much of nineteenth-century urban design. Frederick Law Olmsted, one of two designers of Central Park in NYC and a pioneer of the field of landscape architecture, held a dual life as a public health advisor on the U.S. Sanitary Commission. His designs, as well as the works of other designers of the time, responded to emerging medical theories that disease-laden air, or *miasma*, was produced by particular landforms, climates, and animal waste and was the source of epidemic disease that swept across the landscape (Szcajgiel & Hewitt, 1974).

Olmsted designed Central Park with the idea that the reverse was also possible- that landscapes could be crafted to reduce miasma and therefore increase health. Olmsted envisioned Central Park as a public health amenity that would provide an escape from unhealthy urban stresses, purifying air and water, improving sanitation, increasing mental wellbeing



Frederick Law Olmsted led a dual life as a landscape architect and public health advisor. [New York Public Library]

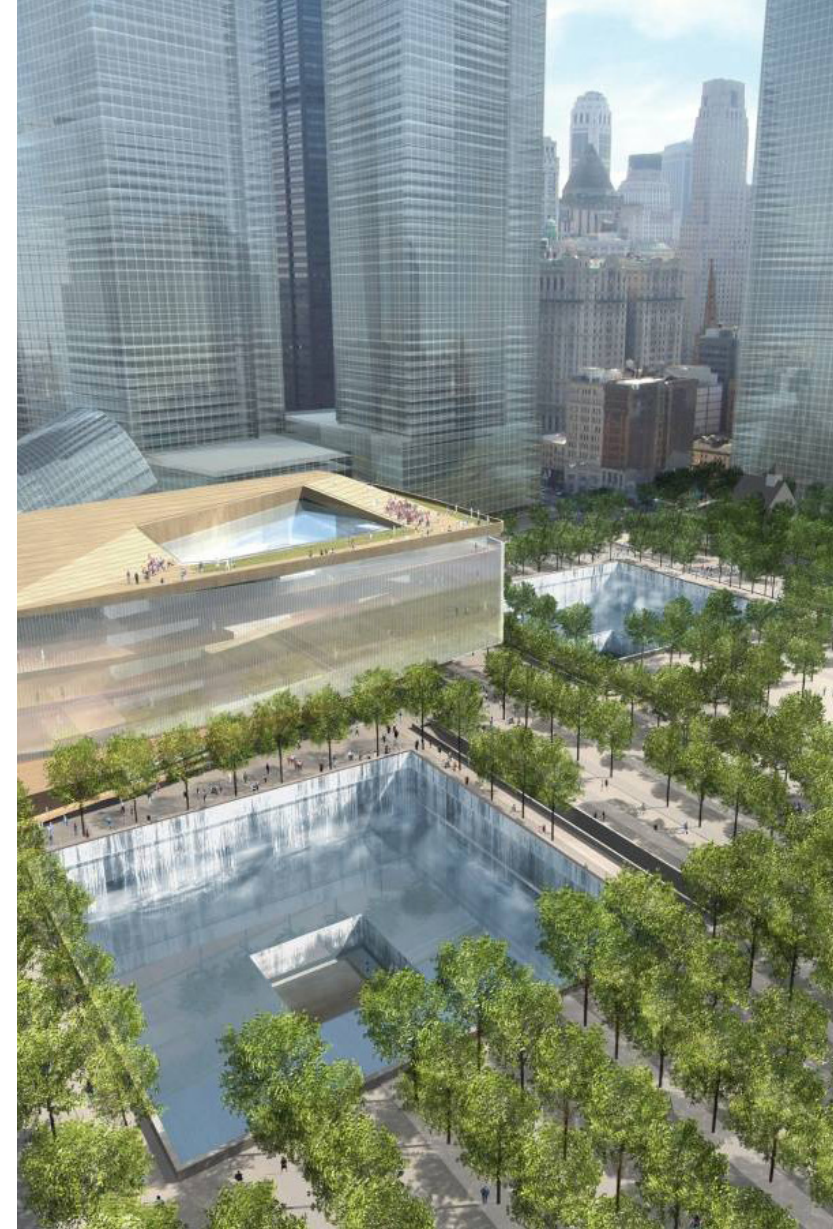


Central Park in New York City was designed with health as the goal. [personaltoursny.com]

and community pride, integrating social classes and therefore reducing discrimination and gangs, and providing a valuable outdoor space in a dense city to be used for human reflection, retreat and restoration (Szcajgiel & Hewitt, 1974). Even today, Central Park is a landscape icon of the city and a source of pride amongst New Yorkers. It is a peaceful yet stimulating oasis nestled inside a bustling metropolis, and one cannot help but feel the goal of health in its memory.

This idea that “unhealth” emerges from the landscape is referred to as the *miasmatic theory*, and was practiced from about 1840 to the 1890s. While the miasmatic theory was adopted as common practice by sanitarians and planners, it was largely discredited by the medical profession who had rechanneled the blame of disease towards the newly discovered microorganism. With these technological breakthroughs in the highly respected and influential medical profession, the miasmatic theory faded with the turn of the century and the close correlation between landscapes and health followed suit (Tesh, 1995).

While the miasmatic theory may have dwindled over the years, there are still niche sectors of the landscape profession that focus on designing with health as the goal. Healing gardens, memorials, and therapeutic landscapes are all designed with the idea that the landscape has the capacity to heal. While stories of therapeutic horticulture are sprinkled all throughout history, healing gardens regained momentum in the 1990s, with research on their effects published by the Kaplans (i.e. Kaplan, Kaplan + Ryan, 1998), Roger Ulrich (i.e. Ulrich, 1986), and other environmental psychologists. A special feature section on healing gardens in the Landscape Architecture Magazine by Molly Dannenmaier (Dannenmaier, 1995) and a popular book by Clare Cooper Marcus and Marni Barnes offering healing garden design recommendations (Marcus & Barnes, 1999) furthered the popularity. As a result, many of today’s hospitals, veterans centers, nursing homes, and outpatient treatment facilities have incorporated healing gardens into their campus designs, with the goal that these designed landscapes might quicken recuperation time, reduce stress, and improve mental health and well-being.



Design for the World Trade Center Ground Zero Memorial
[Michael Arad, Peter Walker]

Health As a Goal In Natural Landscapes

In recent years, much attention has been directed towards understanding the natural healing capabilities of nature. Because of this interest, new interdisciplinary fields have emerged, such as *ecopsychology* which examines the psychological, spiritual and therapeutic aspects of human-nature relationships (Doherty, 2010) and *nature therapy* or *ecotherapy* which seeks to use human exposure to nature as a viable treatment strategy for mental, physical and behavioral health problems (Wolsko & Hoyt, 2012). These emerging fields have developed a lexicon to communicate with newfound precision the relationship between humans and their natural surroundings. Terminologies such as *biophilia*, the instinctive bond between human beings and natural systems (Wilson, 1984), and *nature deficit disorder*, describing the human costs of alienation from nature (Louv, 2009) have emerged to communicate this breadth of research on humans and nature.



With rapid urban expansion and sprawl threatening our natural landscapes, increased leisure time spent in the digital and televised world, and decreased funding in school systems for outdoor education, researchers have taken an interest in understanding the benefits of nature to influence policy and protection of natural landscapes. The Human Environment Research Laboratory (HERL) at the University of Illinois, directed by researchers Frances Kuo, William Sullivan and later Andrea Faber Taylor, has firmly established a relationship between the presence of nature and greenspace to stronger, safer, and healthier communities and individuals. The HERL has discovered that nature may increase a sense of community (Sullivan, Kuo & DePooter, 2004), strengthen neighborhood social ties (Coley, Kuo & Sullivan, 1997), decrease crime and fear (Kuo & Sullivan 2001) and may promote healthy child development (Taylor & Kuo, 2006). The HERL, which later became the Landscape and Human Health Laboratory, has discovered that children with Attention Deficit Hyperactivity Disorder (ADHD) have reduced symptoms when engaged with nature (Faber & Kuo, 2009 and Kuo + Taylor, 2004).

Novelist Richard Louv has taken this research one step further, and hypothesized the negative health effects on children not being engaged with nature, a term he coined *nature-deficit disorder* (Louv, 2005). Later Louv expands this concept to argue that a strong connection to nature is essential for all human health, boosting mental acuity, building smarter economies, and strengthening human bonds (Louv, 2011). Additionally, Peter Kahn, director of the Human Interaction with Nature and Technological Systems (HINTS) Lab at the University of Washington, has explored how degradation of nature and modern technological and societal advances has affected human experience (Kahn, 2011) and child development (Kahn, 1999). The combined influence of these literary findings have led to the formation of the No Child Left Inside Coalition, and legislative movements proposing the No Child Left inside Act of 2008 and 2009, advocating for funding and curriculum changes to include environmental education in school systems (Benbow & Camphire, 2008).



Bridal Veil Falls, WA [Leann Andrews]

Harnessing Health In Natural Landscapes To Apply To Designed Landscapes

With over 50% of the world population living in cities (United Nations, 2007), urban areas are expanding at a rapid rate, consuming natural resources and transforming the texture of urban and suburban areas to that of concrete, brick and asphalt. Urban planners around the world are developing conservation plans and greenspace visions for their cities to preserve the few natural ecosystems remaining. This attention towards urban ecology paralleled with the onset of the 'green' sustainability movement in the past decade has researchers and designers addressing the human benefits of designed nature in their work.

The term *green infrastructure* is often used to describe the layers or systems of designed nature that have widespread environmental and public health benefits. Green infrastructure includes design interventions such as street trees, wetlands, daylighted streams,

urban forests, bioswales, raingardens, green roofs and walls, and even simulated nature such as permeable pavement (Rottle & Maryman, 2012). The incorporation of green infrastructure into the landscape architecture and planning professions has sparked a new design interest, *ecological design*. Ecological design aims to improve upon biological integrity by proposing design interventions that address human needs while supporting the health of natural systems (Rottle & Yocom, 2011). Additionally, research areas such as *phytoremediation*, the use of plants to remove contaminants (Arthur et al., 2005), and *mycoremediation*, the use of fungi to do the same (Stamets, 2005) have grown exponentially in the past few years, discovering further ways to employ nature to improve human health.

Reacting to the popularity of Leadership in Energy and Environmental Design (LEED) certification, and the Sustainable Sites Initiative (SITES), designers are looking to harness the health benefits of natural landscapes by incorporating them into designed landscapes, and communicating those results to their clients. These benefits, referred to as *ecosystem*



Living wall on Qui Branley Museum, Paris
[Gilles Clément and Patrick Blanc]

services, have inspired studies that examine the effect designed nature has on improving air quality (Currie & Bass, 2008 and Buccolieri et al., 2009), thermal regulation (Bass, 2007 and Mackey, Lee & Smith, 2012), economic health (American Rivers et al., 2012, Thurston, 2012 and Wolf, 2007), social health (Peters, Elands & Buijs, 2010 and Sullivan, Kuo & DePooter, 2004), safety (Macdonald, 2008 and Johnson, 2008) and academic and workplace performance (Matsuoka, 2010 and Kaplan, 1993). When viewed at a much larger scale, designed nature in our cities could reduce the harmful health impacts of climate changing conditions (Frumkin, 2011).

Conclusion: Landscapes Can Improve Health

In sum, both the natural landscapes and the incorporation of nature and natural systems in the designed landscape are uniquely capable of providing multiple human health benefits. Through the strategic incorporation of designed nature and the preservation of naturally occurring landscapes, our landscapes have the capacity to heal.



The Built Environment and Health

The Built Environment Can Affect Health

Most people spend virtually every minute of every day moving through different aspects of the built environment. The *built environment* consists of our surroundings that are designed, created and maintained by humans and includes buildings, neighborhoods, plazas, playgrounds, roadways, parks, and their supporting infrastructure. In their book, [Making Healthy Places](#), editors Andrew Dannenberg, Howard Frumkin and Richard Jackson discuss how the built environment profoundly affects physical, mental, social, environmental and economic health and wellbeing (2011). Although often overlooked in medical practices because of its difficulty to assess, the built environment can heavily influence human behavior, daily choices, and life opportunities that may lead to healthy or unhealthy living. Because of its enormous influence on human lives, a mindfully, healthfully designed, planned and operated built environment could even act as a form of widespread preventive medicine for unhealth

of all forms, halting some diseases, illnesses and disabilities long before they even come to fruition (Frumkin, 2011).

The built environment can positively affect the way we lead our lives. For example, the built environment can influence how much physical activity we have the opportunity to engage in, and therefore prevent numerous physical and mental health conditions. The inclusion of bike trails, sidewalks, and parks in neighborhoods provides for more opportunities to exercise than those that lack these amenities (Sallis, Millstein & Carlson, 2011). Access to healthy food options such as grocery stores, farmers markets, and community gardens in our neighborhoods may provide for healthier food choices, shrinking our body masses and the probability of getting diabetes (Cannuscio & Glanz, 2011). Reducing air pollution through carefully designed roadways and alternative transportation options may reduce the effects of asthma and the risk for lung or other chronic diseases (Samet, 2011). Injuries, one of the major causes of death, may be prevented through modifications of the environment to reduce risk and increase safety,

such as safe crosswalks or pedestrian/vehicular buffers (Sleet, Naumann & Rudd, 2011). The design of the built environment can impact how storm and wastewater flows throughout a community and how pollutants impact critical ecosystems and the food we consume. By designing our communities with the proper infrastructure to reduce mold, flooding, and exposure to fecal matter, we can reduce air and waterborne diseases, and ecological degradation (Backer, 2011). Public spaces, community centers and parks may draw people together and thus support the development of social ties and enhance the development of social capital, supporting mental health and well-being (Eicher & Kawachi, 2011). Schools, hospitals, workplaces, homes and other buildings can all be designed with proper air circulation, temperature, sunlight and without exposure to chemicals to positively influence how our bodies can cope with mental and physical illnesses.

Conversely, the built environment can also have powerful negative health consequences, especially for vulnerable populations, such as those with underserved attributes (i.e. age and disability) and social constructs (i.e. race, ethnicity and poverty). Environmental exposures such as unsafe housing, incomplete transportation systems, or inaccessible buildings may create adverse health affects, specifically for those who do not have the economic or social structures to offer alternative opportunities (Kochtitzky, 2011). Noisy, crowded and dangerous places may have negative mental and psychological health impacts such as stress, anxiety disorders, depression, and even violent behavior (Sullivan & Chang, 2011). Lastly, the strength and redundancy of ecological and man-made infrastructure present in a community may play a large part in the resiliency to natural disasters. Disasters that hit neighborhoods with poor preparedness planning, ecological and building design, and weak social networks may damage the community past the point of recovery (Beatley, 2011).



Singapore's EDITT Tower uses the built environment to rehabilitate a damaged urban landscape + promote health + wellbeing [T R Hamzah & Yeang]

The Built Environment Can Be Toxic

While many aspects of the built environment heavily influence healthful human behavior, choices, and opportunities, a few aspects of the built environment are dramatically damaging to human health. Two such examples of toxic aspects of the built environment are below.

In the late 19th and early 20th centuries, cities in the United States laid down public infrastructure to solve major health problems such as disease epidemics caused by on-site waste. To save cost and building materials, many cities built *combined sewer systems*, single pipes that handle both sewage and urban runoff from streets and roofs. The infrastructure planners and engineers at the time over designed these system to capture three to five times the average dry weather flows, however rapid urban expansion and an increase in urban density and impermeable surfaces has caused these systems to carry loads that exceed the maximum limits of wastewater treatment plants, discharging untreated

storm and wastewater, or *combined sewer overflows* (CSOs) to nearby rivers, streams and lakes (United States, 2004). The pollution caused by CSOs has destroyed many aquatic ecosystems, decreasing fish consumption and markets, and causing many public waters and beaches to be unsanitary for public use.

Around the same time, the industrial boom of the early 1900's created great economic opportunities. The urban landscape was dotted with thriving factories, refineries and worker housing and industrial transportation systems were flourishing. Today, American cities have undergone a dramatic spatial transformation. With de-industrialization, urban sprawl, 9/11 recovery and the mortgage housing crisis, cities are experiencing incinerating holes in their urban fabric. These abandoned land scraps are cultural graveyards, toxic urban waste, and breeding grounds for crime. The rustbelt in particular, extending from Chicago to Pittsburgh and swinging up to Buffalo, has been in continual economic decline over the past 30 years due to globalization of the steel and automotive industries ("Rustbelt", 2003). *Brownfields*, abandoned or



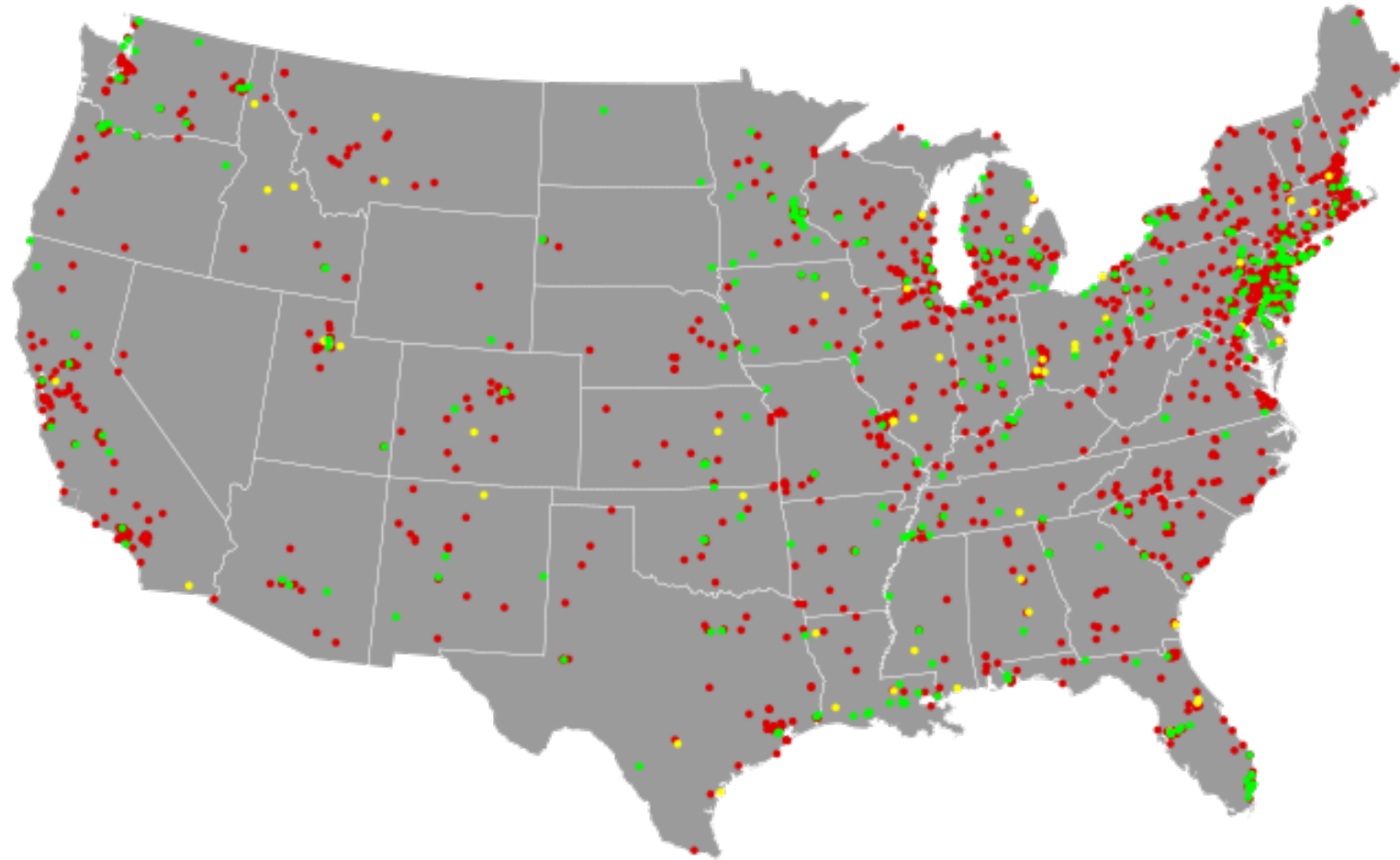
850 billion gallons of untreated sewage enters our waters nationwide from CSOs. [StokeReport.com]



Abandoned brick factory in my hometown, South Beaver Twp, PA. [Leann Andrews]

underutilized industrial and commercial facilities, are often contaminated with toxins left over from prior industrial use (U.S. EPA, 2006). Those brownfields that are particularly hazardous to human health are placed in the prioritized *Superfund* program, a cleanup fund established by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (U.S. EPA, 2012a). The Superfund cleanup program was established in response to the environmental tragedy of Love Canal, where hazardous waste leaching from a buried industrial landfill was suspected to be the cause of numerous cancers, birth defects, chronic illnesses and deaths (Beck, 1979).

