Building

Structures

for Health &

Cities

Well-Being

Systems

Abstract Book

09:00AM - 10:30AM   **Building Well-Being from Academy to Practice**   *Keoni Auditorium*
Moderator: Billie Faircloth, KieranTimberlake

A Community-driven Urban Acupuncture to Address the "Micro-Food Desert" in A Relatively Affluent County

Hui Cai, University of Kansas
Robin Liston, University of Kansas
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Kim Kimminau, University of Kansas

A growing number of studies have recognized the impact of "food desert" on residents' health outcomes such as obesity, diabetes and heart disease. Most existing research focuses on underserved areas with clear racial and economic stratification. It is challenging to identify communities with limited access to healthy food located within highly populated and more affluent counties. These communities are surrounded by resource rich neighborhoods and have unclear geographically delimited concentrations of poverty. These areas are overlooked regarding access to healthy food. Johnson County, KS, a largely urban and moderate/high socioeconomic ranked county in suburban Kansas City is such an example. This presentation will report our recent research on healthy food access in Johnson County through the urban acupuncture approach.

Design: The project has three phases. Phase I identified "micro-food deserts" using ArcGIS mapping and analysis. Secondary data from several sources were compiled and analyzed. Various food outlets distribution (grocery stores, farmers' markets, cultural food stores, convenience stores, food pantries, soup kitchens, and community gardens) were correlated with demographics and neighborhood socioeconomic status at the census tract level. County public transportation system and road network (using 0.5-mile circular buffer and 5-minute driving distance thresholds) overlaid these maps. The community, including the Johnson County Department of Health and Environment Food Policy Council (FPC) used an interactive web map app to facilitate identification of policy options to improve healthy food access.

Phase II engaged three targeted communities using focus groups and Photovoice collected by community members. Researchers worked closely with FPC members, community and faith-based organizations, schools, and residents in the micro-food deserts to further understand food shopping behaviors, barriers in accessing healthy food resources, and potential grassroots solutions to address the issue. Crystallization immersion was used to distill key themes to aid in shaping policy recommendations.

Phase III will use community-based design methods to translate policy recommendations into community-informed planning and design interventions. A joint studio is proposed for students in Department of Architecture and Public Health program to collaborate in generating design solutions to improve access to healthy food and developing audit tools to monitor improvements in behavior and public health outcomes.

Results: The first two phases of the project are completed. The interactive maps assisted communities, public health organizations and the research team to pinpoint the neighborhoods with barriers to access healthy food. These data plus the results of Photovoice informed the FPC and county leaders on the food environment that lead to community-driven policy food access recommendations. Through the participatory design process in Phase III, the concept of community designed enhancement for healthy eating will be further advocated to the community.

This project is a result of close collaborations among public health, planning, design and community stakeholders. The urban acupuncture and community engagement approach allows the multi-disciplinary team to identify areas in need of public health-informed programming and provide specific recommendations for food access improvement that are tailored, ultimately leading to enhancements that encourage behavior change, reduction in chronic disease and improved health outcomes.

Beyond Best Practices: How One Architecture Firm is Exploring Engagement Strategies to Find New Solutions that Promote Healthy Communities

Anne Schopf, Mahlum Architects

In architecture, the intention of best practices has been to efficiently spread knowledge of what works in one environment to others. A benefit of best practices is that they leverage the value of accumulated knowledge of successful design to complex and systemic challenges. One criticism, however, is that best practices propagate the status quo rather than break new ground. Another is that best practices may not be locally appropriate. Predefined, generic design solutions may not fit – or stick – in a unique time, place or culture.

Looking not only to examples of success in the generic, practitioners should be searching for idiosyncratic examples of success close at hand through intimate engagement strategies of stakeholders and users.

One line of inquiry is this: How might architects use engagement strategies to move beyond best practices so we can 1) illuminate already existing but unseen solutions that increase health, including those that are culturally embedded, and 2) create design solutions that better leverage the intersection between the built environment and health-promoting beliefs and behaviors?

We will share case studies from our practice to highlight three diverse methods of engagement. Ethnographic strategies enabled deep understanding of the lives of the Native Alaskan Culture of the Bering Sea Region to support design of a new hospital and primary care center in Nome, Alaska. Here a storytelling technique revealed deep cultural differences around community support networks and wayfinding that led to the design and inclusion of a Qargi (ceremonial gathering place). Additionally, a digital survey engagement tool collects both use patterns and emotional responses within a given area and set of behavioral questions which allows for a deeper understanding of use patterns on a town scale, reinforcing what is known while simultaneously revealing hidden use patterns of thousands of inhabitants. The My Places Survey tool for engagement was deployed on the University of Washington campus to study patterns and behaviors within the campus open spaces of its nearly 70,000 students, faculty and staff. The results influenced the West Campus Development Framework, a plan that imagines the future for 72 acres of underutilized University property as a rich entrepreneurial zone for research, development and commercialization, incorporating unique access to open space and activating uses, tuned to promote a healthy and sustainable campus context responsive to existing patterns and opinions of use. And finally, image gaming cards allow users to self-define wellness and healing through free form association with a variety of images. These insights have formed the basis for an ecologically connected response in the design of our K-12 schools.

Using engagement strategies to move beyond best practices leads to architectural solutions that are emergent, tuned responses to local conditions, and potentially more effective vehicles for pro-health behavioral changes. These early examples from practice reveal both advantages and challenges of various engagement strategies, and show the potential of engagement as an important way to contribute to design solutions for systemic issues of health, safety, equity and social relationships.

Exploring Opportunities at the Intersection of Design and Public Health Pedagogies

Traci Rider, North Carolina State University
Aaron Hipp, North Carolina State University

Though the understanding of the built environment's impact on public health is growing, there are still challenges to engaging meaningful health awareness, let alone metrics, in a design curriculum that emphasizes traditional design strategies, methods, and educational strategies. At the pedagogical level, education in the realms of public health and design are historically different in terms of strategies, tactics, and emphasis. This session will review two approaches to educating for health in the built environment: one collaborative instance of course development between public health and architecture, and another interdisciplinary approach to exploring the issues conceptually through an interdisciplinary but architecture-based seminar.