Over 770 U.S. cities spew 850 billion gallons of untreated sewage each year due to combined sewers overflows (US EPA, 2012c). There are 40,000 Superfund sites, 1,000 of which are on the National Priority list, (US EPA, 2012b) and an estimated 450,000 brownfields across the country (US EPA, 2011). These toxic aspects of the built environment may have serious consequences to human and environmental health.



EPA Superfund Site Status Map, March 2010, displaying the 40,000 toxic Superfund sites sprinkled throughout the country. Red dots are established National Priority Sites, yellow are proposed, and green are sites that have already been cleaned up. [US EPA]

Evaluating And Applying Health To The Built Environment

In the healthcare industry, the growing practice of *Evidence-Based Design* is based on the understanding that healthcare buildings play a key part in health outcomes. Evidence Based Design (EBD) is described as “the process of basing decisions about the built environment on credible research to achieve the best possible outcomes” (The Center for Health Design, 2008). By linking design decisions to key performance outcomes that have been systematically and professionally assessed, the architect can maximize building function, and therefore health outcomes (Harris et al., 2008). EBD ideas are closely linked to the growing practice of *Evidence Based Medicine*, or the systematic process of evaluating scientific research that is used as the basis for clinical treatment choices (Claridge & Fabian, 2005). Very similar to the practice of law, Evidence Based Medicine looks at precedent studies and results to diagnose and treat current patients.

Although it can be applied to all types of design, EBD is rarely practiced outside the design of hospitals and other medical facilities. Design professionals typically depend on intuition and personal project experience to make design choices. However, with advancements in modeling software, an increased interest in LEED and sustainability projects, paired with hard budgetary times, a form of EBD is beginning to be used as a tool for designers to justify costs to their clients (Brandt, Chong, & Martin, 2010). For example, a designer might incorporate solar panels within their design, model how long it will take for them to pay for themselves and the amount of carbon saved, and look at examples of other studies that have documented the savings by solar energy. Additionally, the Landscape Architecture Foundation (LAF) has recently started a collection of case studies on actual landscape performance, which in the future may be used by design professionals as “evidence” (Landscape Architecture Foundation, 2011). While the current definition of EBD relies on published and peer-reviewed scientific research, these techniques of software modeling and case studies may be better suited as evidence in the

design profession (Francis, 2001). In their book, *Design Informed: Driving Innovation with Evidence-Based Design*, Robert Brandt, Gordon Chong, and Mike Martin argue that EBD is the best way to achieve design excellence, and could radically shape the architecture of the future (2010). Although it shows much promise, the use of EBD by designers, and even more specifically landscape architects, has largely been untouched outside the hospital industries.

While not as readily utilized in the design industry, the public health and planning industries are leading the evidence-based initiative in the built environment. *Evidence-Based Public Health (EBPH)*, or the incorporation of scientific evidence in selecting and implementing large-scale programs and policies, is being fueled by public concerns that intervention decisions are often based on perceived short-term opportunities at a high societal cost and a low health return (Baker et al., 2011). Tools such as a *Health Impact Assessment (HIA)* are beginning to be used by planners and public health officials to assess the potential health outcomes of proposed projects

and policies. HIAs pair science with professional experience to visualize the best possible health outcomes for a project or policy. While HIAs can yield valuable recommendations to maximize health outcomes in the built environment, they can be quite costly and, because they are voluntary in the United States, financial interests and other political factors may stand in the way of recommendations being carried out in built environment design (Dannenberg et al., 2008).

Emerging trends of evidence-based practices in medicine, healthcare facility design, sustainability projects, and public health and planning may identify a need for landscape designers to adopt similar practices. Recent understanding of how design directly and indirectly affects health may also identify a need for health to be more closely incorporated into design practices. While designers are not currently trained to understand health consequences of their design decisions, an increased understanding of health outcomes may be critical to creating healthier communities and lives.

Conclusion: Smart Design of the Built Environment May Positively Affect Health

The built environment we experience in our daily lives greatly affects the health of people, landscapes, and ecologies. It influences our exposure to harmful toxins and chemicals, our mental wellbeing and perception of the world, and impacts human behavior, choices and opportunities that affect health.

Understanding this great influence that the built environment has on health may lead to more healthful design, planning and policy-making. Evidence-based design techniques may help communicate health outcomes, while stimulating further research studies and educating those in the built environment professions of the potentials they have to influence widespread public health improvement.



City Farm has a goal to transform all 80,000 vacant lots in Chicago into urban farms, improving the health of the community and landscape. [Letitia L. Star]

Urgency and Interest

In recent years, health issues in the United States have grown exponentially, grabbing the attention of the media as well as political, economic, and research professionals. Rapidly increasing mental and physical illnesses and an increased burden of healthcare costs severely degrade life satisfaction as well as social and individual wellbeing. While the United States is the 7th wealthiest country in the world (Greenfield, 2012), it only ranks 25th in the World Values Survey and the European Values Survey on happiness and life satisfaction (Pappas, 2012). Climate changing conditions will further exacerbate health issues, with increased intensity in weather and natural disasters as well as an upward creep in tropical diseases (Frumkin, 2011). Furthermore, with 12.5 million (8.1%) unemployed in (U.S. Dept. of Labor, 2012) and a staggering 49.9 million (16.3%) uninsured (U.S. Dept. of Health and Human Services, 2011), health may become an indicator of wealth and power. The health situation in the United States is reaching crisis levels, and healthcare professionals are beginning to look “upstream” to built environment disciplines to prevent disease and improve quality of life for all Americans (Jackson, 2011).

Health Realities of Today

Nearly half of Americans are living with a chronic condition (Partnership for Solutions, 2004) and a staggering \$2.3 trillion is spent on medical costs each year (Orszag and Ellis 2007). For the first time in American history, if health trends are not reversed, today’s youth could be the first generation to have a shorter average life span than their parents (Olshansky et al, 2005).

The obesity epidemic among people of all ages is astonishing. The percentage of Americans that are overweight or obese has risen from 45% in the 1960s to a staggering 67% today (CDC, National Center for Health Statistics, 2009 and Flegal 2010). In 1985 no state reported an obesity rate higher than 15%, compared to today where every state except Colorado has an obesity rate greater than 20% (CDC 2010). CDC reports a shocking 1/5 of American children are clinically obese, which is four times the amount reported in the late 1960s (Lumeng, 2005). Obesity has been known to lead

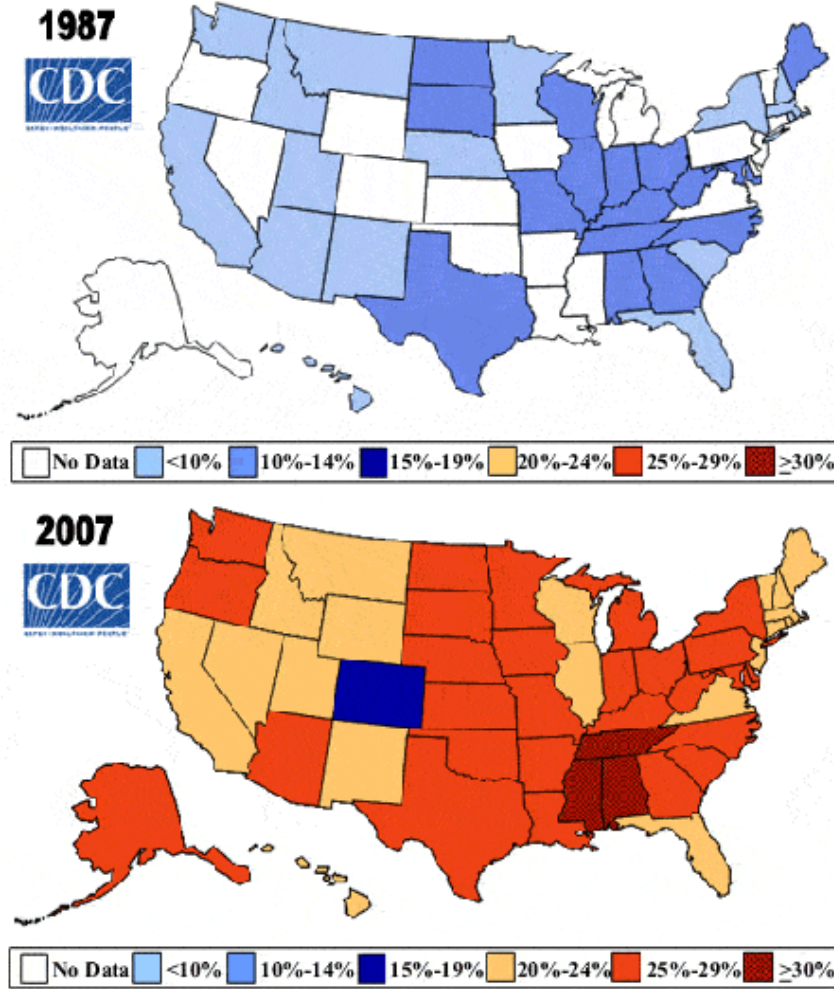
to increased risk for diabetes, heart disease, stroke, high blood pressure, cancer, joint and bone disease, depression, birth defects and other serious health problems (Dannenberg, Frumkin, & Jackson, 2011).

Mental health and wellbeing is also a growing concern. The percentage of the population receiving antidepressants has doubled since the mid-1990s, making them the most prescribed medication in the United States (Olfson and Marcus, 2009). The rate at which American children are prescribed antidepressants almost doubled from 1998-2003, of which the steepest increase (66%) was among preschool children (Delate et al., 2004). Monthly reports on happiness on wellbeing in the United States report that in the Month of April 2012, 42.9% of people are “struggling”, with an overall “happiness score” of only 49% (Gallup, 2012a). In Seattle, growing concern for human wellbeing in their city led to the creation of the Seattle Area Happiness Initiative and the Seattle Happiness Report Card (SAHI, 2011). Recent worldwide reports and conferences on happiness levels express a growing concern for the state of human wellbeing

across the world; i.e. United Nations Conference on Happiness 2012 (Helliwell, Layard & Sachs, 2012), Gallup-Healthways Well-Being Index (Gallup, 2012b), World Values Survey (World Values Survey, 2012), European Values Study (European Values Study, 2012), The National Happiness Initiative (Happiness Initiative, 2012), Gross National Happiness USA 2012 Conference (GNH USA, 2012), the NEF Happy Planet Index (NEF, 2012), and the World Database of Happiness (Veenhoven, 2012).

Our natural resources are being depleted at an alarming rate. Between the 1780s and 1980s, wetlands were lost at a rate of over 60 acres/hour. At the time of Colonial America there were an estimated 392 million acres of wetlands (Dahl, 1990), compared to today where less than 27% remain (Zinn & Copeland, 2001). In the last decade in the U.S., an average of 6,000 acres of forest and natural open space has been lost per day, or an area about the size of Seattle every 9 days (USDA Forest Service, 2007). Riparian habitats are being replaced with urban edges and our water quality is being severely degraded by toxins from human

OBESEITY EPIDEMIC [CDC]



Because of today’s widespread public health issues, such as the obesity epidemic, healthcare professionals are beginning to look “upstream” for solutions in the built environment disciplines.

life. With increased urbanization and urban sprawl, natural landscapes that do remain are fragmented and of low quality, resulting in low biodiversity and ecosystem function. This habitat destruction has both direct and indirect health consequences. Trees assist in carbon sequestration and air purification, a significant loss when being replaced by roads and buildings, where more than a third of air pollution comes from our transportation systems, and more than half from energy use in buildings (Dannenberg, Frumkin & Jackson, 2011). Natural habitat regulates temperatures and reduces the urban heat island effect, the phenomena where cities are actually warmer than their surroundings. Nature not only regulates local climates, but also the global climate. Rapid degradation of natural systems is associated with acceleration of climate changing conditions, causing an increased intensity in weather damage, injuries and diseases (Frumkin, 2011). From a mental wellbeing perspective, there are over 100 studies that confirm that spending time in nature reduces stress (Kahn, 1999). With nearly 83% of the nation (UNICEF, 2012) and 3.5 billion people in the world living in urban areas (United

Nations, 2011) we are losing our experiences with natural areas, and maybe becoming a more stressed population.

With depleting nature in our urban, and non-urban areas, we as a species are relying on artificial and digital nature to fulfill our human needs. With more and more of our lives spent watching television, staring at computer screens, and sitting in air conditioning, our senses are becoming more and more two dimensional. Richard Louv, an environmental novelist, notes, “today the life of the senses, is, literally, electrified” (Louv, 2005). Professor Robin Moore at North Carolina University’s National Learning Initiative, explains that multi-sensory experiences in nature matter because they help build “the cognitive constructs necessary for sustained intellectual development”, stimulating imagination and wonder that we carry with us from childhood into adulthood. Furthermore, even our over utilized dual senses are taking a toll. The Vision Council of America estimates that 75% of adults use some sort of vision correction agent (i.e. glasses or contacts) and 60% of Americans are



Urban sprawl is depleting our natural resources, replacing human experiences with nature with urban stress [top: NASA, NOAA “night lights” bottom: Clark Cty, NV, Christoph Gielen, NY Times]

farsighted. Using a computer for 9+ hours a day is extremely straining on the eyes and is linked to Computer Vision Syndrome (Blehm et al., 2005) and potentially glaucoma (Meikle, 2004). Over the last generation, hearing loss has increased at a rate of 160% in America, affecting about 11% of the population (Kochkin, 2009).

Additionally, our urban areas are ticking time bombs, leaking industrial toxins in the air and water at a faster rate than our current cleanup efforts can afford. With over 450,000 brownfields (US EPA, 2011), 1,000 of which are on the National Priority List for known human health hazards (US EPA, 2012b), we need to find more efficient and affordable cleanup practices. In many cities, the prime urban waterfront real estate is being consumed by these toxic abandoned sites, and with cities doing their best to reduce sprawl, they are running out of uncontaminated land to build on.

Lastly, medical costs have increased exponentially over the years. In 1960, the United States was spending 5% of the Gross Domestic Product on

healthcare. Almost 50 years later, the proportion had increased to 16% of GDP (Orszag and Ellis 2007). With the aging baby-boomers, the proportion of Americans over the age of 65 is expected to increase from 12% in 2009 to nearly 20% in 2030, inevitably projecting an even further increase in medical costs (Administration on Aging, 2010) Although our medical spending increases, rates of chronic diseases are also increasing. An estimated 49.9 million people (16.3%) are uninsured (U.S. Dept. of Health and Human Services, 2011) and an even larger number has inadequate insurance and cannot afford the health services they need.



The 450,000 brownfields and 1,000 Superfund sites are ticking time bombs, leaking dangerous toxins into our environment and degrading human health. [top: Elisabeth Copper Mine Superfund Site, Vermont, USGS below: Lower Duwamish River Superfund Site South Seattle, WA Dept of Ecology]

Renewed Interest In The Built Environment To Address Health

Because of these seemingly overwhelming health issues in our current society, health professionals are looking outside their profession to examine root causes. This has led to a renewed interest in looking at the built environment as a way to address health, as a form of preventive medicine (Frumkin, 2011). More importantly, this renewed interest is coming from both ends- from planners, landscape architects, architects, public health officials, doctors, and researchers in both the built environment and health professions. This excitement can be seen in books, journal and magazine articles, news clippings, exhibitions, and conferences. A brief window into the magnitude of this interest:

Selected books published in the past 3 years:

Building American Public Health: Urban Planning, Architecture and the Quest for Better Health in the United States (2012)
Imperfect Health: The Medicalization of Architecture (2012)
Making Healthy Places: Designing and Building for Health, Well-Being and Sustainability (2011)
Designing Healthy Communities (2011)
An Introduction to Community Health, Seventh Edition (2011)
Changing Planet, Changing Health: How the Climate Crisis Threatens Our Health and What We Can Do about It (2011)
The Agile City: Building Well-being and Wealth in an Era of Climate Change (2011)
The Nature Principle: Human Restoration and the End of Nature-Deficit Disorder (2011)
Sustainable Environmental Design in Architecture: Impacts on Health (2011)
Improving Health in the United States: The Role of Health Impact Assessment (2011)
Toward the Healthy City: People, Places and the Politics of Urban Planning (2009)
Thriving Beyond Sustainability: Pathways to a Resilient Society (2010)
Living Downstream: An Ecologist's Personal Investigation of Cancer and the Environment (2010)
Urban Health: Readings in the Social, Built and Physical Environments of U.S. Cities (2008)
Cities for People (2010)
Innovative Approaches to Researching Landscape and Health (2010)
Biophilic Cities: Integrating Nature into Urban Design and Planning (2010)
Healing Spaces: The Science of Place and Well-Being (2010)
Pedaling Revolution: How Cyclists are Changing American Cities (2009)
Shopping Our Way to Safety: How We Changed from Protecting the Environment to Protecting Ourselves (2009)
Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life (2008)
Therapeutic Landscapes: Geographies of Health (2008)
Health, Sustainability and the Built Environment (2008)
Daylighting, Architecture and Health: Building Design Strategies (2008)

Selected Conferences and Symposiums scheduled for 2012:

SAR Architecture for Health Spring Conference, Clemson, SC

Center for Health Design's Healthcare Design Conference, Phoenix, AZ

Urban Systems Conference: Urban Change- Education, Health and the Environment, Rutgers-Newark, NJ

Making Cities Livable Conference: True Urbanism- Planning Healthy Communities for all, Portland, OR

Healthcare Experience Design Conference, Boston, MA

1st National Health Impact Assessment Meeting, Washington D.C.

International Conference on Landscape and Health, Zurich, Switzerland

International Academy of Design and Health 8th World Congress and Exhibition, Kuala Lumpur, Malaysia

3rd Design + Health Australasia International Symposium, Sydney, Australia

2nd International Symposium on Design and Health Europe, Helsinki

2nd Design and Health Africa Symposium, Johannesburg

2nd Annual Landscape and Health Conference: Effects, Potentials and Strategies, Birmensdorf, Switzerland

The 7th International Conference on Persuasive Technology: Design for Health and Safety, Linköping, Sweden

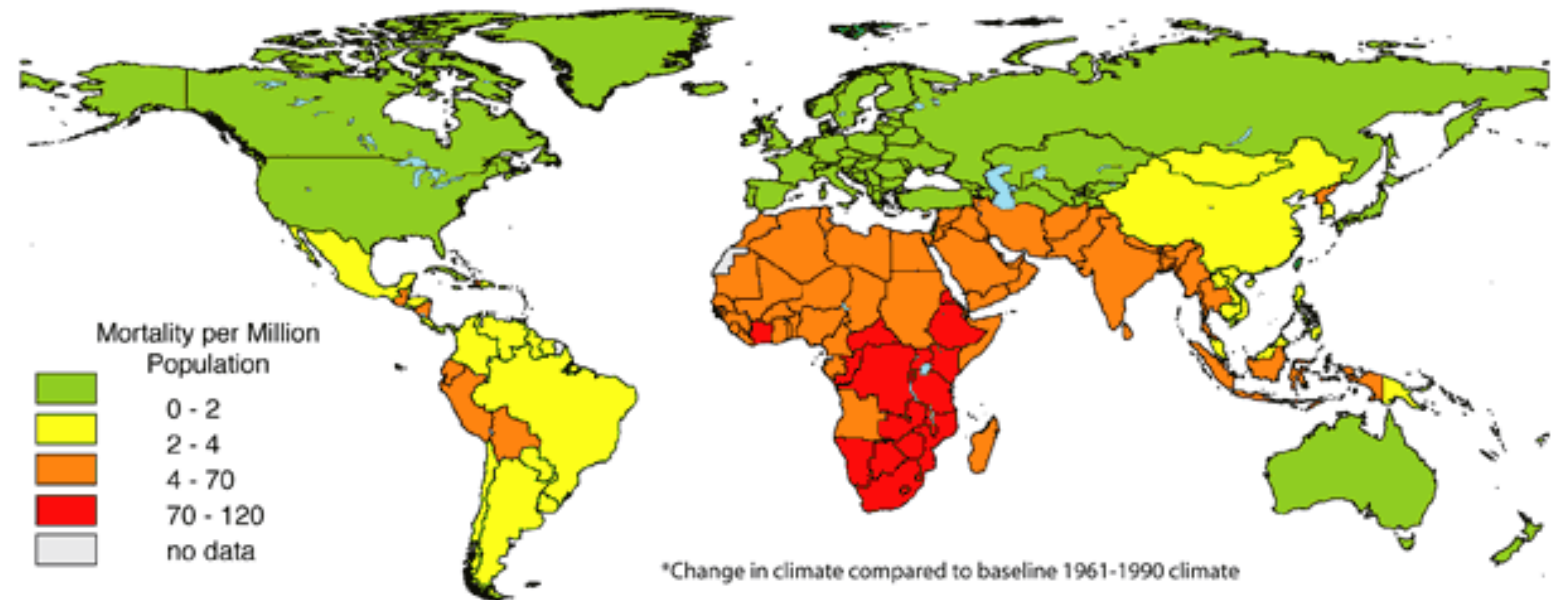


The climate change scare, attention to chemicals in our food and environment, growing population, economic recession and attention to purposeful and practical living, and a desire to live longer, happier and more beautiful lives are contributing to a cultural push that may swing the interest of professionals into mainstream media. Just as the word 'sustainability' has transformed the way we all look at the environment, the word 'health' may create just as powerful of a revolution. Designers, in particular, are motivated by buzzwords, and there just may be a life-changing market for the word 'health'.

While there are numerous books, articles, publications and conferences surrounding the topic of health and the built environment, the dialogue between landscape architects and health professionals is not as strong as it is with other built environment professionals. Only one of the books in the previous pages was written by a landscape architect, compared to the 6 written by architects, and 5 by planners. The reach from public health is even stronger, with 8 books coming from health

professionals. Landscape architects will need to start speaking up if they wish to bring their skills to the table and tap into a blossoming market.

Estimated Deaths Attributed to Climate Change in the Year 2000, by Subregion*



[Data: McMichael, JJ., Campbell-Lendrum D., Kovacs RS, et al. Global Climate Change. In Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors. M. Ezzati, Lopez, AD, Rodgers A, Murray CJL. Geneva, World Health Organization, 2004.

Map: Center for Sustainability and the Global Environment [SAGE]]

The health issues that surround climate changing conditions may lead to an urgent need for smarter and more healthful design.

Conclusion: An Urgency and Interest in Health May Open Doors for Designers, and Landscape Architects in Particular

Richard Jackson, co-editor of the book *Making Healthy Places*, writes:

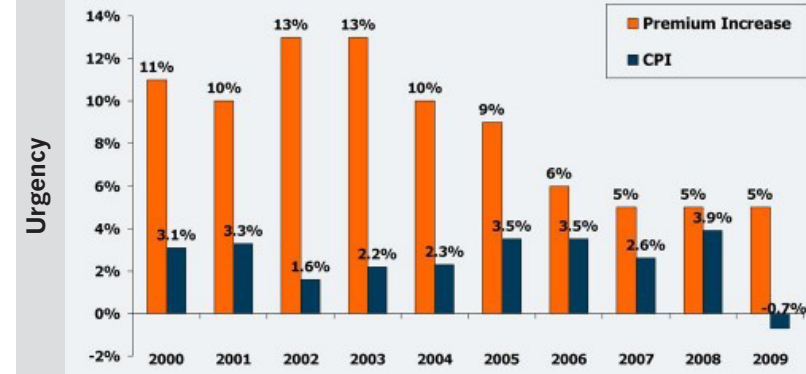
“The modern America of obesity, inactivity, depression and loss of community has not ‘happened’ to us; rather we legislated, subsidized, and planned it.”

If this is in fact true, that we are directly responsible for our pressing health issues of today, then there must be a way to legislate, subsidize, plan, and I would add, design ourselves out of this unhealthy mess. By 2040 the majority of buildings in America would have been designed and built with the knowledge of LEED standards and the decline of the rustbelt, (and consequently the birth of the brownfield), would have happened more than 70 years ago. With our current knowledge, technology, and interdisciplinary interest, there is really no excuse not to design with

sustainability as a goal, and to dramatically improve the health of our current and future landscapes, ecologies and people.

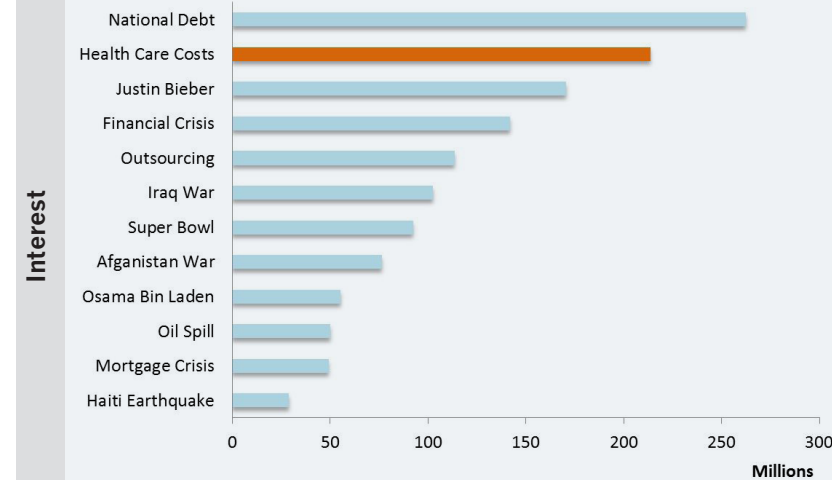
The urgency and interest in health may open new market opportunities for landscape architects and other design professionals. Design, framed as preventive medicine, may be a solution to addressing the increasingly overwhelming health issues we face in today’s society. Because of their collaborative nature, systems-oriented thinking, multi-scale experience, and holistic design approach, landscape architects may be particularly situated to address these multifaceted health issues. The conversation is gaining momentum, and landscape architects will need to join the dialogue or their skills will be overlooked and replaced by other design professionals such as architects, engineers, and planners.

Percentage Increase in Health Insurance Premiums
Compared to Inflation, 2000 - 2009



[Keiser/HRET Survey of Employer-Sponsored Health Benefits, 1999-2009. Bureau of Labor Statistics, Consumer Price Index, U.S. City Average Inflation (April to April), 1999-2009.]

Number of Stories in News Coverage, 2005-2010



[HfS Research/Google, 2011]

The urgent health conditions of today and a renewed interest in health in design, may open a preventive health market for landscape architects and other design professionals.

Conclusion

A New Approach to Contemporary Design: Health as the Goal

In sum, design, and particularly landscapes, have the capacity to affect health; however designers may not be fully aware of the extent their design decisions could have. These findings may identify a need for:

- Health to be (re)established as the goal of landscape design
- An increased understanding of health outcomes by designers
- A potential need for modified evidence-based research and practices in landscape design
- More interdisciplinary collaboration and innovation in design to address the growing health concerns
- More input from landscape architects in particular, on health and the built environment issues and solutions

Incorporating health into the design process may create more salubrious results, however the integration will not be simple. Communication channels between health and design professionals may be difficult to overcome. Buzz words and technical vocabulary have evolved separately and without much influence over the years, creating language barriers. Landscape design and health professions often have different training philosophies that develop different professional brains. Landscape architects are trained to examine systems and patterns first, then funnel down to details, with results considered last. They are taught to embrace natural processes and understand that time and the environment are unpredictable factors in the equation. Health professionals, however, think oppositely, looking at diagnostic details and results and then projecting out to larger patterns and systems. Because of the seriousness of the topic, health aims for accurate prediction and control of results.

While this crossover of professions is becoming an emerging interest on both ends, there are very few professionals who are dually educated. Currently a niche health-design profession does not exist outside research and academia. There is promise, however, with schools such as the University of Washington offering optional interdisciplinary health-design classes that are well received, and educators in both the built environment and health disciplines seeking out dual-associate professorships. Furthermore, design studios at the University of Washington are centered around exploring health and wellbeing issues, beginning the integration of health in the design process for the next generation of designers.

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HEALTH IN DESIGN

A FRAMEWORK TO INCREASE UNDERSTANDING

Introduction

“To know that even one life has breathed easier because you have lived, that is to have succeeded.”

— *Ralph Waldo Emerson*

Health in Design

The built environment can have a great affect on health. In order to maximize its healthful potential, the designers responsible for shaping the built environment must be aware of the correlation between health and design and the consequences of their design interventions. Common contemporary design practices are just beginning to consider health in the design process, but an overall lack of dialogue may reduce health potentials or consequently result in unhealthful designs.

This section explores how health can begin to enter into the design conversation. By incorporating health education within the design process, designers can begin to understand both the negative and positive consequences of their design actions. This increased understanding may bring to light the large impact that designers have on the health of individuals and the communities they live in. Thinking about health opportunities and consequences during the design process will help

inform design thinking prior to construction and common mistakes might be avoided. A framework for incorporating health in design will increase the understanding of health outcomes for designers, clients and the general public pertaining to how the built environment affects individual and community health. With this framework, a new profession may emerge, bridging the health and design worlds. As a tool, this framework can guide designers and clients to achieve more salubrious results. In the future, the health-design profession may fade as health enters into a robust everyday design dialogue. If health enters into everyday design dialogue.

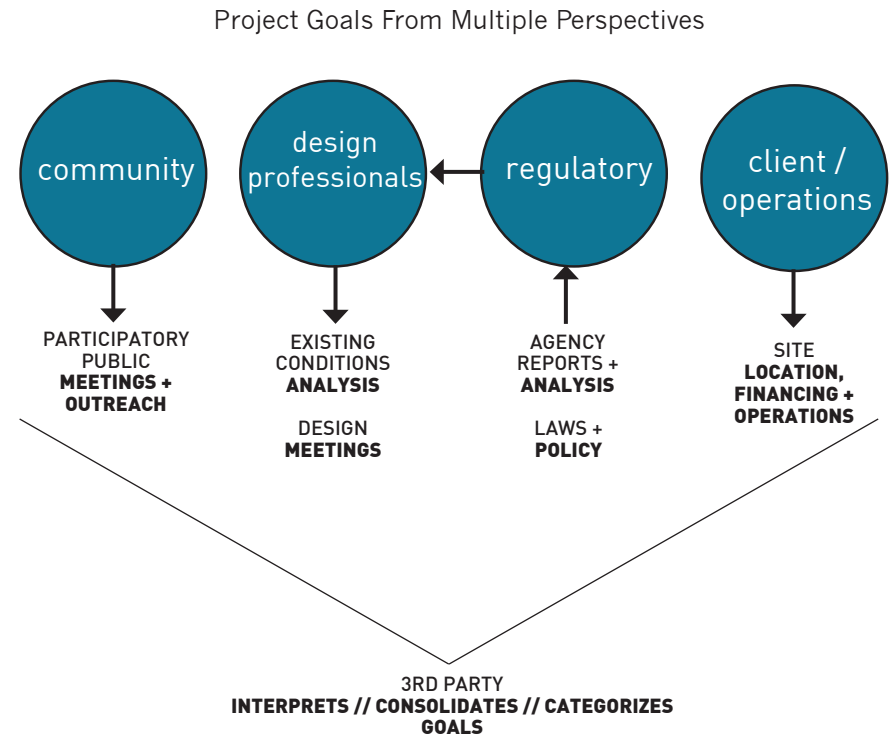
The following pages explore the capacity for a framework to increase understanding of health, using DIG Studio's project as a test example of the framework process. This section asks the question:

How might a health conversation be incorporated into the design process to increase understanding of the health consequences of design?

Health Dialogue

Define Health Through the Goals of the Project

Health is personal, contextual and complex, making it difficult to define, and therefore difficult to design with health as the goal. Because of this, in landscape design it is best to define health through the goals of the project involving the desires of all current and future stakeholders, not just a designer's vision or a regulatory standard. Existing conditions analysis performed by the designer, client and any regulatory agency involved will identify unhealth and issues with the current state of the site. Public meetings and outreach will collect the community perspective on issues and community vision. Careful attention should be made to gather perspectives from all community populations, especially those with softer voices. Initial design meetings with design professionals and the client will translate community needs and desires and brainstorm solutions. Operations and site management personnel should also have input on the goals of the project. A definition of health will emerge from identifying these goals of the project.



Need for a 3rd Party Health Champion

A challenge with collecting goals from multiple perspectives lies in facilitating and translating with a genuinely open mind, and without bias towards the designer, client, or a particular user. Additionally, few people are skilled in understanding both complex health issues and the creative design process and the intricacies of construction. This may identify a need for a third party mediation... a Health Champion that would defend the health definition and the needs and desires of all parties throughout the process.

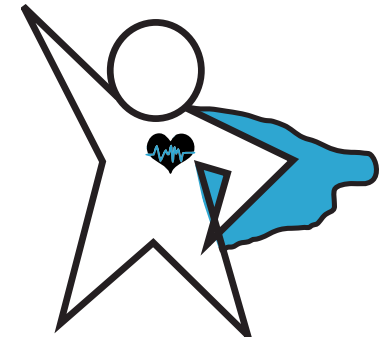
The Health Champion could be one person or a neutral organization acting as a translator and communicator between the design, health, and community worlds. Ideally, the Health Champion would be a designer who is knowledgeable in public health, policy, and regulatory requirements or visa versa. They would be able to openly facilitate public meetings and participatory design charettes as well as client and design meetings. The Health

Champion would not only speak on behalf of the stakeholders, but also be able to represent those without a voice such as disadvantaged populations and the environment itself. They would be skilled in translating and communicating to all parties, mindful of jargon and professional perspectives, and the financial and cultural realities and constraints of construction.

One aspect of this thesis explores the feasibility of such a position. By walking through a health/design process with a group of student designers working on their capstone project, this thesis explores the following questions:

- How can the Health Champion help designers to better understand the health implications of their designs?
- How can understanding health make better design?

The following pages outline the process of the Health Champion walking the designers through a health-design framework to explore these questions.



Developing a Health Framework

Developing a Framework to Understand Health

To explore the idea that an understanding of health can contribute to better design and more salubrious results, this thesis develops a design framework. The design team references the framework while making connections between their design interventions and their effects on both individual and community health. Health analysis and evaluation of design happens within the design process, rather than after design completion or construction to influence outcomes at a low cost. Moving the designers through a health framework in the design process will help inform how they think about future design, with the framework potentially unnecessary over time.

Three different framework strategies were tested before a recommended framework was chosen. Each of the frameworks were tested on a team of students in the beginning stages of the design process for a capstone project. The results of each of these framework strategies are the following:

Strategy 1: Design to Outcomes

The initial framework tested a simple relationship between design ideas, the potential results of those designs, and the health outcomes of each. The resultants were grouped in categories of ecological, social and economic for ease in digestion. The outcomes looked at both individual health and wellness, and community revitalization.

After running through the framework with the design team who were in their initial brainstorming stages of their project it became clear that beginning with design concepts was not helpful in informing more healthful design development decisions, but rather validated existing design ideas. Additionally, categorizing the resultants and outcomes was tedious, subjective, and unhelpful, since many spanned multiple categories and the grouping did not change the outcomes.

Framework Strategy 1 Design to Outcomes

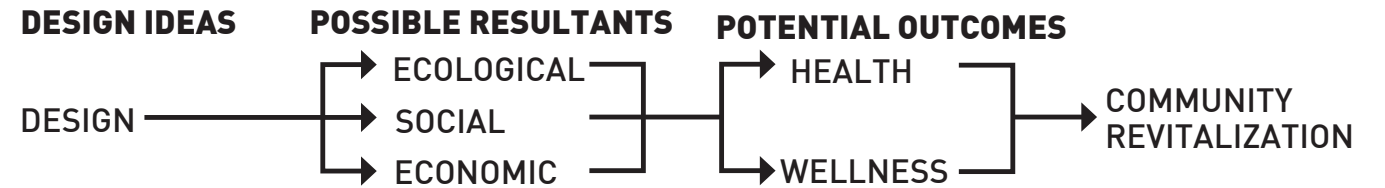
Pros:

- straightforward and easy to add into current design process
- designers began thinking about health

Cons:

- beginning with design doesn't influence outcomes
- more validation than education
- categorization of resultants unhelpful and tedious
- categorization of outcomes subjective and unhelpful
- categorizations difficult since many spanned multiple categories
- uninspiring, did not influence design or change outcomes

Framework Strategy 1: Design to Outcomes



ATSDR Steps in Developing a Healthy Community



ATSDR Community Health Evaluation

Category (Physical + Mental Health, Safety + Security, Housing, Education, Economy)	1. What are the community issues?	2. How can redevelopment address the issues?	3. What are the community health benefits?	4. What data are needed to measure change? (e.g., baseline indicators; before/after measures)
Physical and Mental Health	Lack of parks/playgrounds/green space	Build play lots; community gardens; recreational parks (basketball courts); walking trails linked to transit; bike lanes; bike parking services at bus/train stations	Improved mental health status; walk more, leading to possible reduction in obesity and other diseases; improved social interaction	Number and types of vacant property; number and use of green parcels; number of recreational parks; number of links to transit; number of bike lanes
Safety and Security	Perceived or actual high crime rate Streets are dark and uninviting	More and improved lighting; broad sidewalks; more streets (get on the grid); community watch groups; street-level homes and businesses	Feel safer and more secure; more people will use their neighborhoods (walk, be out at night); community ownership and pride increases	Crime rate; number and types of sidewalks; number of streets; number (and types) of light fixtures; reports from community watch groups
Housing	Lack of affordable housing	Build new or rehabbed mixed-use housing	Avoid gentrification; increase home ownership or stable rental home percentage	Number of affordable homes/units, percent home owner occupancy, socio-economic/demographic statistics
Education	Lack of elementary and vocational schools; high school dropout rate	Add elementary and vocational schools, with community centers/after school programs	Provide access to education and community programs, increase graduation and employment rates, reduce crime (indirect)	Number of children attending new schools, truancy statistics, graduation and dropout rates; employment and crime rates
Economy	Many vacant commercial properties; high unemployment rate	Recruit new businesses to area; hire community workers	Improve economy of area; people feel "better" with more income, less idle time; indirect reduction in crime	Number of new businesses, employment rates (from community workers), crime rates

[Agency for Toxic Substances and Disease Registry]

Strategy 2: Goals to Outcomes

The next strategy was loosely based on an existing tool used in the Agency for Toxic Substances and Disease Registry (ATSDR) out of the U.S. Department of Health and Human Services. The ATSDR uses this tool (shown at the right) to inform residents near brownfields of public health concerns and redevelopment opportunities (ATSDR, 2010).