The first course, 'Transdisciplinary Problem Solving: Public Health and the Built Environment,' is a graduate course designed as half seminar and guest lectures and half a student-completed Health Impact Assessment (HIA) for a local built environment change. One iteration of the course focused on a built project on campus, completing a series of baseline measures prior to the beginning of construction. Three years later, post-occupancy evaluations are ongoing (Spring 2016) which will allow impact evaluation of the new building. The course has been co-instructed between public health and architecture faculty as well as cross-listed across graduate programs.

The second course conceptually explores the impacts of built form on the end users, which is not currently emphasized in

the curriculum. Focusing on the implementation of the WELL Building Standard in six real-life projects, interdisciplinary student teams partner with six local architecture firms on the assessment of actual projects in various stages of design and construction. Course outcomes for this design-based effort include expanding critical thinking and analysis skills; engaging students in real world projects; understanding different green building assessment systems; and participating in interdisciplinary student teams. The first half of the semester focuses on understanding the basics of the WELL Building System and Living Building Challenge. The second half of the semester emphasizes partnerships with the firms, reviewing both possibilities for the existing designs as well as alternative strategies for higher achievements in the two assessment systems.

There is a significant push at many universities to focus both on interdisciplinary collaborations as well as important, game-changing topics in research and education. Exploring unique partnerships and approaches to real-world, applied projects can position our departments for greater engagement with stakeholders and practitioners, pedagogical and research-based funding opportunities, and equipping students with skills increasing in demand. Centered on the findings from these two tactics, a conceptual framework for future interdisciplinary approaches to address health and well-being in the built environment will be presented. The framework will highlight common themes, terminologies, and backgrounds between the two, and suggested future steps for a more meaningful approach to applied pedagogy about health in the built environment.

11:00AM - 12:30PM	Health, Place, and Equity	*Asia Room*

Moderator: Howard Frumkin, University of Washington

Application of the Ecologic Environmental Justice Framework in Charleston, South Carolina: An Environmental Justice Case Study

Sacoby Wilson, University of Maryland

Environmental injustice is often the result of cumulative exposure to multiple chemical and non-chemical stressors at the individual, population, and ecologic levels. Additionally, many communities impacted by environmental injustice have exhibited some degree of resiliency which has helped overburdened groups survive and to a certain extent thrive under unhealthy environmental conditions. This is due in part to positive exposures to ecologic salutogens. In this presentation, we will discuss the development and application of the ecologic environmental justice framework that helps to capture the experience of communities impacted by environmental injustice. This framework takes an ecological approach towards community health, showing that community capacity is tied to the ecological features of the built and social environment. The framework allows all types of hazards to be integrated in a researcher's understanding of environmental health disparities by classifying them under the umbrella of structural factors. The framework assumes that community structures, both physical and institutional, form an umbrella under which a community ecosystem develops. Such a system develops as the result of such structural factors as segregation and zoning, planning, and community development. The model further assumes that community ecosystems are comprised of pathogenic and salutogenic features, here easily categorizing the many hazards a community may face and subsequently allowing researchers to determine their cumulative effects (either positive or negative) on the community. This holistic approach provides researchers a simple tool for assessing the sources and magnitude of disparity in a community. It also brings simplicity to a complex web of agents that act through many media and take many forms to impact members of a community.

In this presentation, the authors will discuss the application of the ecologic environmental justice framework in Charleston, South Carolina. The research team will discuss the use of block assessments to measure positive and negative ecologic features in neighborhoods that are part of the Low Country Alliance for Model Communities (LAMC), a local environmental justice and health organization. The team will also discuss the use of the framework in the development of a community-informed cumulative stressors and resiliency index. The team will conclude by discussing how this index has been used to educate residents about the health of their community ecosystem and used to inform zoning and planning decisions in order to revitalize LAMC neighborhoods.

Backyard Junk and Big Boxes: Inequality and Spatial Politics in the Rural South'

David Franco, Clemson University

The contact with nature is commonly seen as a source of health and life quality. However, it is precisely in the environments where this contact seems easier -small towns and rural suburbs, where obesity and heart disease rates are higher. Symptomatically, it is in such settings where poverty rates and inequality have grown most rapidly during the last decade.

This paper aims to study the correlation between social inequality and unhealthy lifestyles that has progressively become intrinsic of contemporary rural suburbia in the American South. With that end it will focus over the interrelation and contrast between two spatial manifestations that define this territory: On one side the carefully planned environment of retail Big Boxes as spaces for controlled consumption and, on the other, the informality and looseness of Rural Domesticity. These two opposite built forms -Big boxes and cheap rural houses- constitute the main architectural elements of an urban model which, despite fostering poverty and social disconnection, remains the dominant in most of American Southern regions. Departing from the notion of Spatial Politics –understood as the set of relationships established between certain productive and social practices and the built environment where they take place-, this paper attempts to clarify how much of this distinctive condition of the Rural South is determined by its current spatial organization.

Recent scholarship highlights, for example, the correlation between the presence of large retail stores –such as Wal-mart- and the increase of poverty rates in low-density areas (Goetz and Swaminathan, 2004). Although we know the extensive influence of the feared and well-known 'Walt-mart effect' over the economy of rural communities -impact over local commercial tissue and oppressive labor policies-, there is an essential blind spot in the way it is understood and studied: the role of the actual architectures where this vicious circle of consumption and poverty takes place. But the everyday life of the rural South also incorporates a rich collection of spatial practices - informal farming, backyard occupation, accumulation and recycling of junk,…-, in which we recognize what Jeremy Till and others have defined as Creative Scarcity: the use of design ingenuity to redefine a particular problem, concentrating on the redistribution of what already exists rather than on the addition of something new.

Therefore, this paper tackles together, as parts of a multifaceted system, the spatial and social techniques used to design Big Boxes in little towns -which tend to be uniform and rationalized-, and the domestic practices of most of their customers and employees -which despite their shortages tend to be rich and highly subjective. Attempting to clarify, firstly, their role on the persistence of poverty and sedentary lifestyles and, secondly, what type of spatial transformations based on them could be performed to break this relentless cycle.