This framework strategy digs further into the design process by beginning with identifying goals of the project and criteria needed to meet those goals. Design is then introduced and resultants and health outcomes are extrapolated. Lastly, the outcomes are analyzed to determine the degree to which the design has affected health.

While a much more in-depth process, this framework was wildly unsuccessful. The design team that tested the framework could not move beyond identifying the goal criteria. The failure was due in part to the framework's linear nature, inhibiting the natural design process. Design is much more organic and less mathematical. The design team did appreciate considering goals of the project and felt it was helpful in informing design decisions in the future. This framework also revealed a need to group "health" and "wellness" together, since one informs the other, and to begin to examine how one would evaluate results.

Framework Strategy 2 Goals to Outcomes

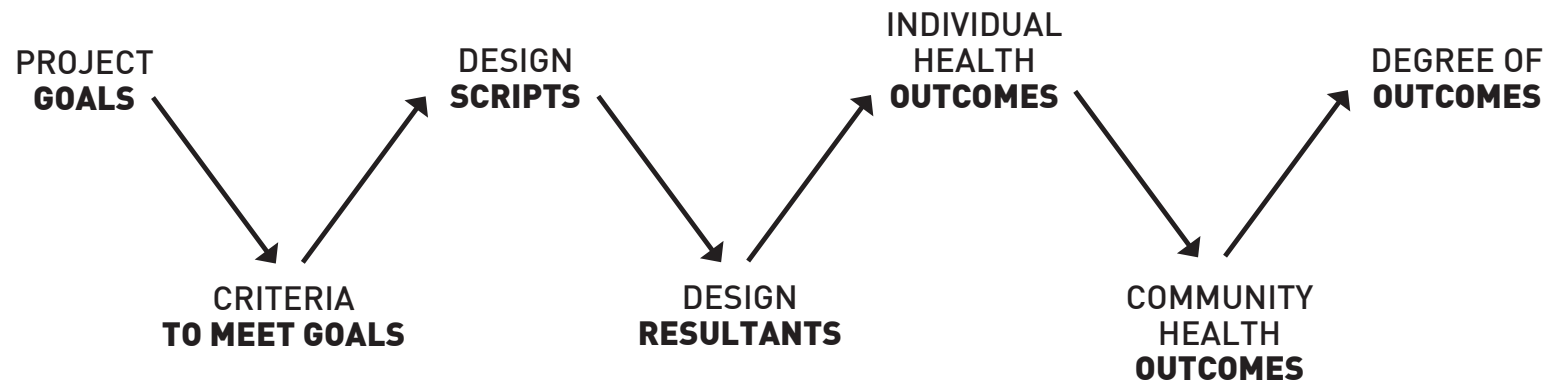
Pros:

- in-depth process
- considering health from the beginning in goals
- grouping health and wellness together
- considering how one would evaluate results

Cons:

- too linear
- inhibited creative design process
- unnatural and painful for designers
- uninspiring, did not influence design or change outcomes

Framework Strategy 2: Goals to Outcomes



Strategy 3: Organic Flow

The third strategy is flexible enough to allow for a freeflowing creative design process while also adding layers of information regarding health into design development. Instead of forcing designers to follow a health framework outside their training and comfort zone, the health dialogue is essentially embedded within the design process.

The designer begins identifying issues on the site, as well as project goals regarding health. When these goals feel solid, the designer then moves to design ideas that meet those goals and address the site issues. The design ideas may stimulate additional project goals or reveal further issues on the site. Each of the design ideas is then extrapolated to predict individual and community health outcomes, as well as any unhealthy consequences of these actions. The designer then weighs the health and the unhealth and makes changes to the design. Lastly, the designer considers how each of these health outcomes might be evaluated, and what

resources are available to collect such data. Existing published literature and software modelling tools would be scanned to determine if previous studies have measured or correlated similar design concepts with health outcomes.

The framework is loosely based on Complexity Theory ideas, the Health Impact Assessment framework used in the public health and planning professions, and Evidence Based Design practices. Complexity Theory understands that not all health outcomes could or should be measured, and that merely revealing a relationship is a strong discovery in itself (Mugerauer, 2010 and Mugerauer, 2012). The Health Impact Assessment tool is used to evaluate large scale policy, planning and design projects, and gives a value to precedent literature and professional opinion as accepted ways to predict health outcomes (Dannenberg et al, 2008). In using Evidence Based Design, decisions about the built environment are based on credible research to predict outcomes (The Center for Health Design, 2008).

Conclusion: A Health Framework Stimulates a Health Dialogue

Strategy 3 seemed the most successful of the frameworks tested. The design team was able to follow the process and, by the end of the discussion, was using the word 'health' in conversation. Because it was tested on a theoretical student project, it is unclear just how helpful the framework is in creating smarter design, and more healthful outcomes, however the framework did stimulate dialogue centered around health and may have created an impact on these students learning to consider health, which is a first step.

The following pages outline the testing of Strategy 3 on the design team.

Framework Strategy 3 Organic Flow

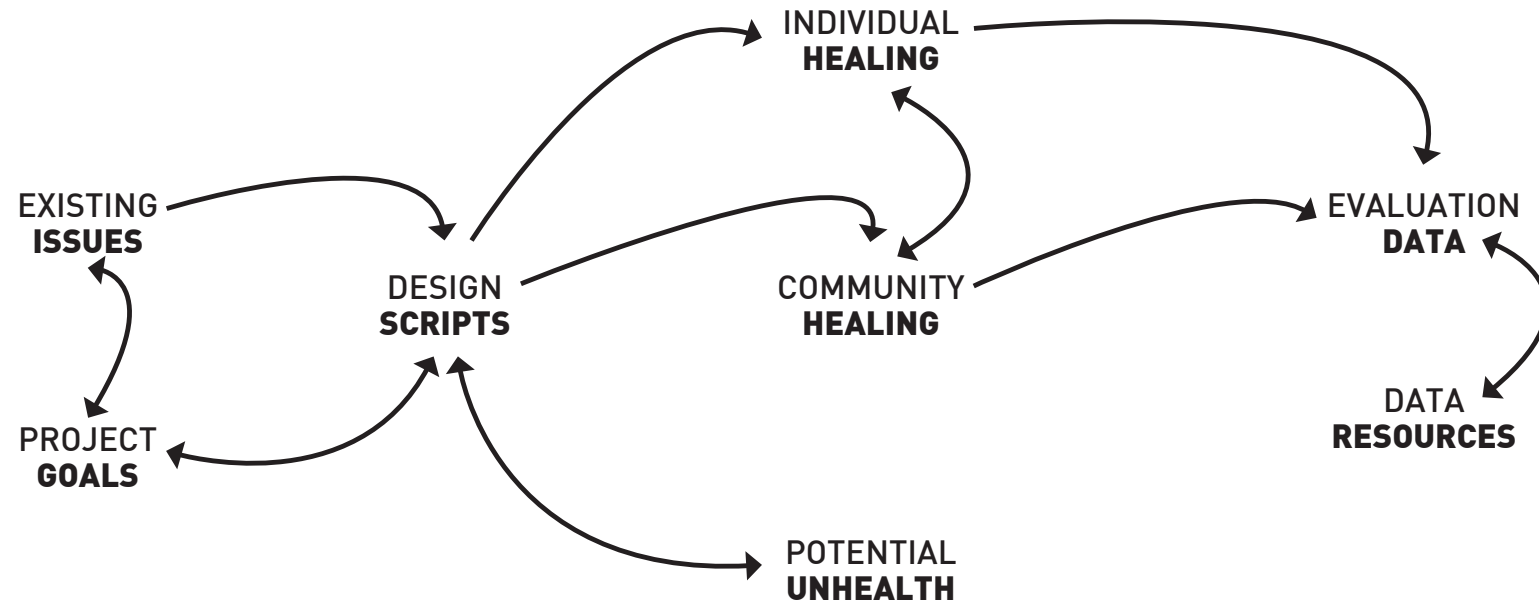
Pros:

- flexibility of framework embeds health dialogue within the creative design process
- conversational and freeflowing
- health outcomes open to being determined by published literature, modelling, professional opinion, or merely identifying positive correlations

Cons:

- unclear how helpful the framework is in creating more healthful outcomes
- data collection potentially cumbersome (i.e. literature, modelling etc) to determine health outcomes

Framework Strategy 3: Organic Flow



Testing the Framework

Participating Parties

Framework Strategy 3, outlined in the previous pages, was tested on a student design team in the process of designing their capstone project. Due to time constraints and student schedules, the framework was not as in depth as it might be in the professional world, however a general testing of its potential is outlined in the following pages.

The author of this thesis acted as the facilitator, or Health Champion, of the project and was involved from the earliest stages of the project. It should be noted that the Health Champion has a background in landscape architecture, and, although has studied public and global health concepts in graduate school and practiced professionally in ecological landscape design, does not have a formal health background. The design team is made up of three graduate landscape architects also without a health background. Together, the Health Champion and student design team make up DIG Studio. They were advised by a collection of professors and

professionals knowledgeable in both health and design, a few of which have practicing experience in both professions.

The Design Project

Because of its dramatic health conditions, degraded maintenance regimes, entropic boundaries and migrating plumes, DIG Studio was interested in designing on a contaminated Superfund site. The site chosen is the McCormick and Baxter brownfield in the Port of Portland Superfund site along the Willamette River in Portland OR. The design explores ways to harness natural processes to improve the health of the landscape and greater ecological systems, as well as the health and wellbeing of the people in the surrounding communities.

Missing Stakeholders

Because this framework tests a theoretical student project, stakeholders were missing from the conversation. A lack of community or client simplified the design process, however the design team did their best to consider cost barriers, cultural context and regulatory requirements.

Timeline

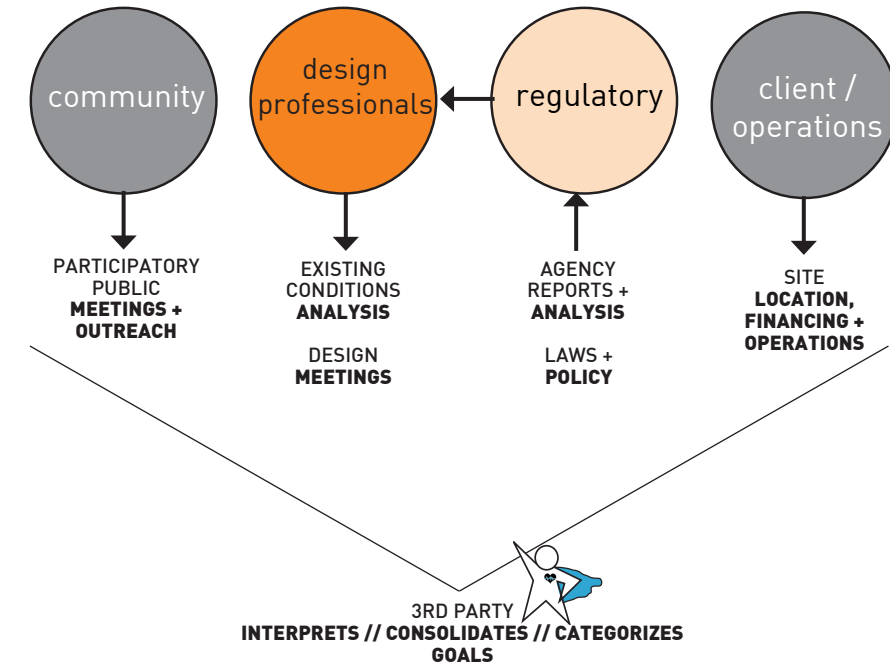
Because of the testing of prior unsuccessful frameworks, Strategy 3 was tested on DIG Studio after initial design brainstorming had already taken place, but before a schematic design had been formulated.

Project Location



DIG Studio chose to design on the McCormick and Baxter property adjacent to the University of Portland. This site is part of the Port of Portland Superfund site along the Willamette River just north of downtown Portland OR. [googlemaps]

Participating Project Parties



Because the framework was tested on a student project, stakeholders such as the community and client were missing from the dialogue.

Goals

The first step of the health framework identified existing issues and translated those issues into goals of the project. Ideally, these goals would be generated by all stakeholders, however as previously mentioned, the client and community were lacking from the discussion because it is a theoretical student project. The goals were generated collectively by all students in DIG Studio, and were organized and translated by the Health Champion. Categorizing the goals helped the design team to understand how they might translate into design aspects. The team came up with four categories for the goals: Ecological, Economic, Social, and Phenomenological or Experiential. Since many of the goals spanned multiple categories, a Venn diagram was formulated to express this relationship, shown to the far right.

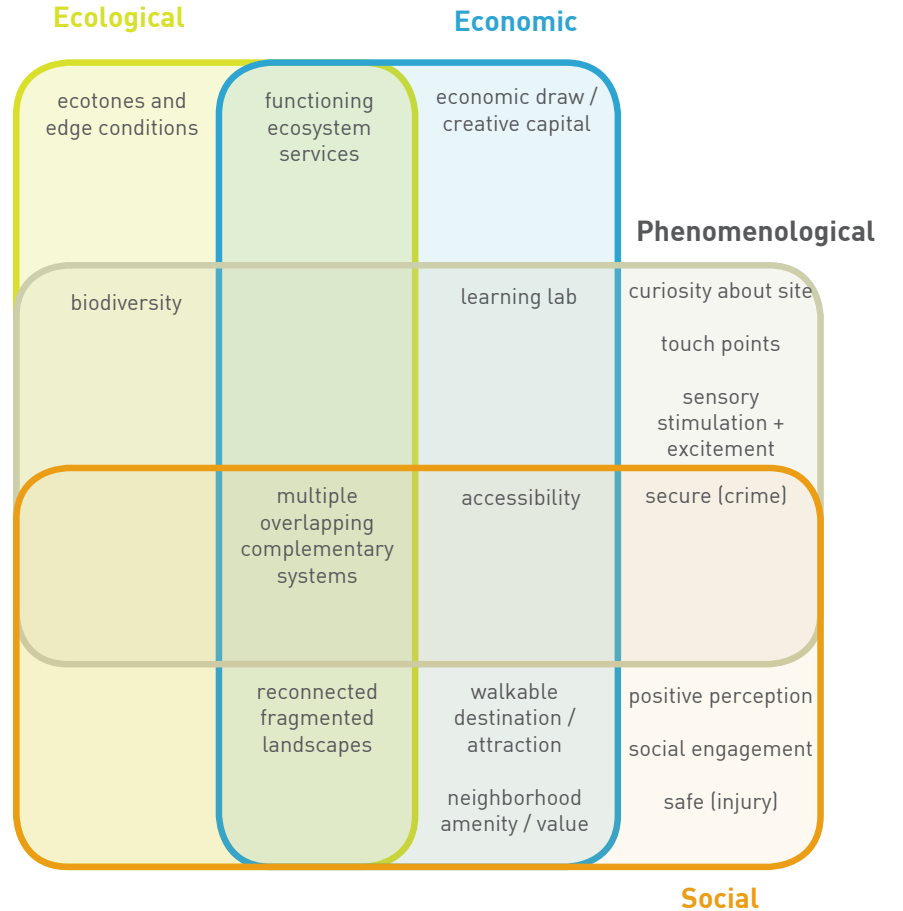
Health Definition

Next, DIG Studio formulated a project specific definition of health that would act as an umbrella goal for the entire project. The definition allowed the design team to collectively discuss the relationship between the goals and desired outcomes.