Development of Environmental Benefits Districts in Prince Georges County, MD: An Approach to Address Environmental Injustice and Revitalize Underserved Urban Neighborhoods

Sacoby Wilson, University of Maryland
Jake Bueno de Mesquita, University of Maryland
Katrina Bibb, University of Maryland
Hillary Craddock, University of Maryland
Melissa Desantiago, University of Maryland
Winnie Mutunga, University of Maryland
Rhodel Bradshaw, University of Maryland

Many communities impacted by environmental justice (EJ) issues not only have a differential burden of environmental hazards and high concentration of psychosocial stressors but also inequities in planning, zoning, and development including an abundance of pathogenic infrastructure. Environmental Benefits Districts (EBDs) may be a solution to the problem of environmental injustice because of the focus on salutogenesis and equitable development. For example, green benefits districts in San Francisco, California, are especially zoned to facilitate the channeling of resources and revitalization into improving cityscapes through the promotion of green space, parks, and other activities that enhance local environmental health. Additionally, the ReGenesis Project in Spartanburg, SC has leveraged $300 million dollars to redevelop an EJ community with brownfields, Superfund sites, and other environmental health hazards into a model sustainable community.

Unfortunately, this EBD construct is relatively new and its small, early successes warrants an in-depth analysis to help describe the metrics that can be used in citing EBDs and estimating the social, health, and economic and environmental impacts of EBD implementation. As part of a class project in Environmental Law and Policy at UMD, students worked on

behalf of their client, the Prince Georges County Department of the Environment, to develop a more structured and defined EBD construct for Prince Georges County, MD that leverages EJ science and the equitable development framework. The students developed metrics for designating EBDs using the ecologic environmental justice (EEJ) framework which frames neighborhoods as community ecosystems, and focuses on increasing the number of salutogenic features and reducing or transforming pathogenic features of the built and social environments. Additionally, the students developed an EJ profile for Prince Georges County using EJSCREEN. This profile included case studies of zoning and planning inequities in the county, accounting of health disparities using the MD Environmental Public Health Tracking Program, and case studies on Sheriff Road and Brandywine, MD, two EJ communities. Additionally, the students reviewed the gaps in similar programs including brownfield redevelopment efforts, Economic Enterprise Zones, Health Enterprise Zones, and the Transforming Neighborhoods Initiative. Additionally, the students explored funding mechanisms to support EBD implementation, metrics to evaluate positive and negative impacts of the EBDs, and recommendations on how to successfully implement and evaluate the EBD program.

Products from this EBD project will be shared with the Prince Georges County Department of the Environment and other entities including the Maryland Commission on Environmental Justice and Sustainable Communities, National Environmental Justice Advisory Council (NEJAC), the Interagency Workgroup on Environmental Justice, and community-based organizations throughout the county and the region. This project has the potential to 'inpower' local residents to be more engaged in decision-making around zoning and planning and help them implement a vision for making their communities greener, sustainable, healthy, just, and more equitable. As part of the session, team members will discuss EBD designation and evaluation metrics, benefits of the EBD construct for different stakeholder groups, and opportunities for better integration of salutogenesis in planning, community development and redevelopment particularly in areas with underserved and overburdened populations.

Street Urbanism in a Global Context: Research Methods in Understanding Health and Place
Mary Anne Alabanza Akers, Morgan State University

Street urbanism is a term coined to describe the dynamic interplay of people, streets, vehicles, sidewalks, and buildings. In an Asian context, street urbanism implies seemingly chaotic architecture; disorganized array of signs; deafening sounds of honking vehicles, shouts, and urban noises; concoction of vehicular exhaust, construction dust, and other smoke producing activities; and street vendors who impede movement on sidewalks and streets. The informal vendors are common "fixtures" in Asian streets and are often misunderstood and become prime targets for strict regulations. However, they are integral to the vibrancy of Asian streets.

Baguio City is an upland city founded on health and healing by the American government during its occupation of the country. To provide respite from the sweltering lowland heat, the American government developed Baguio City as the rest and recreation headquarters for its military personnel. In 1909, Architect Daniel Burnham was commissioned to design a plan for 50,000 residents. He did not anticipate the city's growth in his plan.

Today, Baguio City has 319,000 residents and is exploding at its seams. As the educational and medical center for the Northern region, it has attracted people from all over the country. But the local economy is not robust enough to provide jobs and residents often end up in the informal sector. Women, particularly, find street vending as an option for earning a living.

The proposed paper is a segment of a Philippine study involving street vendors and the urban spaces they occupy. The research project is a longitudinal, mixed method, and multi-faceted program that has engaged transdisciplinary teams with expertise in urban planning, anthropology, sociology, environmental science, public health, and medicine (Table 1).

A transdisciplinary approach to collecting data is necessary in understanding complex urban situations. Using mixed research methods (i.e., health surveys, measurement of physical places, medical screening, visual documentation, air quality measurement, etc… (Figure 1), the proposed paper offers an analysis of how street urbanism impacts vendor health. Based on Hippocrates' treatise on "On Airs, Waters, and Places" as a starting point, the entire research project examined health and disease in the context of the physical attributes of downtown Baguio's streets. Specifically, the paper will address the following research questions:
1. How did the various research methods produce data and information to better understand the relationship between health and place?
2. What were the strengths and limitations of these methods?
3. How were these research methods applied in a cultural context?

The paper will end with an explanation of how the research findings informed design and planning solutions to improve healthy downtown places in Baguio City.

Moderator: Andy Dannenberg, University of Washington

Designing for Health: at the center of the perfect storm that is redefining how we teach

Ray Pentecost, Texas Tech University
Saif Haq, Texas Tech University
Theresa Byrd, Texas Tech University

How we teach designing for health is experiencing three particularly strong forces arrayed in a dangerous constellation. Drawing reference from the term popularized by the 1997 book and 2000 movie by the same title, the perfect storm already raging in architectural pedagogy involves:
1. The re-characterization of what designing for health means.
2. The requirement that curricula reflect the real world complexities of multi-dimensional design challenges.
3. The transformation of practice to a growing reliance on research.

First, the phrase "designing for health" is confusing. Historically it has commonly meant designing healthcare facilities. Many well-known health design programs in the United States teach health facility design. More recently "designing for health" also refers to designing environments and facilities that are healthy. The inevitable confusion over this phrase demands development of a lexicon of purposeful clarity. It should embrace what has been labeled the "designing for health continuum curriculum," a reference to projects ranging from health-enhancing design for all building types to the health-restoring design of healthcare facilities.

Second, architecture must find a way to emerge from what is typically a highly siloed curriculum so filled with accreditation-required design courses that students typically have little opportunity to study outside their primary academic emphasis. Yet, the world into which they will graduate, and within which they will seek careers, is anything but siloed. Multi-disciplinary problem solving, team management, and knowledge integration for design purposes is not altogether natural – but it is absolutely central to the professional conduct and knowledge strategy of today's young design professionals. And it benefits from instruction on techniques and tools designed to create valid complex solutions to extraordinarily complex problems.

Finally, every aspect of the design field is evolving in light of the power of research to reshape and redefine design intent, outcome and performance. Both the use and conduct of research in design are rapidly becoming indispensable tools for those determined to move beyond "we've always done it that way." Finding room for teaching the finer points of research in an already packed architecture curriculum is a tremendous challenge, made no less formidable by the reality that most members of the architecture community are not trained in this activity and do not fully appreciate its power to transform design.

In this presentation each of these three forces is reviewed to fully delineate its intensity and reach, and then discussed to expose the exceptional synergistic power of these three forces working in concert. Failure to recognize and respond to the imminent danger of these three forces quietly undermining the value of our various degree and certification programs risks promulgating confusion within and outside our professional and academic communities while spawning graduates who are seriously unprepared for practice - and potentially largely irrelevant. To confront this very real threat, this university has just launched its new "designing for health continuum curriculum" offering multiple degrees and certificates, specifically created with these three forces in mind. Come hear how one architecture school is aggressively pursuing relevance in a rapidly changing world.

Converging Pedagogies: Human Health and Sustainable Design

Kimberly Rollings, University of Notre Dame

In order to create healthy, sustainable buildings and cities, architects, planners, public health practitioners, and policy makers must understand design and construction processes as well as social and cultural factors that support and constrain what can be accomplished via design. The interaction between people and the environment – both built and natural – affects environmental, economic, and social sustainability, as well as human physical health, mental health, and social well-being. The intersection between sustainable design and healthy living presents a unique pedagogical opportunity to advance interdisciplinary knowledge on health and the built environment among undergraduate and graduate students from multiple disciplines.

Drawing from architecture, landscape architecture, urban planning, environmental psychology, and public health, an innovative syllabus, teaching method, and course will be discussed that covers a range of concepts underlying the

complex interaction between people and the physical environment on health and sustainability. After introducing theories and methodologies used to examine influences of the built environment on health and sustainability, three units outline key concepts across a range of environmental scales: healthy people, healthy places, and healthy planet. Each unit identifies how the range of both physical (built and natural) and social factors contribute to the design of healthy, sustainable, functional, aesthetically pleasing, just, and culturally appropriate environments people wish to maintain and preserve. Seminal literature linking the built environment to human health and sustainable design is presented, as well as guest lectures and exercises that engage students in evaluating existing and planning, programming, and designing future healthy, sustainable buildings and cities.

The course attracts students from architecture, planning, design, sustainability, poverty studies, social science, engineering, environmental science, and business. In addition to small assignments, a semester-long community-based project includes field observations and interviews, application of theory, a literature review, and completion and presentation of an evidence-based final product (e.g., design guidelines, poster) in partnership with a community organization that converges methodologies from architecture, design, public health, and social science. The project engages students with the community and real-world contexts surrounding environments and health; offers instructors and students flexibility with content to adapt to different interests and program requirements; and provides opportunities for students to work in groups, promoting communication across academic fields. Course learning objectives and outcomes, institutional and department structures such as course and accreditation requirements, and instructor limitations such as class size and demands of community-based teaching will also be discussed.

The Well-Tempered City: Health & the Built Environment in Interdisciplinary Design Education
Zaneta H. Hong, Harvard University

Humanist approaches to architectural knowledge and production have traditionally taken the body as the irreducible unit of measure. Likewise health is an attribute most often ascribed to individuals, measured against other individuals, and enacted upon at the scale of the individual. As architecture, along with landscape architecture, urban design and planning, more fully address issues of health, we have come to understand it as a collection of attributes that also describe places and phenomena beyond the individual, from information and systems to environments and behaviors. Not only does this shift how we design for health, but what we analyze, how we intervene, and in what ways we define irreducibility. This paper examines the role of the city as the pedagogical subject of inquiry and site of speculative intervention for interdisciplinary design education.

Cities are the physical manifestations of adaptive modes of exchange, economy, and production. As such, they require multiple lenses through which to view their complex spatial construction; and to understand how they are to be conceived, perceived, and occupied. To understand the latitude of the city is to not just see it as a collection of individuals, rather as a collection of information that represent constituents, municipalities, and circumstances.

In a series of undergraduate design-research studios at [school], students were asked to examine an urban environment vis-a-vis a non-human urban agent, which became the indicator and lens through which students both interpreted and re-imagined an urban context. The decentralization of the human body and human experience repositioned the city as design subject for health. Socioeconomic and spatiotemporal data sets for each urban agent were collected and examined in order to reveal potentially latent connections between territories, behaviors of occupation, and trends in environmental phenomena.

In its institutional context, the studio pursued the study of architecture and urbanism within the framework of a liberal arts education. This studio was jointly administered between [school] and department of History of Art & Architecture, where interested students come from all parts of the university including visual and environmental studies, environmental science and public policy, biomedical engineering, human evolutionary biology, molecular and cellular biology, economics, computer science, and applied mathematics. In advancing forms of knowledge between health and the built environment, this studio engaged contemporary topics of the city, while practicing methodologies of lateral design thinking, information visualization, and trans-disciplinary collaboration.