Overarching Definition of Health for the Project

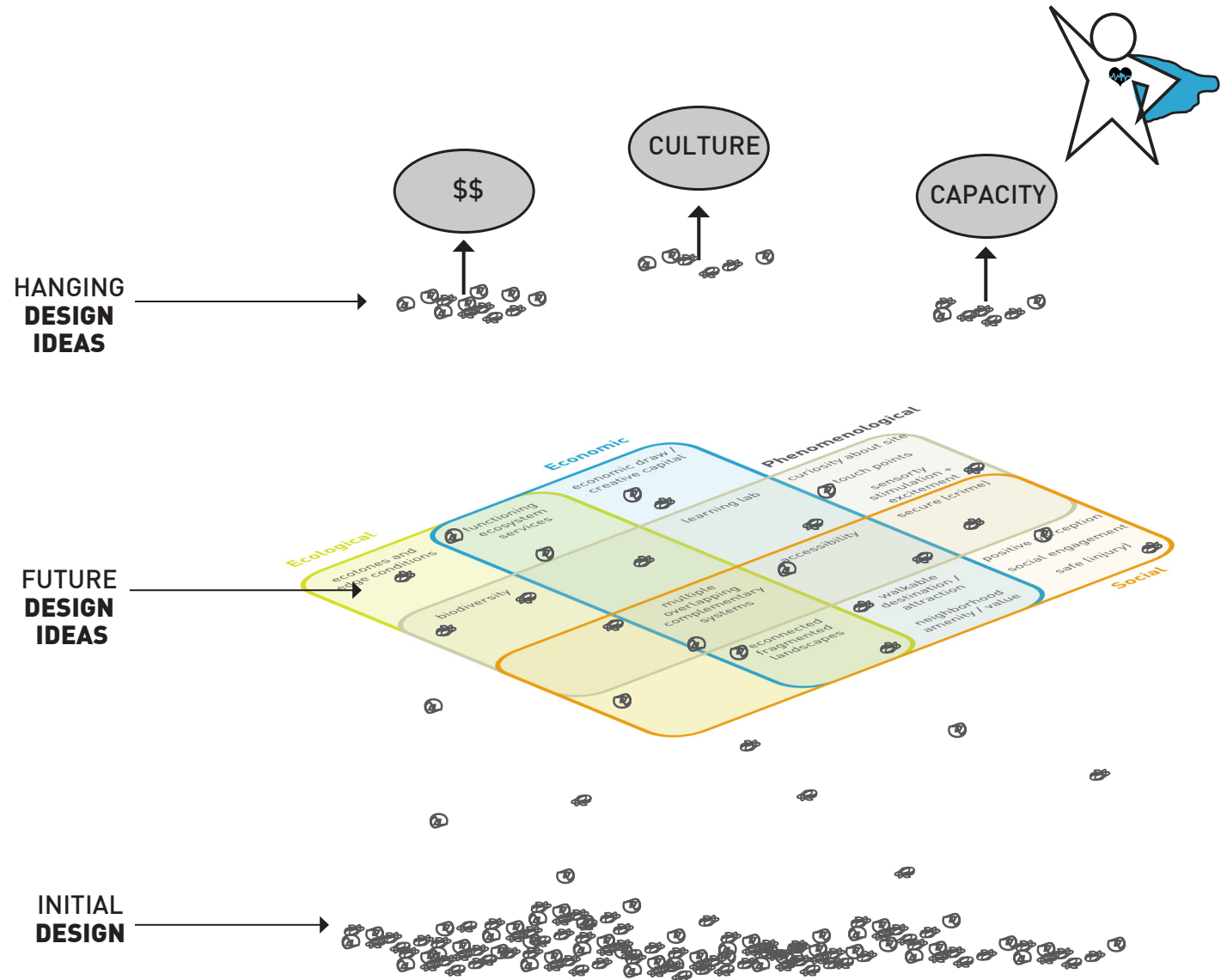


Categorized Health Goals of the Project



Weighing and Sifting

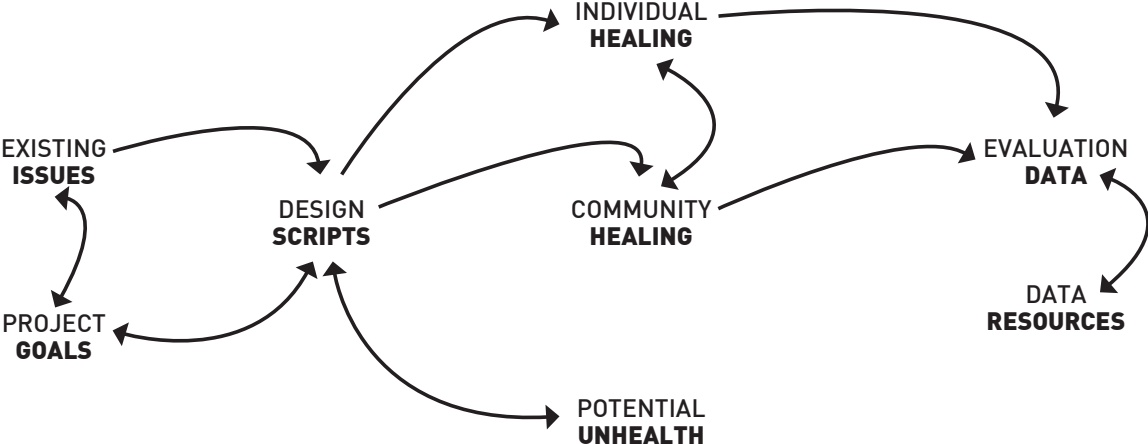
The most difficult part of any design project is weighing the goals and ensuring that the design ideas are compatible. To picture how this might happen in relation to this framework, the goals diagram is visualized as a sieve that the design ideas sift through. The Health Champion generally would compile the goals from all the stakeholders and facilitate the sifting. Design ideas that hit the goals, and especially those that hit multiple goals, will fall through and become the initial design. Financial constraints, constructability, cultural acceptance and other factors would act as “reality magnets,” drawing up design ideas that are not strong enough to bypass the reality check. Some design ideas might fall in the middle, to be saved for a later design phase or if any reality magnets decrease in strength.



Running Through the Framework

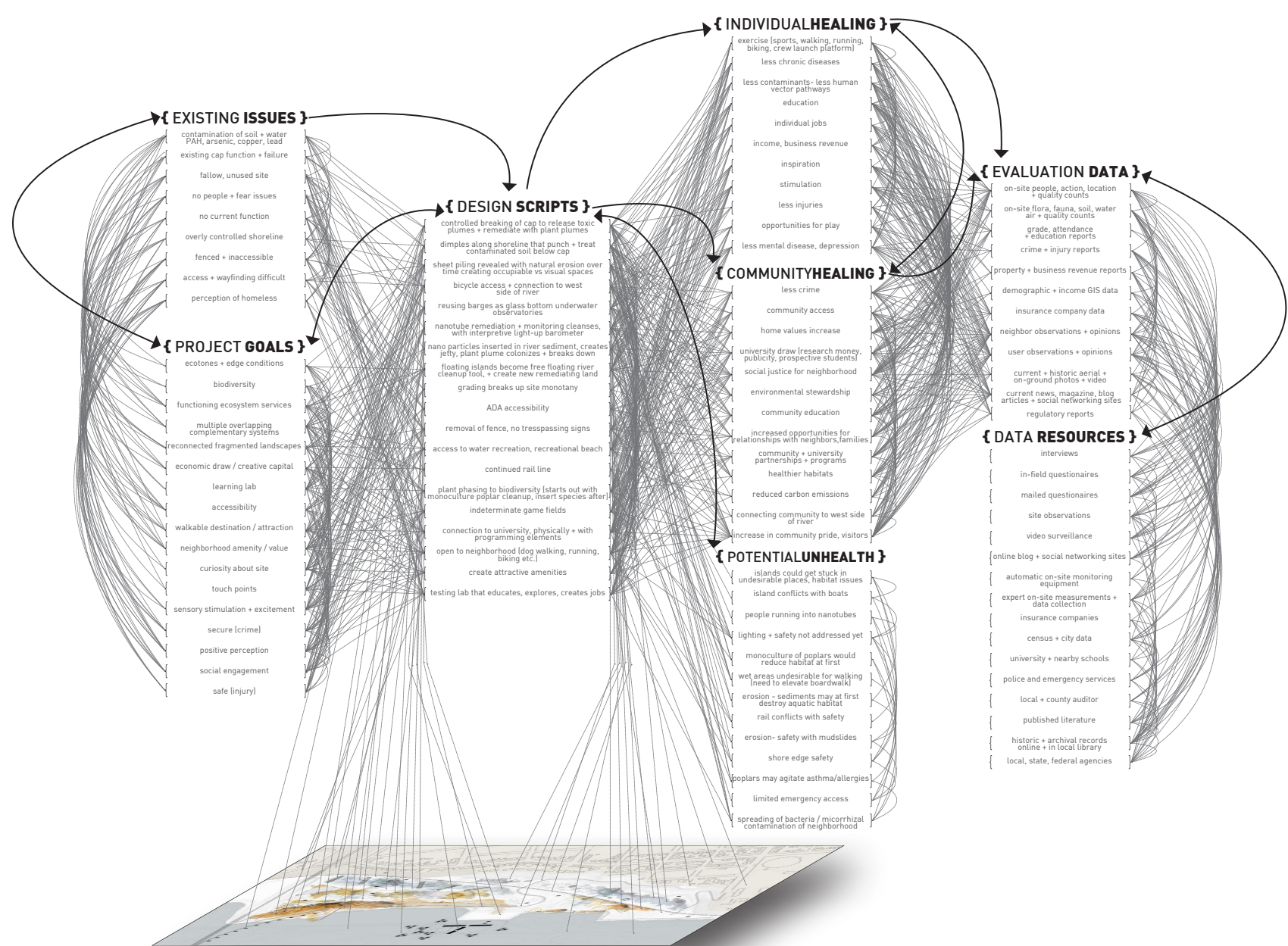
The final step, which is really a series of steps, is running through the framework. DIG Studio revisited the goals and issues identified in the previous steps, refining them throughout the weighing and sifting process. Design ideas were then brainstormed, and the Health Champion, based on literature review and professional experience, determined potential individual and community health outcomes for each. Any unhealth that appeared in the outcomes was then communicated back to the design team, where they could weigh it and change the design if needed. The Health Champion then identified potential ways that the health outcomes could be evaluated and how that data might be collected. Lastly, the framework was extrapolated to the site, to give spatial context to health outcomes.

An Outline of the Health Framework



Testing the Health Framework

A visual example of testing the health framework on the student design team. The diagram reveals relationships and connections between each aspect of the framework.

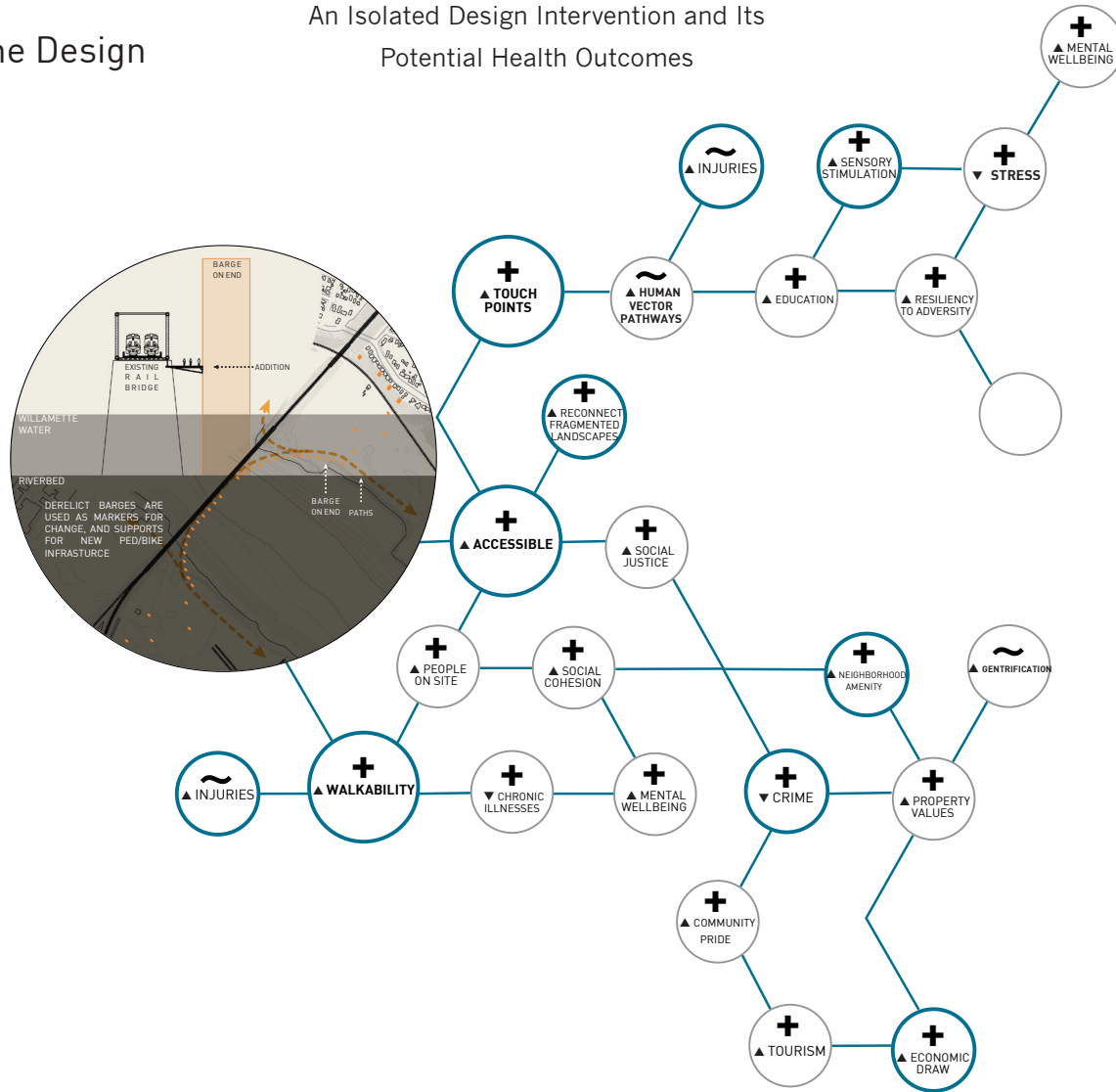


Understanding the Framework

Application of Health to the Design

To better understand how the health framework could affect design and outcomes, a series of diagrams were created. Several key design interventions were mapped out, with potential physical outcomes predicted over time. Each potential physical outcome then was evaluated in terms of individual and community health. The diagram to the near right displays one such design intervention. The blue circles are health outcomes that double as identified goals of the project. Positive as well as potentially negative health outcomes were identified, each line indicating a correlation or relationship. Some health outcomes are yet unknown, visualized by the blank circles.

An Isolated Design Intervention and Its Potential Health Outcomes

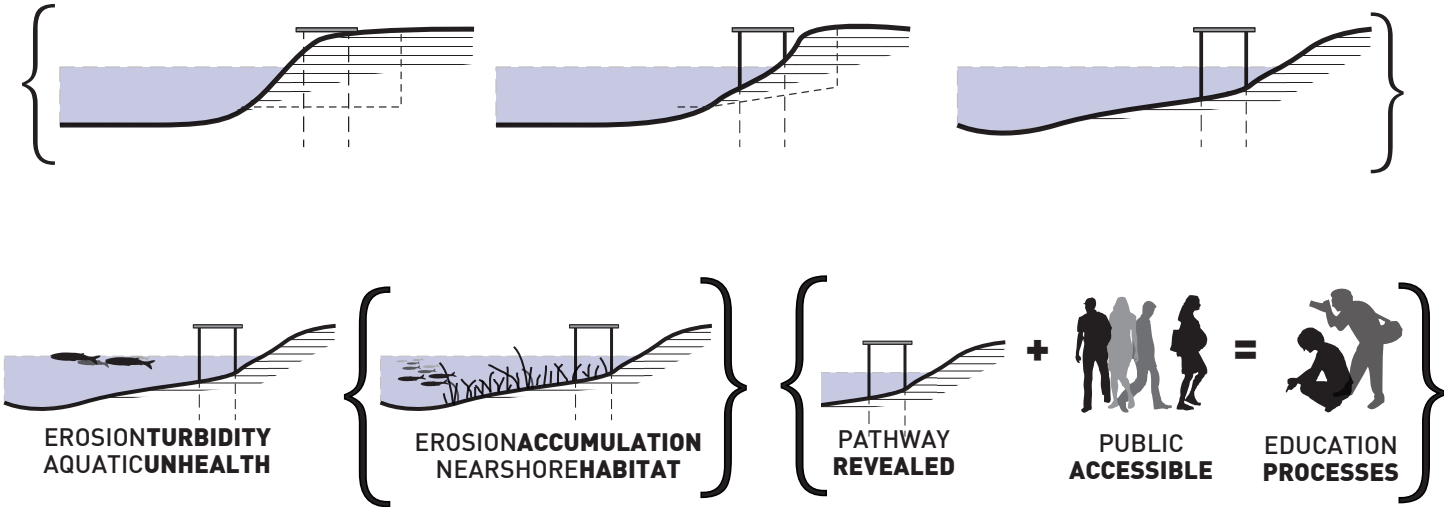


Applied Results

Because DIG Studio was interested in how design interventions can stimulate natural processes, and eventually health outcomes, a static masterplan was not developed. Instead, a fluid, initial masterplan was drawn using design “scripts.” These scripts would initiate processes, using health as a goal instead of a concrete masterplan as the goal, as is often used in contemporary practice. The idea is that each design script insertion would be evaluated as to the potential health outcome, and those that fall outside the brackets of the predetermined health definition and goals, would be reexamined, with additional design scripts added to move it back into the accepted brackets. The Health Champion would facilitate this evaluation, utilizing evidence-based research to predict the likelihood of health outcomes.

The diagram to the immediate right isolates one script idea. Sheet piling will be added to a shoreline area, revealing a public pathway with natural erosion over time. Outcomes within the health brackets

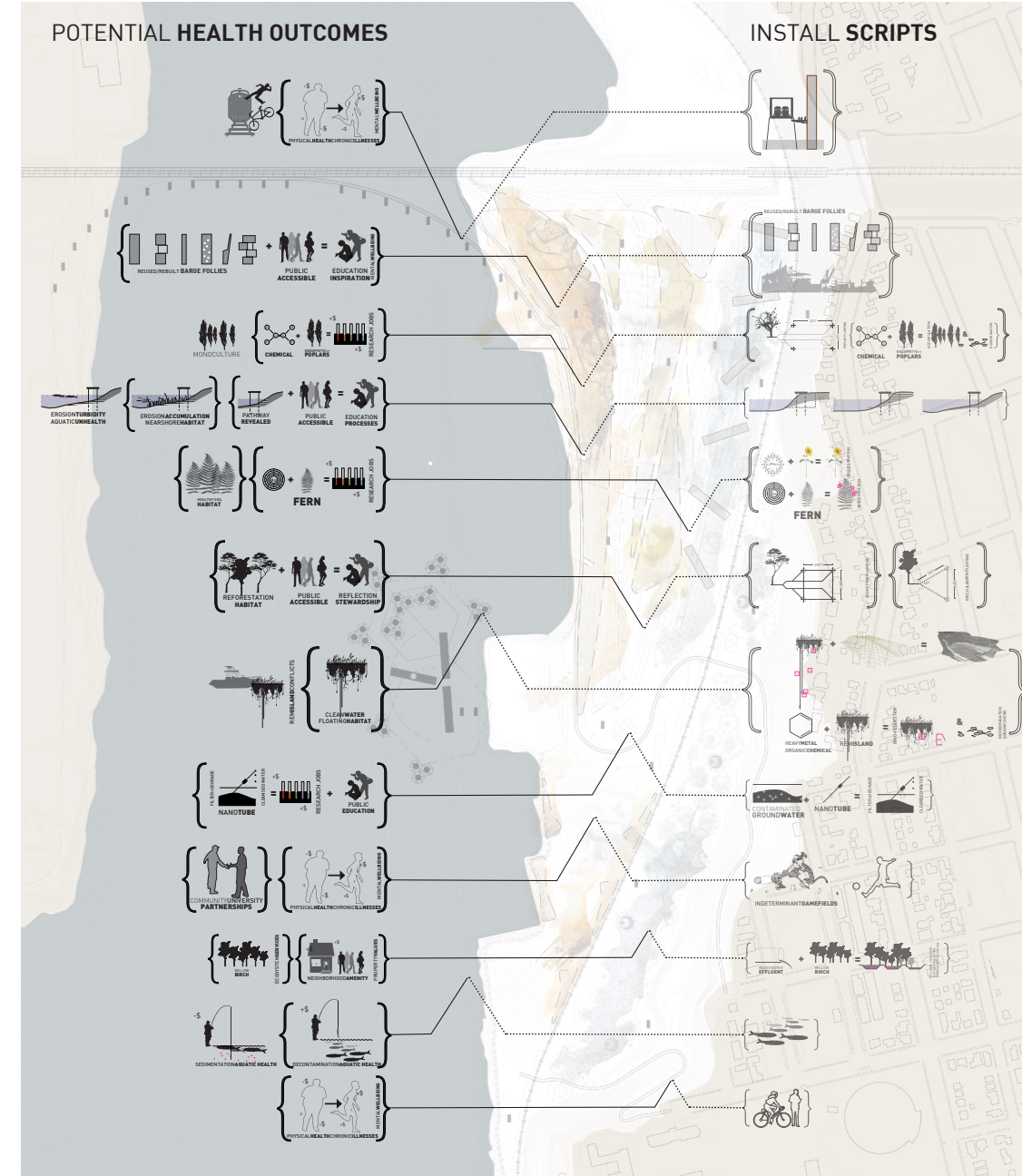
An Isolated Design Intervention and Its Potential Health Outcomes + Evaluation



include creating a healthy nearshore habitat area, making the site publicly accessible, and promoting ecological education of natural processes. Education and stimulation in outdoor areas is known to improve resilience to life challenges, and can affect one's ability to deal with mental and physical health problems. An accessible pathway provides the opportunity for recreation and increased physical activity, reducing the probability of diabetes and other chronic illnesses. The creation of nearshore habitat increases aquatic health, contributing to balancing out the food chain and providing increased opportunities for fishing and the recreational, economical, nutritional and wellbeing aspects of the activity.

The visual evaluation of each design intervention was helpful in understanding the complexity of health implications of the design. While the designers were aware to some degree of potential physical outcomes and their effects on human health, this process was helpful in communicating the extent of the "ripple effect" and those indirect health consequences often left out of the design conversation.

Design Interventions and Potential Health and Unhealth Outcomes



Conclusion

A New Approach: Health Within the Design Conversation

In sum, a dialogue about health taking place within the design process could create more salubrious design and positive health outcomes on people, landscapes and ecologies. The findings in the previous pages may identify a need for:

- Health goals to be defined by all stakeholders
- A 3rd party Health Champion to help navigate and communicate between health and design professionals, as well as stakeholders and the public
- A framework to guide designers and help them understand the health consequences of their design actions
- Further dialogue centered around health in design

By testing the health framework on a university design project, the role of the Health Champion, and the feasibility of the framework was explored. While the DIG Studio project was a theoretical student project, lacking many constraints and input found in the professional world, the framework did appear to embed health into the design conversation, which is reflected in the design. Furthermore, the Health Champion was able to communicate the “ripple effect” and those indirect health consequences (both negative and positive) often left out of the design conversation. Further exploration is needed to determine the actual success of the framework, but the health dialogue within the design process was a positive first step.

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Application of Health to the Design

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HEALTH EVALUATION

RESEARCH + EVALUATION IN THE DESIGN PROCESS

Introduction

Current Trends in Research + Design

Design and research are often viewed as two separate disciplines that rarely cross paths. Very few projects have an appropriate budget for research and evaluation (if any at all) and the little that is conducted often occurs before a designer enters the picture or after the designer is finished, missing valuable cross-pollination of information. Organizations such as the Environmental Design and Research Association (EDRA) are working to weave the perceived academic and professional disciplines together and incorporate research more within the design process, and many high profile design projects are beginning to prioritize research, however mainstream practice does not reflect this trend. Misunderstandings and stereotypes between professionals, differences in training and communication, and a lack of prioritization from clients may be to blame. However, recent inquiries into how the built environment affects health may call for a renewed interest in the integration of research and design.

A Need for Health Research and Evaluation

While designers, and particularly landscape architects, are trained to have a basic understanding of many different disciplines and topics, designers rarely are required to understand health. Other than safety issues, health concepts are not incorporated in the training or licensing of landscape architects.

This used to be the case in understanding environmental sustainability and ecological systems, however with current market trends favoring “green” and sustainable practices, designers were forced to learn these concepts in order to please their clients and win proposals. To cater to this growing need to understand and predict environmental outcomes, a series of tools and metrics were developed for designers (i.e. LEED, SITES etc.). While not every design gets LEED certified, the knowledge of sustainability is transferred to coworkers, other projects, and the next generation of designers. Eventually, concepts of sustainability may become

such common knowledge and practice that the LEED framework may become obsolete. While funding might not be there just yet, the conversation of monitoring and evaluating projects to measure environmental outcomes is becoming more commonplace. This conversation may trickle down to influence market demand and client desires, to prioritize research in every stage of the design. Furthermore, desires for adaptive management practices may create a need for ongoing evaluation of environmental outcomes.

The growing interest in health and design may follow a similar pathway. Tools could be developed to help designers understand and predict health outcomes. Projects may incorporate monitoring and research to determine how the design affected health in a given community. Long-term monitoring may be desired to fulfill adaptive management trends. Eventually, tools and frameworks to help designers understand health in their design may disappear and a health focus in design could become the new 'norm.'

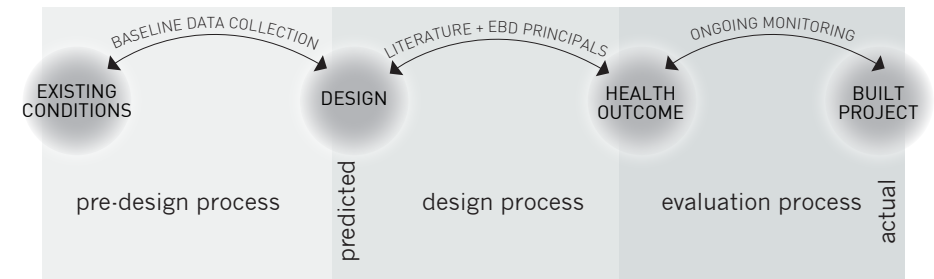
Complete Health Research + Feedback

Research in Every Project Stage

To maximize understanding of health outcomes, research should occur in each stage of the project. Research can be a valuable tool in both predicting and reflecting on health outcomes. Before design, baseline data can be collected to determine preexisting conditions. During design, evidence-based design methods such as a literature or case study review can help predict health outcomes to inform design strategies. After construction, a follow-up evaluation can help determine actual health outcomes. Since health requires time and periodic reflection, ongoing monitoring is best to determine long-term health outcomes.

While research in every project stage is ideal, it is incredibly difficult to accomplish. Research can be expensive and funding is often unavailable for evaluation or long-term monitoring. Following construction, clients may feel satisfied and not interested in researching for the “greater good.” Lastly, project participants will likely change over time, and the desire to follow through with evaluation may be lessened.

Research in Each Project Stage to Maximize Understanding of Health Outcomes

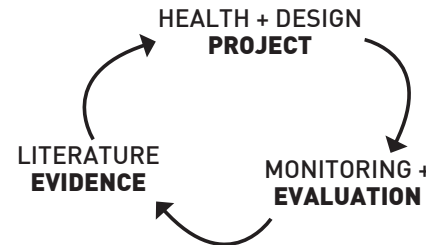


Feedback Loop

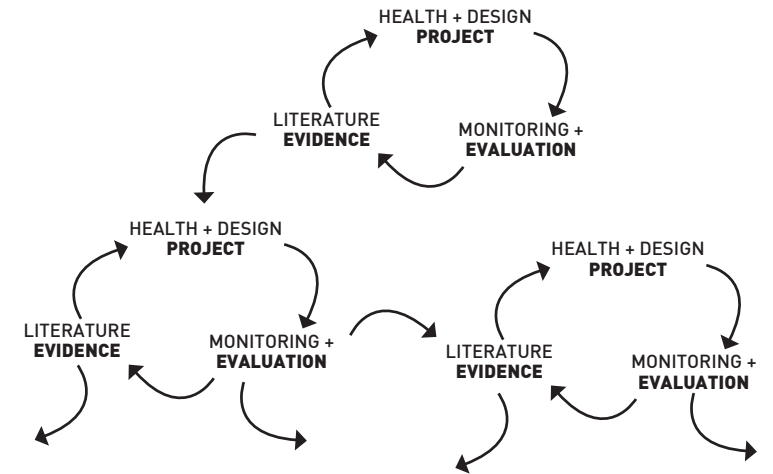
The value of full project research and evaluation lies in the feedback loop. Field research is affected by many different external and internal factors and tests are not able to be isolated in the way they are in the lab. Because of this, the literature database needs to be quite large to account for errors and misinterpreted correlations. By monitoring the project and sharing results, the literature and case study database can grow and designers will have more information to reflect upon. Sharing research can, in turn, help inform other projects in an interconnected feedback loop.

In order for the feedback loop to be fully effective, honest transparency of outcomes must be shared, including both successes and failures. This unfortunately is often not the case, since job reputations, funder expectations, stakeholders and professional pride often interfere with full disclosure.

Health-Design Feedback Loop



Health-Design Feedback Loop and a Growing Database



Evaluation Precedents

There are many existing tactics and tools for predicting and determining outcomes in the built environment. The following section outlines the existing methods for pre-design data collection, tools that help predict outcomes, and methods/tools that evaluate outcomes after construction. While most of these “metrics” quantify outcomes, the last section examines precedents that measure quality and experience. Both quantification of scientific outcomes and examining quality of experiential outcomes are important in health-design practices.

Methods for Existing Data Collection

Gathering existing data can utilize traditional research methods in the natural, social, economic and health sciences. Land surveys and geotechnical reports identify existing landform conditions. Public meetings, interviews, questionnaires and site observations can establish baseline community perception, opinion and use of the site. Health data requires a much more extensive process, but utilizes similar qualitative tactics as well as quantitative health records and public health statistics.

Tools to Predict Outcomes During Design

The recent burst of “metrics” in the design profession responds to a growing interest in predicting quantitative outcomes of design. Most of these tools revolve around the “green” movement to help identify environmentally sustainable layers in a design. Design tools such as LEED (Leadership in Energy and Environmental Design), LEED-ND (LEED Neighborhood Development), SITES (Sustainable Sites Initiative), and SEED (Social Economic Environmental Design) run a design through a metric with the aim to achieve a certain amount of points, reflective of environmental outcomes of the design. While these metrics are voluntary with certification and positive marketing as the goal, several have become local code or required by regulatory agencies. The Seattle Green Factor (SGF) is a mandatory metric aimed at decreasing permeable surfaces, and predicting environmental outcomes in Seattle. The Environmental Protection Agency (EPA) requires a certain “score” predicting

ecological quality outcomes for designed wetlands, called a Vegetated Index of Biological Integrity (VIBI). The National Environmental Policy Act (NEPA) requires an Environmental Impact Statement (EIS) for federal public projects describing the anticipated environmental effects of a proposed action and suggesting alternative solutions.

The Health Impact Assessment (HIA) is similar to the EIS only it anticipates issues regarding human health for projects or policies. The HIA is conducted by planners or public health officials and shares recommendations to decision-makers how a project or policy could be improved to maximize health outcomes. While the HIA is voluntary in most situations, a few local governments around the nation are requiring HIAs for large scale public projects.

Other evidence-based design practices can be employed to predict outcomes and validate design choices such as modelling, simulations, iterative testing + evaluation, learning labs and mock-ups testing usability or functionality.

Precedent Tools for Predicting Outcomes During Design

	Launch	Subject	Audience	Reach	Structure	Media
EPA VIBI	2007	Biodiversity	Biologists, Wetland Designers, Clients	National	Regulation for Wetlands	Paper Submittal, Human Reviewer
HIA	2002	Human Health	Planners, Policy Makers, Public Health Officials	International	Volunteer Assessment	Online Resources
LEED	2000	Environmental + Energy Sustainability	BE Designers, Clients	International	Volunteer Certification	Online Documentation, Human Reviewer
LEED-ND	2009	Environmental + Energy Sustainability	BE Designers, Clients	International	Volunteer Certification	Online Documentation, Human Reviewer
NEPA EIS	1970	Environmental Risk Assessment	Decision Makers, Agencies	National	Regulation / Permit	Paper Submittal, Human Reviewer
SEED	2009	Social, Environmental + Economic Sustainability	BE Designers, Community Leaders	National	Volunteer Certification	Online Documentation, Human Reviewer
SGF	2009	Quantity + Quality of Landscaping	BE Designers, Developers	City of Seattle	Regulation for New Development	Excel Worksheet, Human Reviewer
SITES	2010-pilot	Sustainable Land Design, Construction + Maintenance	Land Designers, Clients, Maintenance	National	Volunteer Certification	Pilot Program Stage

Tools for Evaluation of Outcomes

Gathering data after a project is built can help determine the success of the outcomes. Similar tactics can be used as in existing data collection such as public meetings, interviews, questionnaires and site observations. There are several precedent tools and metrics that assist in evaluating specific outcomes. These tools can help quantify impacts and are helpful for designers and decision-makers to reflect on outcomes and make changes to achieve a better “score.” Salmon-Safe Certification evaluates sites and campuses on their efforts to treat stormwater and protect native salmon in the Pacific Northwest. The STAR Community Index evaluates local government’s initiatives to create sustainable communities and STARS, the Sustainability Tracking, Assessment and Rating System helps colleges and universities evaluate their sustainable initiatives. Walkscore is an evaluation of walkability in communities around the nation. Lastly, the Seattle Happiness Report Card uses surveys to determine the happiness “score” in the city.

Precedent Tools for Evaluating Outcomes Post Construction

	Launch	Subject	Audience	Reach	Structure	Media
Salmon-Safe	2003	Sustainable Land Management Practices	Land Managers, Construction Managers, Maintenance	Pacific NW Region	Volunteer Certification	In Person Assessment
Seattle Happiness Report Card	2011	Mental Health + Wellbeing	Public Officials, General Public	City of Seattle	Public Education	In Person Surveys
STAR	2012-pilot	Sustainable Livable Communities	Local Governments, Communities, Planners	National	Volunteer Rating	Pilot Program Stage
STARS	2008	Environmental, Economic + Social Sustainability	Colleges + Universities	International	Volunteer Certification	Online Documentation, Human Reviewer
Walkscore	2007	Physical Health + Wellbeing	General Public, Planners	National	Public Education	Online Evaluation

Precedents for Qualitative Evaluation

While there are many precedent tools and methods that help gather quantitative data to predict and evaluate science based outcomes, qualitative experiential or emotional outcomes are much more challenging to measure. In design, emotions and perceptions are important to understand to maximize human experience and satisfaction. These factors, in turn affect human happiness and wellbeing, which is linked to positive health outcomes. Interviews, questionnaires, and narratives are typical methods for collecting experiential data, however there are several precedents outside the typical design professions that could also be studied. Olympic figure skating and rhythmic gymnastics as well as competitive dancing utilize metrics to score on presentation and artistry. The Academy Awards, Tonys and Grammys evaluate and rank movies, musicals and music based on personal preferences. Lastly, many Eastern cultures evaluate the quality and energy of a space based on Feng Shui Scores.

Precedents Evaluating Human Experience and Quality

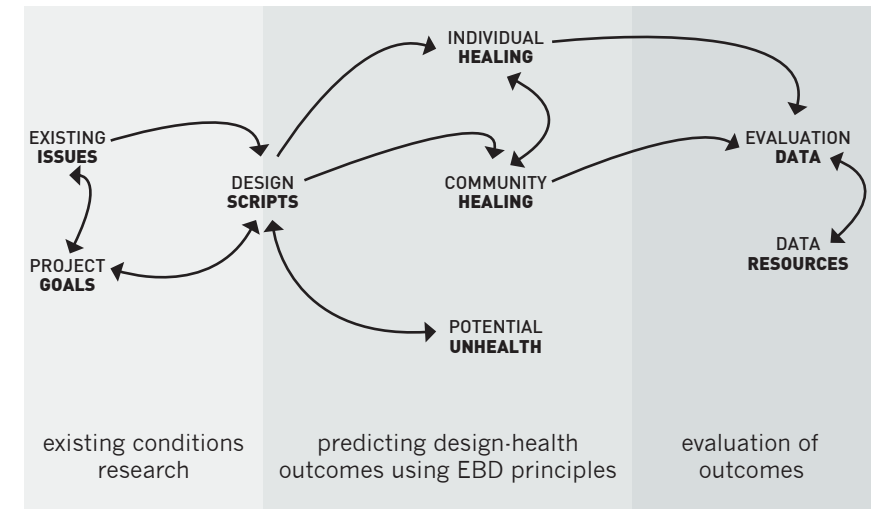
	Subject	Scoring Categories	Reach	Structure	Media
Academy Awards	movies	24 categories, score based on personal preference	International	5,500 members vote for best picture, each professional votes for their expertise, if get 20% of votes you are nominated, most votes win an Oscar	In Person Event
Feng Shui Scores	quality of space, flow of life energy	furniture placement per size + type of room	Personal	lose points for items on the floor and incorrect orientation of the house, rooms, and furniture, gain points for lucky items	Online Calculator
National Youth Ballet Competition	performance art	classical technical ability, performance quality + distinction	National	judged in a technique class + classical repertoire performance that every dancer learns so can easily compare technique + performance against other competitors	In Person Event
Olympic Figure Skating	arts + sports	technical merit + presentation/ artistry	International	9 international judges, computer picks 7 scores randomly, tricks scored for execution and degree of difficulty by computer	In Person Event
Olympic Rhythmic Gymnastics	arts + sports	execution + composite score (artistic + difficulty)	International	execution starts at 10.0 and deducted for technical faults, artistry is quality of music + choreography, difficulty is quality of skills performed	In Person Event

Testing the Health Research Process

Framework for Incorporating Research in Every Project Stage

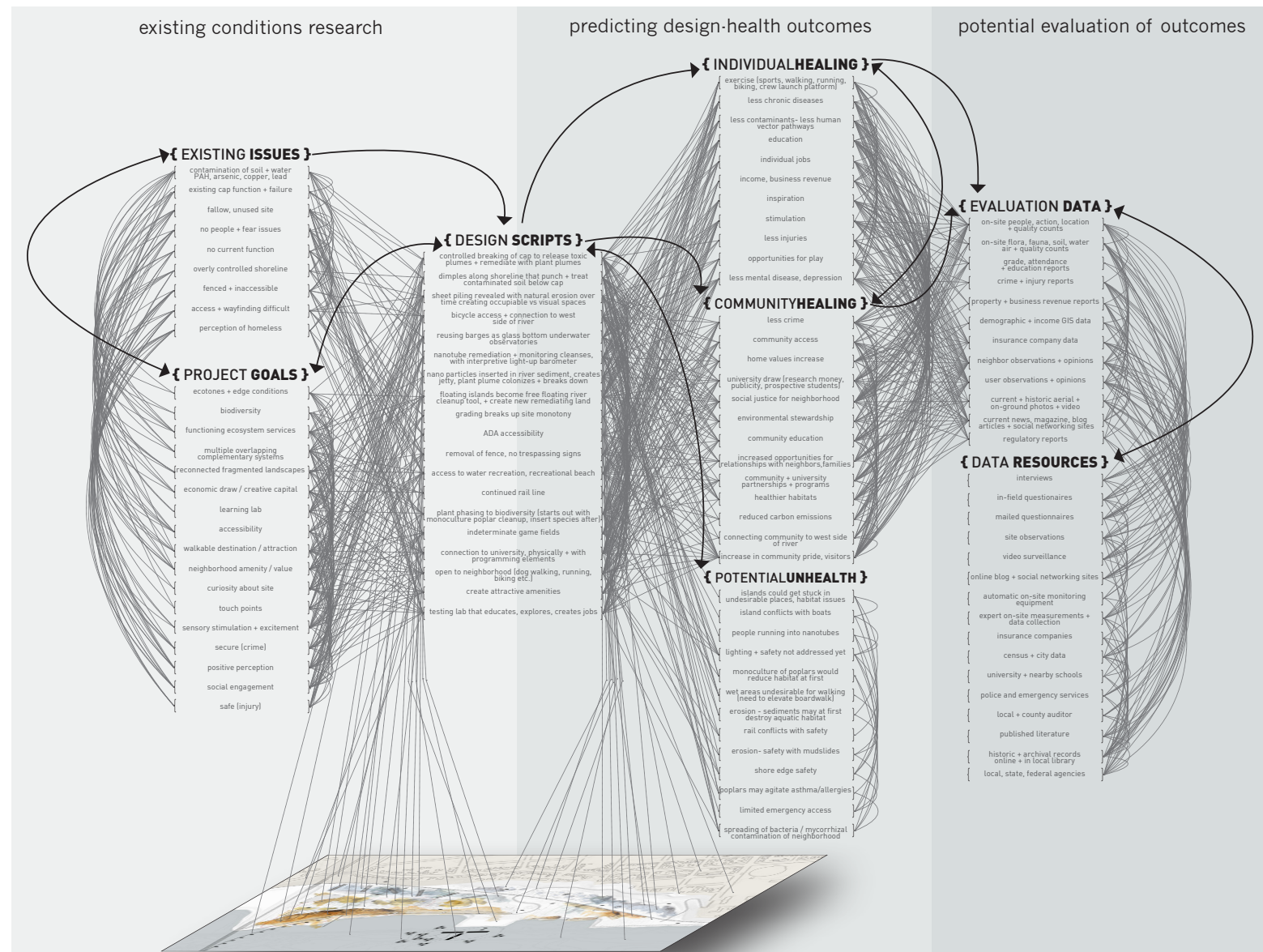
A framework was developed to incorporate research in the full life of the project and understand the health implications of the design. This framework was tested on DIG Studio's design process. The framework begins by collecting existing data to establish baseline conditions. While in the design process, the framework identifies a need to predict health outcomes by using evidence-based design practices. Finally, the framework recommends incorporating evaluation and long-term monitoring to determine the level of success and the actual health outcomes. This framework is visually depicted in the outline to the right, and a more complex visual example of DIG Studio's design in the framework to the far right.