Although fields of inquiry and modes of practice may be similar between the STEM disciplines and design disciplines, both entailing a systematic approach to observation, measurement and the formulation, testing and modification of a proposition, the process of developing conclusions are very different. Fundamental to design's agency is its capacity to evoke diverse meanings and interpretations; to expose vulnerabilities and capitalize opportunities and efficiencies; and to envision projective models and/or execute deployable scenarios. The dichotomy between the design and non-design disciplines can in itself be cultivated – to bridge the practical with the impractical, the logical with the imaginative – and yet also be exploited when developing converging pedagogies in design thinking.

Moderator: Billie Faircloth, KieranTimberlake

Connected Healthy Living for Smart Cities

Paola Sanguinetti, University of Kansas
Hui Cai, University of Kansas
Joseph Colistra, University of Colorado
Hugo Sheward, University of Kansas
Ferdous Farhana, University of Kansas

Current healthcare system in the United States is fragmented and expensive. The focus has been largely on care instead of prevention. Moreover, as the Baby Boomers generation enters into their 60s, the healthcare system is under great challenge to respond to the needs of rapidly increasing elderly population. A more innovative, preventive, proactive, evidence-based, person-centered and wellness driven approach is needed to transform the health delivery model.

Interoperability is a challenge for exchanging information between the smart city inhabitant and the built environment. This problem cannot be understood only as technical, data-driven or policy problem; rather the problem needs to be analyzed by integrating scientific technology (Sci-Tech), built environment, and behavior and human factors' perspective. More recently research efforts have focused on database structures that integrate all these types of data for specific applications such as reduced energy consumption and increased security. A framework for healthy living in Kansas City, as a prototypical smart city for connected health, proposes to integrate heterogeneous sets of data to support user-level behavior monitoring, building-level environmental optimization, and neighborhood-level modification to enhance the quality of life of inhabitants at both Kansas City and nearby rural areas. This approach for interoperability between the smart city inhabitant and the built environment traverses across scales to connect data and improve health and wellness: 1) within the interior environment, to address the needs of the smart city dweller aging in place and 2) in the exterior environment, to improve mobility and walkability, and access to food. The approach presented here focuses on the integration and visualization of data centered to improve the lifecycle of both the health of the urban inhabitant and the urban environment.

This research will advance the understanding of how do people make connections with their surroundings and neighborhoods, by implementing and prototyping a 3-level approach to the data exchanges (inhabitant, building, neighborhood) in Kansas City. The research help urban design and construction professionals understand how to integrate data from building information models, geographic information systems, and other source of information, to enhance the quality of life of smart city inhabitants.

Predictive Modeling Network for Performative Health Design, Agents and POE's

Thomas Spiegelhalter, Florida International University

This paper is focused on a large-scale grant for predictive modeling networks in Health Design. It includes not only comparable real-world building case studies with metrics and POE's but it also includes critical investigations for interdisciplinary education in architectural design, engineering and technology, computer science, information technologies, sociology, psychology, neurology, and others.

In particular models and examples of cross-institutional education and research for salutogenic environments in sustainable human-building ecosystems, occupant behavior analysis, air quality and thermal comfort demand response, and energy saving behaviors for buildings in health and well-being are subject of this grant investigation.

The research framework with the in-situ analysis for salutogenic indoor and exterior environments consists of multiple components: sensor networks deployed in and outside of buildings that monitor and measure various parameters through self-learning and optimizing algorithms. This includes air flows, air pressure, air quality, air and surface temperature, humidity, lighting, acoustics, energy/water demand, etc., that lead to efficiently operated and controlled dynamic models; Computational Fluid Dynamics (CFD) and parametric-algorithmic coded software components that allow human occupants to interact and provide feedback; and actuation outcomes that allow "control of building components". This

includes cooling, humidity, airflow and lighting sub-systems to optimize these controls in real-time via self-learning, genetic algorithmic optimizations.

The novel aspect of this research effort is that it combines the following elements in the feedback control of building systems:
(a) Predicting internal variables and metrics for optimized coding for occupancy and user comfort preferences, and state variables as obtained from predictive dynamic models and rating systems; (b) Extracting and then exploiting pattern repetition (daily, weekly, and yearly cycles in temperature, occupancy, usage, peak loads, etc.) for agent based self-learning algorithms that can dynamically predict behavioral patterns and peak loads; (c) Incorporating human, physiological, and psychological factors in the model, by obtaining and processing human-in-the-loop feedback effectively; (d) Forecasting of external variables, metrics such as energy, water pricing, energy, water demand, CO_2 reduction and dynamic weather patterns, as can be determined from the smart grid, and validated by cloud-service operated real-time building automation with interactive and virtual dash boards and apps.

Furthermore, through the design of user-friendly human-machine interfaces, the creation of appropriate incentives for human participation and interaction with the environment, effective feedback collection and POE's, and integrated processing of sensory measurements (obtained from an in-building automated sensing network), the research project aims at providing a by-demand comfort level that is mediated by end-users through their personal communication apps. This approach differs significantly from the current academic courses, research and practices of modeling, controlling and optimizing building energy sub-systems in isolation, and providing by-default comfort level everywhere in the building independent of occupancy level and demand level. The unique aspect of this project includes course of actions by which multiple building users can participate in the Thermal Comfort and Air Quality and Energy Management process and allow the various control and actuation functions to efficiently meet their collective needs to develop a blueprint for a more sustainable, salutogenic design and operation of next-generation buildings.