An Outline of the Health Framework + Method for Complete Research and Evaluation



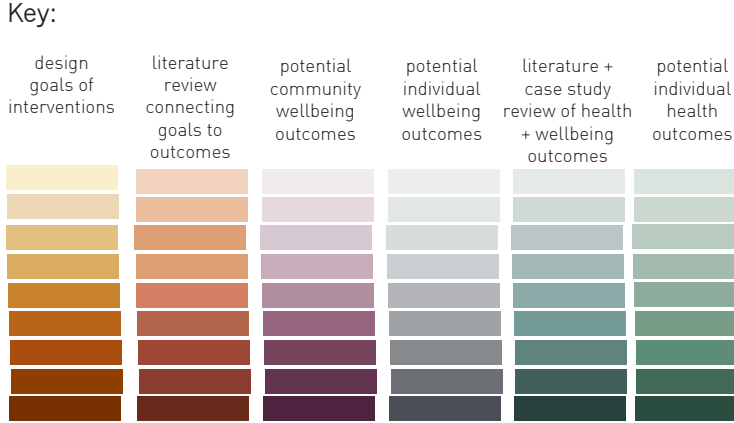
Testing: Existing Conditions Data Collection

Because DIG Studio's project is theoretical and without a client or community, research on existing conditions was not as in-depth as it could be. Ideally, the community would be closely studied for existing baseline health conditions, obtaining both medical statistics and personal opinions. That said, DIG Studio was able to collect data on the existing environmental conditions and the health concerns of contaminants present on the site from EPA and Department of Ecology reports due to the Superfund status and cleanup efforts. Additional physical data was also collected from topographic and aerial mapping, and census demographics and GIS data painted a picture of the existing social and economic conditions of the community. Furthermore, site visits were conducted to obtain additional information such as personal experience, neighborhood perceptions, human scale site interactions, and sight views.

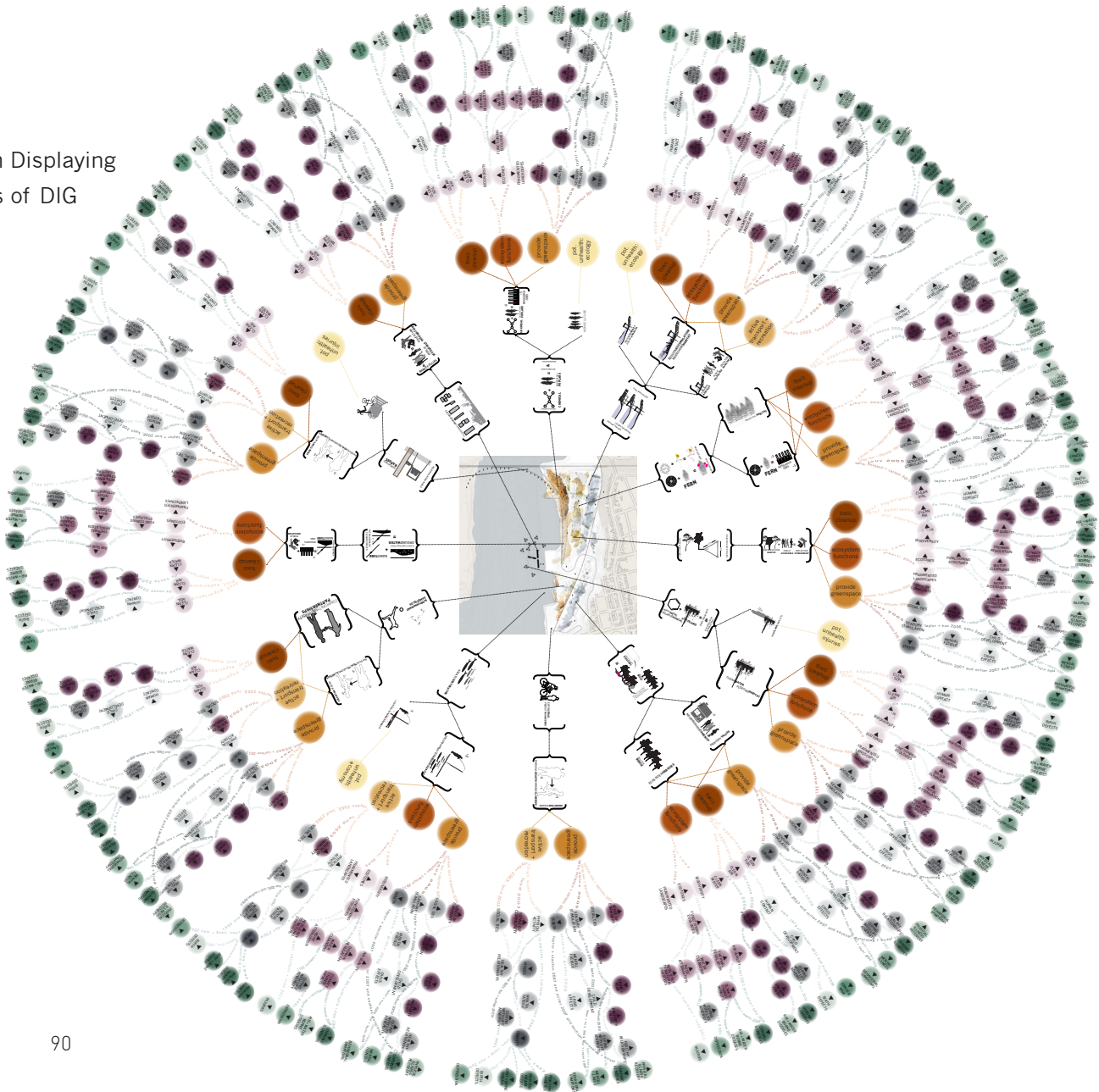


Testing: Health Outcome Prediction in the Design Process

To test how one might go about predicting health outcomes in the design process, aspects of evidence-based practices were conducted on DIG Studio's design. The goals of each design element were formulated and health outcomes were predicted based on literature review and case study research. A complexity diagram was created to visually display this process.

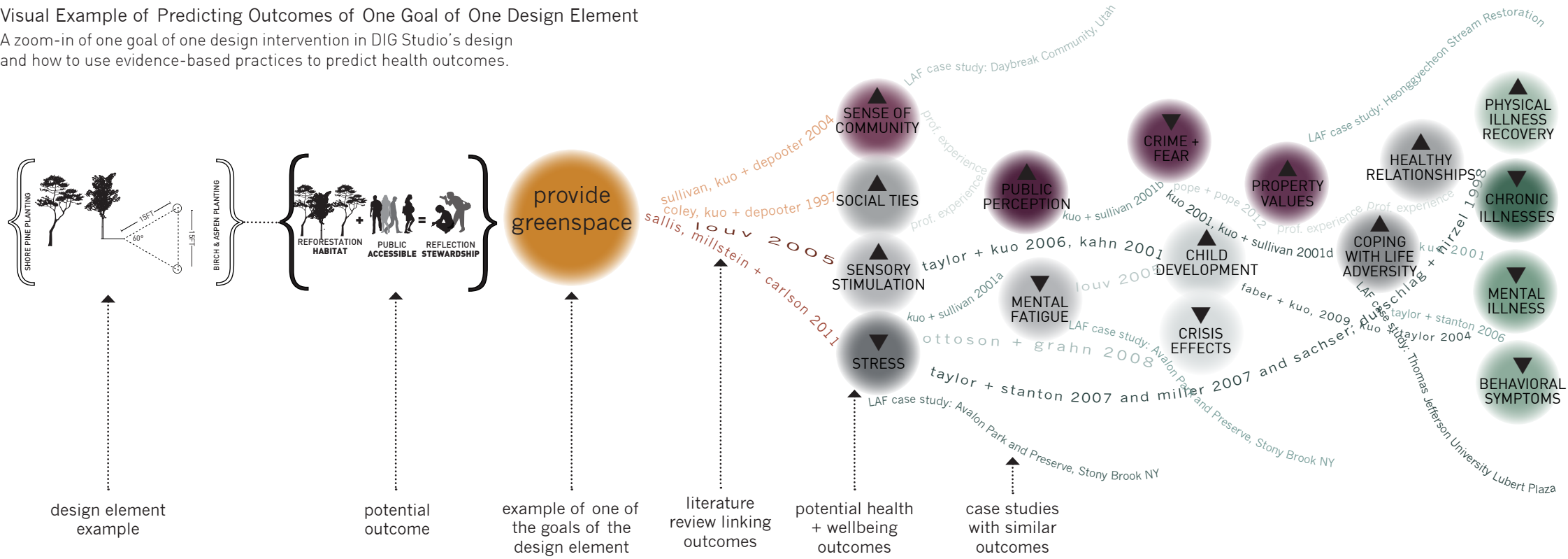


Complexity Diagram Displaying Predicted Outcomes of DIG Studio's Design



Visual Example of Predicting Outcomes of One Goal of One Design Element

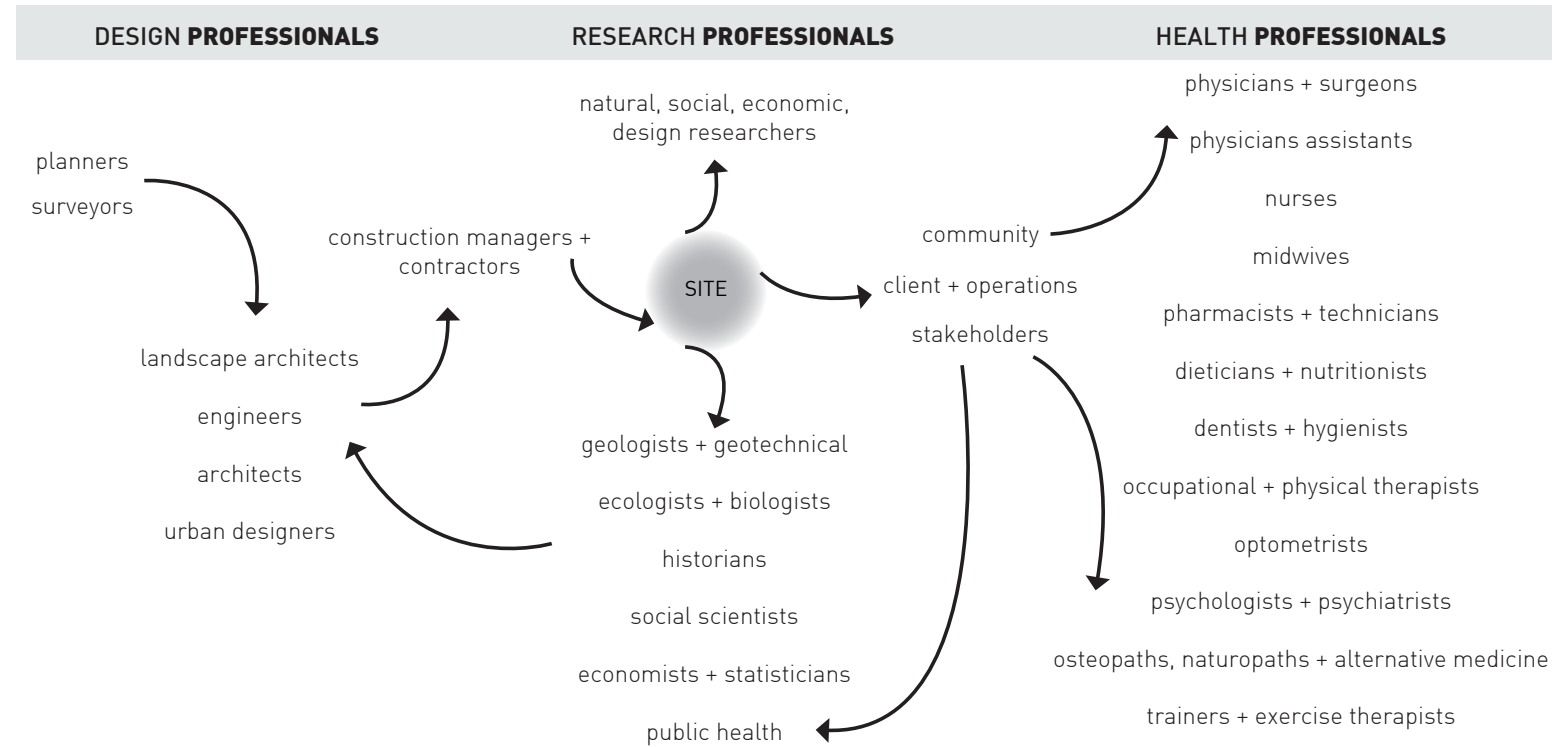
A zoom-in of one goal of one design intervention in DIG Studio's design and how to use evidence-based practices to predict health outcomes.



Challenges with Evaluating Health

Health is an incredibly challenging outcome to evaluate in the field. Because so many aspects of life affect health, it is difficult to correlate that any given built environment intervention is responsible for health changes. Many health issues, such as cancer, take years to develop, and therefore require long-term studies that may not take place because of a lack of funding, patience, or interest. Health is a sensitive topic, and people are not always truthful or willing to talk. Medical records and physicians are held to confidential codes and those without insurance or the ability to see a health care professional may not have an official diagnosis. Lastly, to measure holistic health, a wide range of professionals in many different disciplines are needed. This complexity may create issues in communication and narrowed views based on professional specialization. The actor network diagram to the right outlines some of the disciplines that are involved in design, research and health and their relationship to the site and its users.

Health-Design-Research Actor Network Diagram



Conclusion

Benefits of Predicting and Evaluating Health Outcomes

Utilizing tools and methods to predict health outcomes in the design process and evaluate results after the project is built can be beneficial to the project and its players. Expanding design thinking into the near and long-term future enriches the landscape design process and makes the designer feel a sense of accountability. Metrics and evidence-based design processes aim to close the gap between health issues and what is actually being built. Because of its interdisciplinary nature, a holistic examination of health may facilitate collaboration between otherwise unfamiliar professionals, fostering information exchange and fresh perspectives. Integrating research in every stage of the project synthesizes theory, practice and research of health and the built environment, which in turn increases the demand for further research, builds awareness of the impact the built environment has on health, and shifts the baseline of what is acceptable to be healthy.

Challenges with Predicting and Evaluating Health Outcomes

While there are many benefits to full project research and evaluation, there are a few dangers to consider. This highly logical and scientific approach to design may squish creative thinking and cause designers to only focus on known performance measures, which in turn may smother innovation, resulting in boring designs. Metrics and tools suggest that a designer aim for measurable “points” and ignore artful considerations in design, such as emotion, experience, or intuition. There is the danger and perception that research may make the design process painful or uninspiring. Furthermore, landscapes in particular are affected by larger regional and global systems, and these “plumes” make it difficult to predict or determine health outcomes for any given site boundary. Lastly, a narrow focus on performance outcomes may deduce design to mere numerical or financial outcomes, when, in the context of health, may translate to assigning a number to our wellbeing as a society.

Conclusion: A New Approach to Incorporate Complete Health Research

In conclusion, research can be highly complementary, however it should enhance and inform design, not narrow its parameters or dictate its form. Non-quantifiable or even measurable factors such as emotion or creativity should be allowed to coexist alongside logic and science. Research in the design process as well as evaluation of outcomes after construction should be conducted in an honest and transparent way to educate designers, researchers, health care professionals, clients, stakeholders and users about how the built environment can affect health. Outcomes should be professionally shared to expand the already growing body of research in health and the built environment that designers and decision-makers can learn from. Lastly, funds should be allocated in every public design project for research for the full life of the project in order to maximize and prioritize understanding health outcomes.

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ADAPTIVE INTERVENTIONS

AS A RESULT OF HEALTH EVALUATION

Introduction

“It is no measure of health to be well adjusted to a profoundly sick society.”

~Jiddu Krishnamurti

Adaptive Interventions

Common contemporary practices rarely incorporate long-term monitoring into the management strategy, and even more rarely do projects examine long term health impacts. This lack of evaluation and understanding of design results over time may reduce health potentials or even create unhealthy results. Long term monitoring may continue the health dialogue and provide a better understanding of the long-term health implications of design interventions.

This section explores how long term monitoring can be incorporated into a project to determine success. Success is established by a variety of factors and includes success in the process and acknowledgement of health as well as the actual health outcome.

Using the DIG Studio project as an example design that would benefit from long term evaluation, this section identifies a need for adaptive management practices to direct physical outcomes that will maximize health outcomes.

The following pages explore how adaptive interventions could be utilized to steer a project towards previously established health outcomes. Due to time constraints and a theoretical test project, adaptive intervention techniques were not able to be tested directly on the DIG Studio project, however a system for how interventions could be inserted is discussed. This section asks the question:

How might the health dialogue continue through long-term evaluation informing insertions of adaptive interventions?

Measuring Success

What is Success?

Evaluation occurs so the designer, client or researcher can determine how successful the project is and identify any changes needed to be made to increase success. This begs the following questions:

What does one evaluate when determining success?
How does one know if a strategy is successful?

According to the Minnesota Dept. of Health there are several different types of evaluation. These are:

Process

-evaluating the methods and process for implementing the health intervention

Application: What was accomplished by incorporating health and research into the design process?

Impact

-evaluating how well the goals were reached

Application: Was health more understood? How did the health framework affect the design outcome?

Outcome

-evaluating the health results

Application: How did the health-design process or the designed landscape affect long-term health?

Summative

-A combination of measurements and judgements about the process, impact and outcome that determines the overall success of the action

Application: What is the overall success of these new approaches that integrate health and design?

In their book The Effectiveness of Health Impact Assessment, Wismar, Blau, Ernst and Figueras explain that there are varying degrees of health effectiveness when it comes to decision making, balancing education and acknowledgement with actual actions taken. These degrees are summarized in the chart to the right. An intervention is deemed “effective” if health is acknowledged and a decision was changed in support of health. If no change was made in the decision, but health was added to the dialogue among decision makers, the authors say they “raised awareness” of health, a success in itself. If a decision was changed but health was not the basis for that change, the authors label it “opportunistic,” pointing out that it is not full success unless there is a genuine understanding of the action taken. Lastly, if health never entered the discussion and no decisions were changed, the intervention was not deemed successful (Wismar et al., 2007).