Using Social Innovation, Design Thinking and Co-Creation Research Methods to Solve Real World Challenges Facing a Top Ranked Children's Hospital

Ann Black, University of Cincinnati

The healthcare industry is experiencing unprecedented change and reinvention. The Affordable Care Act, increasing competition for funds and the democratization of healthcare are just a few of the factors influencing the design of products, services and systems that lead to the optimal patient experience – the ultimate goal of healthcare. Rittel and Webber identified problems addressed by designers – as opposed to natural science problems – as "wicked problems" or problems that are ill-defined. (Rittel and Webber, 1973: 155-169) They defined wicked problems as a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing." Some characteristics of wicked problems include no definitive formulation, no stopping rule, not true-or-false, but good-or-bad, each is essentially unique and is considered a symptom of another problem. These problems (or design challenges) do not have one right answer but an array of possible solutions.

If design problems are wicked problems, what is the best way to approach possible solutions in healthcare – especially when dealing with medical professionals who are accustomed to approaching problems that have a definitive answer? A non-profit organization utilizes Social Innovation, Design Thinking and Co-Creation Methods when partnering with institutional sponsors to create successful design solutions. These research methods are gaining popularity and prominence as successful problem solving approaches where "the person who will eventually be served through the design process is given the position of 'expert of his/her experience' and plays a large role in knowledge development, idea generation and concept development." (Sanders and Stappers, 2008:12) Medical staff and patients are embracing these methodologies and bring them back to their own labs and practices.

This unique, academic-industry innovation center was founded in 2007 by a public university and fortune 500 company. The non-profit has completed over 50 projects, involving greater than 500 students, over 40 faculty members and 15 corporations and healthcare providers. Its purpose is to specialize in user centered research and development of products and services for living well across the lifespan with an expertise in the 50+ market place. Successful projects that follow the 15-week academic semester using a Design Thinking Process Model will be shared in this session.

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02:30PM - 04:00PM	Well Futures	Pacific Room

Moderator: Sara Carr, University of Hawaii at Manoa

Natural Building in the City: Salutogenic Construction Techniques in Urban Environments
Joseph Kennedy, NewSchool of Architecture and Design

In recent decades there has been a resurgence of interest in vernacular building techniques based on materials such as earth, stone and straw. These methods have come to be known as "natural building" and include such vernacular methods as: dry-stacked stone, cordwood, timber frame, cob, rammed earth, and lime and earth plasters. New techniques inspired by traditional methods include: compressed earth blocks, hemp-lime, and earthbags, as well as hybrid techniques with conventional construction, such as modernized bamboo construction and straw-bale construction integrated with conventional wood-framed structural systems. Natural building has been driven by several factors, including: economy, cultural interests, community building, and aesthetics. But much interest in these techniques has stemmed from their health-supporting (salutogenic) qualities, particularly the absence of artificial chemicals. Many early natural buildings were built for clients suffering from multiple chemical sensitivities, who had no choice but to use materials free of the artificial additives common in modern building materials. These clients, as well as their architects and builders, pioneered the adoption of these methods into contemporary building codes. These techniques also support human well-being in ways that are often mentioned anecdotally, but until now have been difficult to measure, such as: tactility, light modulation, as well as the hydroscopic and/or acoustic properties of some of these materials. Many of these techniques (such as straw bale construction) have also been promoted for their support of planetary health, as they are often local, have low-embodied energy, and/or are of high carbon-sequestering materials. Parallel to (but largely separate from) the growing interest in natural materials has been the recognition of the importance of creating healthy cities. However, most natural building systems have been utilized in rural or village conditions that do not have the constraints of urban environments. In recent gatherings of natural builders, interest in these two issues has converged, and a range of practitioners have begun to address the questions of if and how natural building techniques can be utilized in the city. This paper will address the possibilities and constraints of using natural building techniques in a range of urban conditions, including contemporary urban cores as well as the rapidly urbanizing informal peripheries of cities such as Tijuana and Lagos. Issues such as codes, structure, material availability, and current development practices will be analyzed to see how contemporary urban trends can either allow or hinder the use of vernacular building techniques in urban environments. Current building sustainability and health metrics such as WELL, LEED, Green Globes, and the Living Building Challenge will be analyzed to understand the role of natural building methods in contemporary sustainable urban development. This study will also include an analysis of extant historic urban environments and buildings (as all cities were once built of natural materials, after all), current case studies, and visionary proposals for integrating natural building into urban environments. Finally, an exploration of hybrid approaches to creating healthy urban environments using natural, conventional and emerging technologies will be undertaken.

Post-Petroleum Design
George Elvin, Ball State University

As the global supply of oil dwindles and concerns about its use rise, designers are searching for alternatives. An increasing number are choosing to reduce the amount of petrochemicals used in their raw materials, manufacturing processes and product distribution. Some are achieving significant reductions in petrochemical use throughout the entire product lifecycle. By interviewing over 40 industrial designers and architects practicing "post-petroleum design," the author found that significant reductions in petrochemical use often begin with design. The design intent of the industrial designer or architect in many cases establishes the goal of minimal petrochemical use, which is then achieved through material acquisition, manufacturing, distribution and recycling. Qualitative analysis of the design processes and their lifecycle repercussions as revealed in the interviews exposed six recurring practices characterizing post-petroleum design: the use of renewable resources, recyclable materials, non-toxic materials, low-energy manufacturing and distribution processes, low-carbon manufacturing and distribution processes, and local artisanry. Of even greater significance is the observation that these six practices often appeared to be manifestations of five post-petroleum design principles: energy flows, cycles, resource balancing, resilience and interdependence. These are, perhaps not coincidentally, also principles of living systems, and this resemblance is further explored in the paper. The results of this study of post-petroleum design will be of value to architects and their educators in two ways. First, the analysis of interviews with architects reveals specific principles and practices for reducing petrochemical use in architecture. Second, the analysis of interviews with the designers and manufacturers of post-petroleum products and materials, which can be specified by architects, opens new approaches to green building. This study also addresses obstacles to post- petroleum design, including environmental,

social, economic and design challenges. And it includes a look forward to emerging post-petroleum practices such as landfill mining, industrial recycling, and the increasing use of nanomaterials and biomaterials.