This is important in understanding the varying degrees of how a health framework in design might begin to be evaluated. Even if the framework doesn’t change design decisions at first, the process of implementing the framework could spur dialogue and awareness of health implications of design, potentially informing the next project and set of design decisions. It could be argued that designers might already be subconsciously making design decisions that positively affect health, they just might not be understanding the health outcomes or the magnitude of this impact. The degrees of health effectiveness tell us that an understanding of health is just as important, because without this education, health outcomes will not achieve their full potential.

Degrees of Health Effectiveness

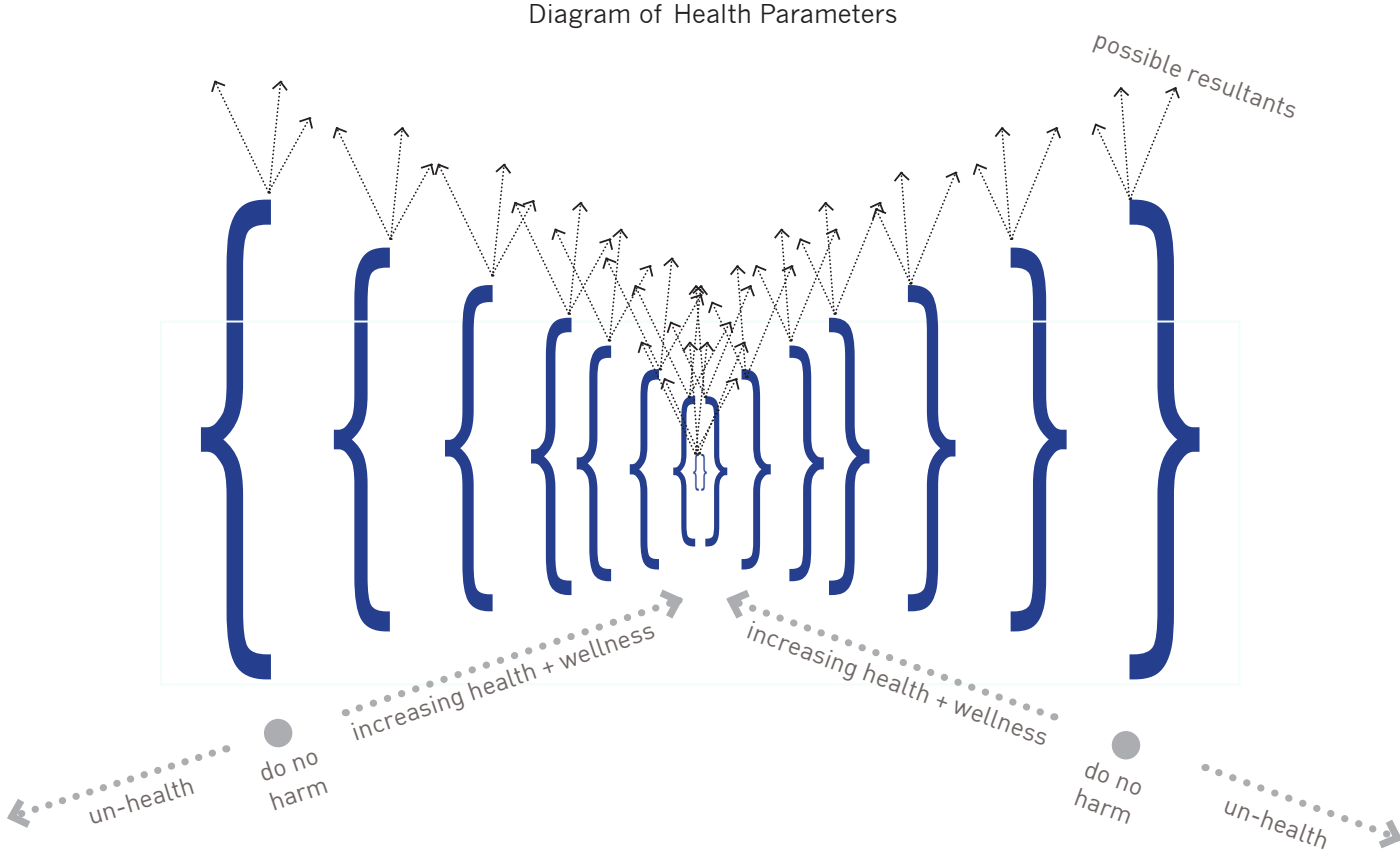
		DECISION CHANGED	
		+	-
HEALTH ACKNOWLEDGED	+	effective	raised awareness
	-	opportunistic	ignored, rejected

[modified from Wismar et al., 2007, p 22]

Parameters for Success

Individual health outcomes can be measured and evaluated only after parameters are established to determine the amount of success. Parameters can be set based on goals established by stakeholders in the beginning of the project. They can be cross-checked with predicted health outcomes that emerge from the evidence-based design process and regulatory standards that apply to the site. Parameters should be revisited over time to reflect a changing community and their needs.

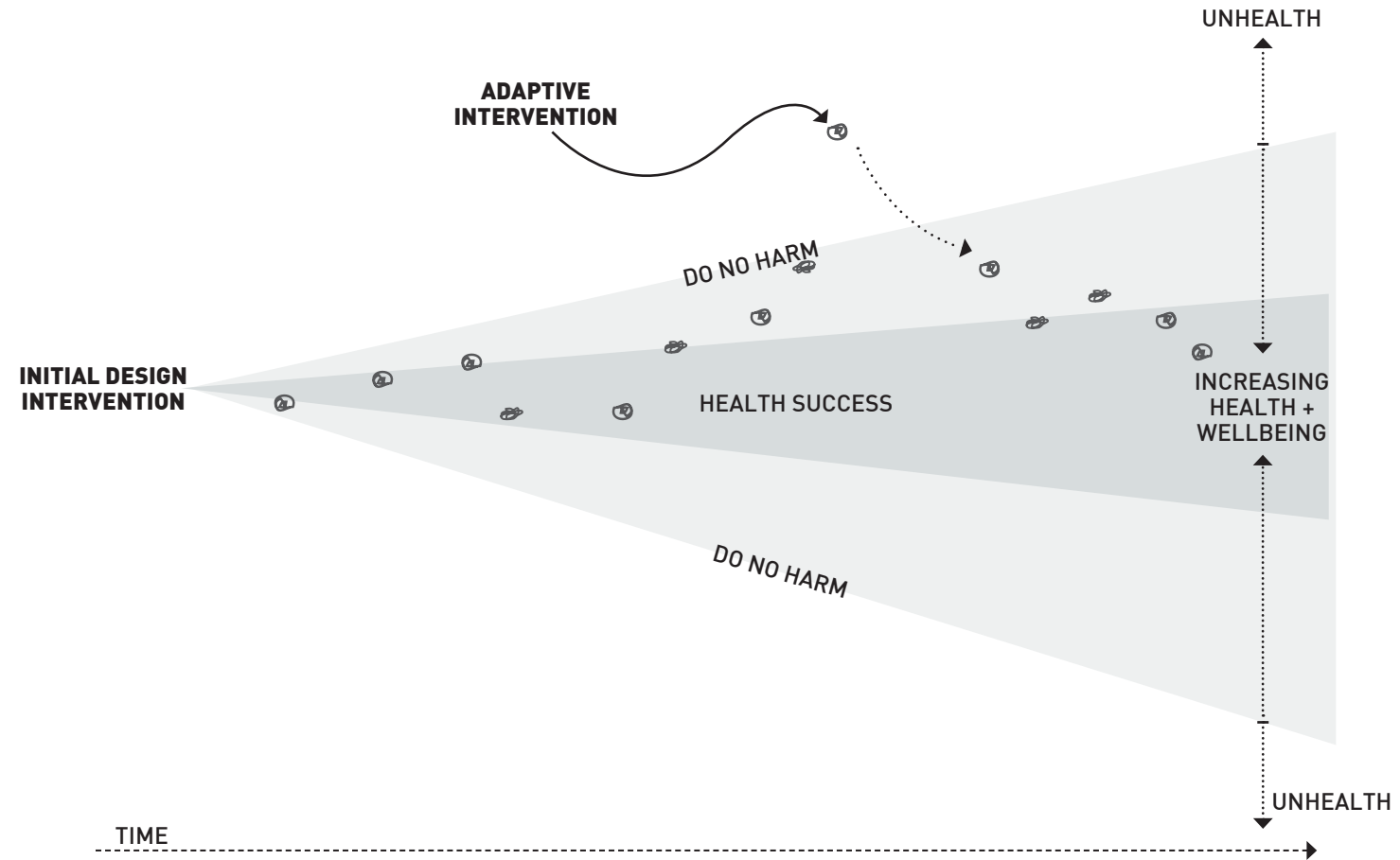
To some degree, it is easier to determine health failure over health success. The diagram to the right describes the clarity of un-health as being worse than the existing state. The “do no harm” point is maintaining the existing state. Health and wellness, however have varying degrees of success. With each health “bracket” follows a different health resultant. Health and wellbeing can almost always be reevaluated to reach for a higher standard. Additionally, regulatory standards might



set minimal parameters for health, while personal opinions of health and wellbeing might reach for a higher standard.

After parameters are established to determine what is deemed unsuccessful, or unhealthy, monitoring and evaluation can occur to measure success. Monitoring ideally should occur periodically and over a long period of time to determine long-term health successes. If monitoring results deem an aspect of the project and its health outcome unsuccessful, then the client, designer or site manager should intervene with a design intervention or policy to fix the issue. This practice of allowing flexibility and growth in design, monitoring periodically, and intervening when necessary is called adaptive management. Adaptive management is a growing trend, especially in ecological design, allowing for several acceptable design results instead of a static masterplan as a goal. If the design strays outside the health parameters, adaptive interventions can be utilized to steer the outcome back on the track to success. The diagram to the right illustrates this concept.

Diagram of the Role of Adaptive Interventions To Steer Towards Acceptable Health Parameters



Conclusion

Testing the Adaptive Intervention Process

In the interest of time, DIG Studio was not able to establish specific parameters for each predicted health outcome, and because it is a theoretical project, it is not feasible to test the implementation of adaptive management. That said, the adaptive management process would be quite appropriate for this project. Because health is the goal, rather than a static masterplan or specific physical outcome, ongoing evaluation will be necessary to determine the successes of the project. Adaptive interventions will steer the physical outcomes when they begin to drift off course.

A New Approach: Adaptive Interventions To Increase Health

In sum, adaptive interventions may be an effective way to aim for successful health outcomes over time and maximize the health of people, landscapes and ecologies. The findings in the previous pages may identify a need for:

- Defined health parameters to guide health evaluation
- Ongoing dialogue and evaluation with client, community, and users for periodic reexamination of health standards
- Periodic evaluation over the long-term for checkpoints on health status over time
- Adaptive management strategies for projects involving health to intervene when outcomes steer outside the health parameters

By establishing a methodology and prioritizing funding for adaptive interventions, the health dialogue can continue, maximizing potential health outcomes.

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CONCLUDING THOUGHTS

LOOKING BACK AND MOVING FORWARD

Thoughts on Thesis Structure

Reflecting on the Thesis Process

While it was merely theoretical and lacked many aspects of real world projects, using the student capstone project as a tangible example to test the feasibility of the Health Champion and the Health Framework proved very valuable. I was able to get honest responses from real designers entering the profession, as well as observe discomfort and creative excitement. These initial responses helped me craft a framework without the pressures of affecting the timeline and budget of a professional project. Because there were three landscape architects, all of different design personalities, the feedback is much more rounded than if it were tested on only one designer.

There were, however some limiting downsides to using a theoretical student project. The lack of a client, budget and community made the process much simpler and more flexible, reducing the complex multi-dimensional role of the Health Champion merely to a health advisor for the designers. If the Health Champion were to be a liaison between

the health-design-community worlds, it would be a much more extensive position, opening the door to many more issues and opportunities, and a possible funding constraint.

Additionally, pairing with a student project meant that the project timeline needed to conform to an academic schedule. These timeline constraints did not allow for the project to get past schematic and big-picture design, leaving out the technical and construction detailing that is where many health decisions are made. Since I also was on an academic schedule, I was unable to deeply or formally analyze the reactions of the capstone group members. With additional time, I would love to perform extensive interviews or questionnaires, perform videotaping of the design process, and/or formulate an objective way to measure successful adoption of the framework. Lastly, the required thesis timeline meant that the capstone group and I were developing our projects at the same time. Since I needed to digest what the capstone group was doing in the moment, but they also needed to proceed further in their design, there were several

times where the capstone group was unable to reflect on my findings in order to make deadlines. While I am able to conclude that a health dialogue was established, I do not believe that ‘health’ was as deeply embedded in their design as it could be, due to these restraints.

In an ideal world without academic and life schedules, the framework would be tested on both theoretical as well as professional projects, and would incorporate voices outside the design profession including varying communities, regulatory agencies, health departments, public health officials and clients. Surveys and interviews would be conducted to get varying opinions of the success, and the framework would be recrafted to reflect these results.

Health in the Design Conversation AND Design in the Health Conversation

One of the biggest hurdles I have discovered in this thesis process is communicating between professions. I have found that terminology in the

health professions is often very well defined, while designers tend to create words to fit what they are describing. Both professions are jam-packed with discipline specific buzzwords. Additionally, designers are trained to examine big-picture systems and patterns first then funnel down to details and results, while health professionals often think oppositely, looking at diagnostic details and results and then projecting outward to larger patterns and systems. This difference in language and training can make for quite confusing conversations and often result in frustration, bruised egos, and feeling like one must simplify complex thoughts for the other profession. A Health Champion might help with translation and communications, however the best way to overcome language barriers is to be immersed in the culture- by continued collaboration and sharing across disciplines. Both professions must meet each other in the middle, which is more easily said than done.



DIG Studio on the designed site, from left: Tera Hatfield, Jordan Bell, David Tomlinson, Leann Andrews

Thoughts on Thesis Contents

Reflecting on the Health Framework

Feedback early on in this process identified a desire to help designers quantify health impacts so they could understand the extent of their health consequences. Because health is not a direct correlation, and there are many aspects of health that can (and should) not be quantified, a health metric was discarded for a more fluid Health Framework. This Health Framework was crafted to accomplish the same task as a health metric would- to get designers to think critically about health impacts.

The Health Framework that came out of this thesis is merely a starting place. It got the capstone group thinking about health while in the design process, and talking about potential health consequences of design actions. The framework identified ways that the design affected both individual and community health in various scales. The framework expanded the designers' concept of health to include both people and ecological function, and while they did not have the time to fully digest the results of the health evaluation, the designers did acknowledge

gaps in their design strategy that, with further design iterations, may have led to more salubrious results. It is impossible to fully understand how successful the Health Framework is unless it is tested out on a professional project and monitored for many years.

Reflecting on the Health Champion

The role of the Health Champion in this thesis accomplished its task: to facilitate a dialogue of health in the design process. While it is difficult to determine exactly the cause, the word 'health' did not appear in design conversations prior to the adoption of the Health Champion role, but was commonplace after the role was established. That said, as previously mentioned, my role of testing out the Health Champion in this thesis was not quite as extensive as I believe the role should be. The lack of public, client and a budget simplified the role. Additionally, while I have studied health concepts in depth, I do not personally have the technical background in public health that should be present in the Health Champion. The Health Champion should be skilled in understanding both complex

health issues as well as the creative design process and the intricacies of construction. A multi-faceted education is needed across both design and health disciplines in order to effectively communicate between the professions.

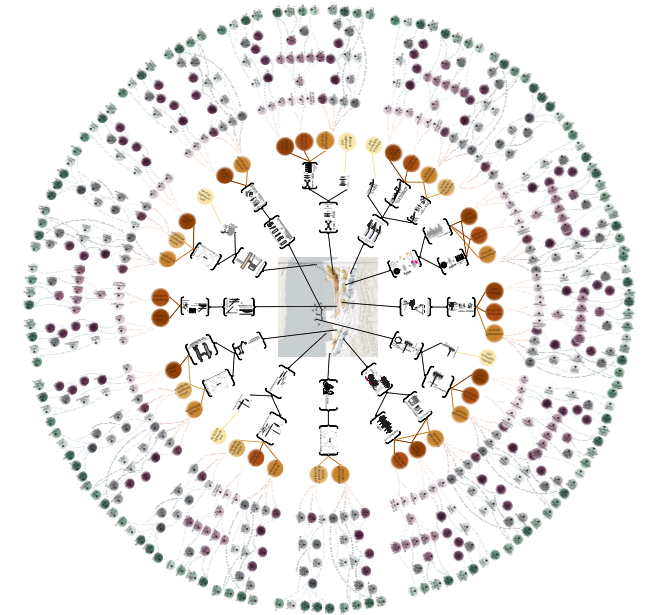
Diagramming and Graphic Output

The process of creating diagrams was quite helpful in exploring such a heavy and complex topic as health. Several themes emerged from the diagramming production process.

First, when drawing each of the diagrams, I was constantly fighting urges to simplify and organize. Even the diagrams expressing visual complexity are not fully representative of the non-linear entanglement that is present in the health and built environment world. Specifically, the visual complexity diagrams in the Testing the Health Research Process section turned out much more neat and orderly than present in reality. I believe a more organic feel would be more representative of the process.

Secondly, I began to wonder how helpful the diagramming process is to those not intimately involved in the project. I received positive feedback on some of the more simple diagrams such as the holistic health model and the health-design-research actor network diagram, as conveying information clearly that one can digest in a single glance. I wonder, however if this is problematic, since both of these topics are incredibly expansive and complicated. Conversely, with the complexity diagrams I received feedback that it is incredibly difficult to understand what is going on in these diagrams and, while attractive to look at, the viewer is quite overwhelmed. So overwhelmed in fact that even my own team members in the capstone group did not grasp the information, which means the data never transferred over to them. Personally, in the act of drawing the diagram, I believe I was able to absorb and digest significant amounts of information and have learned quite a bit from this process, so I very much value this method, but I would like to continue exploring ways that those that are not involved can learn from this process also.

The last theme that emerged was how each of these diagrams benefitted from organic and fluid graphic language. Testing out the different health frameworks in Chapter 2 particularly displays the value of organic “conversation.” The successful framework was one in which dialogue and freedom in creative thought were also valued.



Thoughts on Next Steps

Overall Insights

This thesis has merely brushed upon the health-design relationship, which merits significant further attention. A few concluding thoughts have emerged from the process of working with the capstone group of designers and examining the outcomes and conversations along the way:

- **today's designers don't really talk about health**
- **health is extremely complicated and there is not enough research available on health impacts of the built environment**
- **healthful design should occur beyond medical institutions; we all need health**
- **an interdisciplinary approach is needed however communication barriers between professions need to be addressed**
- **to appeal to the design market, health should be generative, inspirational, accessible, and enjoyable**

Moving Forward

If I were to expand on this thesis, I would continue exploring the ideas of complexity, communication and

transfer of knowledge within the health framework. I would dig further into how one might evaluate the “softer” outcomes such as human experience and emotion, to reveal their value and role in affecting health outcomes. I would like to explore monitoring and evaluation of health more thoroughly, in both quantitative and qualitative data collection. Lastly, I would like to reflect more upon the process of working with DIG Studio, or other projects in progress, potentially conducting interviews and/or questionnaires to understand the value of the health framework in their design process.

I believe that health is an emerging market in the design professions, and, with the increasingly growing health and environmental issues all over the world, is not going away anytime soon. Health and design professionals need to work together to solve health issues on a larger scale and more attention should be placed towards collaboration and cross-pollination between disciplines to break down barriers and move together in a collective force to create healthier people, landscapes and ecosystems.