Reclaiming Recreation
Bradford Watson, Montana State University

Butte Montana, nicknamed the "richest hill on earth" due to the unmatched scale of resources available within the 25 square mile area of the Butte Mining District, is simultaneously the largest historic landmark district (over 6,000 contributing properties) and the largest superfund site (reaching over 100 miles) in the country. In 1912, Walter Harvey Weed wrote "Heaps of waste are everywhere prominent, attesting by their great size the extent of the underground workings" foreshadowing the environmental impact of mining on the Butte Hill. In 1983 the EPA designated the region as a Superfund Site with clean up beginning in 1987 to protect human health and the environment. An initial Phase was an expedited Response Action to source areas of contamination by removing or capping waste dumps and other related areas of mine waste. Phase II is the final remediation work related to addressing the remaining environmental and human health issues associated with water and soil. Reclamation efforts continue to this day.

Due to the EPA's findings of the Practical Infeasibility to remove the hazardous materials (over 660 million metric tons of material have been displaced) a Waste Left in Place strategy was implemented. In order to stabilize the ground and reduce the risk of erosion, waste rock was graded to a maximum slope of 1:3 and covered with a minimum of 18 inches of compacted soil and seeded. This process has resulted in large swaths of the town that are unoccupiable native grass fields as the cap is only tasked with providing protection for people and the environment. This fragile surface protection has not created places of value and in many instances has removed opportunities for recreation within the city.

In his keynote address to the Vernacular Architectural Forum Symposium in 2010 Edwin Dobbs describes his childhood growing up in Butte:
We found the place to be endlessly rich and stimulating, a thousand times more interesting than the fakery of a Disneyland. Another playground, when I visited my older cousins on the Hill, was the Steward Mine. We played there while the mine operated. It helped to be lucky. It also helped to be able to run fast and scale fences quickly.

While clean-up efforts have improved the health of the environment, they have been detrimental to the reclamation of the community. This paper presents a project that began as a graduate studio proposing alternative strategies to the reclamation effort that leverage the funding for clean-up to provide opportunities for the community to reclaim the land through recreation and promote economic growth. The paper evidences the process over the last three years of working with a collection of interdisciplinary students from two universities, government agencies and the community to develop the design and funding mechanism for the reclamation of the former Bonanza Mine Dump, an unreclaimed site currently being illicitly used as a BMX track by children. The paper documents how the protection of human health could promote health, environmental understanding and create a new economy.

Urban Vertical Farming
Jefferson Ellinger, University of North Carolina at Charlotte

The paper proposed here will describe the means and methods for producing a healthier food alternative to the mega industrialized farming complex - an urban vertical farm prototype.

The United Nations has projected that the world's population will increase by roughly three billion people by the year 2050. The Food and Agriculture Organization of the United Nations has estimated that farmers will have to increase production by seventy percent to meet the demand to feed this population. Presently, eighty percent of the land that is suitable for growing crops is being used. There is a global need to develop an efficient food production model to supplement traditional farming techniques to meet these needs and not continue to destroy other habitats to increase the available land. More locally, in the United States industrialized farming has developed to provide production and distribution techniques that provide produce to dense urban areas by engineering the produce for that purpose. For example, tomatoes have been bred to endure long journeys to the markets at the sacrifice of nutritional value and taste. Beginning as a Request for Proposal (RFP) to develop a residual piece of land adjacent to a city owned parking garage, the Vertical Farm in (location removed) is a prototype that proposes a solution to these issues related to human health as a means to provide locally sourced healthy produce in urban communities. The site available from the town for the RFP was not large enough for a traditional horizontal greenhouse to generate even a small amount of produce and led to the decision to farm vertically. This became the inspiration for an Architect to become involved and provide a solution that only could be met through an innovative architectural prototype – to design a prototype that could provide a healthy alternative for food production on limited land resources.

As the proposal for this particular community, one that imports most of its produce from afar due to harsh climate and short growing seasons, the project grew to become a community focused initiative to provide fresh, local produce in a community that has little to no farming in the region. As a project type with no built precedent at the time, working with community partners from the city and state levels became a major driving force to ensure the much-needed access to healthier produce would become a reality.

Developing these relationships and researching best practices in urban greenhouses that provide locally sourced produce for communities the project evolved to address another community need. Specifically, working with social services in this effort led to developing an employee model that would serve another underrepresented citizen in the community by providing meaningful employment opportunities for developmentally disabled adults.

While much of the design and technical issues are focused wholly on solving the issues associated with growing vertically with limited access to natural resources, the sociopolitical factors have become leveraged to developing economic and social models for a way to grow vertically in dense urban environments.

04:30PM - 06:00PM   **Health and Vulnerable Populations I**   *Asia Room*
Moderator: Jenny Roe, University of Virginia

Augmenting Against Inequality: Improving Social-Technological Access for the Senior Community via Design
            Ziad Qureshi, University of Houston

In a world increasingly defined by technological proficiency and access, the provision of technology-oriented spaces and infrastructures to the broad community is a social and public health priority. With continuous advancements in technologies – particularly the ubiquity of Internet social connectivity, information dissemination, and communication methods – bolstering access and abilities is increasingly challenging to those who are unaccustomed and economically disadvantaged. As technologies encompass additional facets of everyday life, grave risk remains of leaving those with limited spatial, educational, and economic means behind – alienating them from broader society and detrimentally affecting their health. Simultaneously, the potential exists to harness the benefits of technology to elevate humanity with new resources. Representative of this prioritization and contemporary relevance, recently major global initiatives such as MIT's One Laptop per Child program, Facebook's Internet.org, and Google's Project Loon have attempted to rectify large-scale technology and internet access issues in the developing world.[1] Closer to home, strong need exists with some of our most vulnerable community members to ensure their continuing technological accessibility and enablement. Currently social isolation among the elderly is estimated to be as high as 43%, with 1 in 4 older adults in Harris County TX living alone,[2] demonstrative of its particular relevance to our Senior and economically disadvantaged citizens.

This proposal intends to discuss and demonstrate how empowered, participatory design can serve as a tool for enhancing the mental and social health and well-being of vulnerable, disadvantaged, and stratified communities. With the essential goal of protecting and promoting the mental and social health needs of an economically marginalized and politically disenfranchised elderly community in the Fifth Ward of Houston, Texas, USA – multiple collaborative and ongoing initiatives between spatial designers, design students and educators, public health workers, city officials, and community partners are augmenting the Seniors' access to both space and technologies for improved social connectivity. Particularly, in contrast to historical design methodologies, these initiatives have directly facilitated the Seniors' participation, harnessing their input and perspectives to enable responsive and inclusive design results, including mobile technological infrastructures, flexible spatial insertions, and the creative adaptive-reuse of existing buildings. These architectural and urban initiatives for the Seniors of the Fifth Ward neighborhood have brought together in action the City of Houston, the Senior Services group at community advocacy organization Neighborhood Centers Inc., social workers engaged in the neighborhood, as well as architecture faculty and students at the University XXXXXXX, demonstrative of the broad coalitions that are increasingly necessary in today's environment to provide successful design responses to community health issues.

Via a presentation of exemplar community-based and collaborative initiatives, this discussion expects to offer unique insight into the wider complexities, difficulties, and extensive benefits of on-the-ground trans-disciplinary partnerships. It will enable and offer a potential model for the future, specifically illuminated by its example of broad participants united via a shared goal of enabling the improved mental and social health of Houston's Fifth Ward seniors via spatial design and technological enablement.

Improving Human Health + Well-Being through Sustainable Coastal Restoration and Community Advocacy

Phoebe Crisman, University of Virginia

A growing body of research measures how short-term activity in parks and other green urban environments positively affect human health and well-being. While evidence-based research has intensified, few coastal restoration projects directly consider connections between public health and the constructed environment. This case study examines an interdisciplinary design research methodology that works with community partners to design sustainable projects that improve human health and well-being, while restoring ecosystems and inspiring environmental stewardship. The Paradise Creek Nature Park is a forty-acre, restored wetland park located amidst contaminated industrial sites and an economically challenged and racially diverse urban neighborhood. A challenging mix of environmental, economic, and social stresses contributes to environmental degradation, gang violence and public health risks in the area. In collaboration with the City of Portsmouth, non-profit environmental groups, Portsmouth public schools, and community partners, University faculty and students from architecture, art and medicine designed the Park and its' sustainable and interactive Wetland Learning Lab and Rainwater Filtration Pavilion. This civically engaged design research empowered the community and influenced public policy while investigating the question: Does experiencing a restored urban nature park amidst industry affect the visitor's well-being and resilience? There were several research goals: create a park that increases human health and well-being and promotes outdoor exploration for all ages; design green pavilions that educate visitors about sustainable and healthy lifestyles; and construct a restored wetland where citizens may rediscover the healing respite of a healthy river. The paper examines how the participatory process, university-community collaboration, and innovative design research raised public awareness of connections between environmental design and health, while fostering a commitment to sustainable coastal restoration, stewardship and community engagement. Ultimately, the Paradise Creek Nature Park research project provided the opportunity to empower an urban community in need, while designing, implementing and testing translatable strategies for creating healthy, public landscapes. The necessity of integrating resilient coastal design strategies and public health and advocacy policies is escalating as sea levels rise.

Housing the chronically homeless: Opportunities and challenges of a community-based design studio

Kimberly Rollings, University of Notre Dame

Permanent supportive housing (PSH) links safe, affordable housing with social support services that address challenges associated with chronic homelessness, addiction, and other disabilities. People struggling with chronic homelessness and associated challenges often cycle in and out of shelters and require costly emergency medical and public safety services. PSH helps to break this cycle so people can regain stability and move forward with their lives. Few resources, however, exist to guide architects and clients during the PSH design process. The proposed presentation discusses an undergraduate architecture design studio's partnership with a local PSH team, architects of successful PSH, and PSH residents to propose an evidence-based, dignified, culturally and contextually appropriate, highly functional, healthy, safe, and sustainable PSH facility.

A Midwestern community development corporation and local partners received a grant to construct the area's first PSH facility with 30 one-bedroom apartments and a variety of shared and support spaces, including outdoor space. The client and local architect asked architecture students to inform the design of the facility. After visiting the local site, learning about PSH, and conducting precedent research, students extensively researched connections between architecture and physical, mental, and social health. They also studied post-occupancy evaluation, observation, and interview methods in preparation for visits to PSH facilities. Students traveled to two successful PSH examples designed by an architecture firm that provides architectural services for underserved populations. After visiting the firm and interviewing the architects, students studied the housing facilities. Additionally, they shared meals with and interviewed PSH residents, giving a voice to and empowering the resident population in their design process. During their visit, they learned not only the role of the built environment in supporting a vulnerable population, but that few architects had the opportunity to interview residents of PSH facilities.

Based on students' readings of architectural, technical, environmental psychology, and public health literature, research, observations, and interviews, a set of evidence-based design guidelines were formed that students applied to their design proposals and shared with the local project team. Student learned to articulate their questions and communicate their ideas to architectural professionals, community partners, and PSH residents. Design proposals focused on creating healthy, supportive, and empowering environments. Students addressed issues related to privacy and social interaction, safety and security, restoration, control and independence, identity and meaning, culture, context, material durability and cost, universal design, green materials and native landscaping, crime prevention through environmental design, and promoting healthy & sustainable lifestyles. Project challenges included interpreting complicated funding source design

requirements, timeline misalignment, and conflicting interests between developers and PSH resident case workers, especially related to safety and health. The project and partnership provided a real-world experience for design students, educated the local project team and architectural professionals, and empowered the interviewed PSH residents. Students had the opportunity to emphasize the importance of including PSH residents in the design process of the proposed and any future PSH facilities.

Is Green Housing Healthy Housing? An Examination of Green Building and Healthy Building Guidelines for Residential Structures

Sherry Ahrentzen, University of Florida
Elif Tural, Virginia Tech
James Erickson, Arizona State University

Green building practices are increasingly embedded in policy, financing, and professional standards. Could the use of green design guidelines simultaneously enhance occupant health through green building performance? While recent research has demonstrated some level of alignment between green building practices and physiological health in various commercial, educational and public buildings (see Allen et al., 2015), other research by environmental health scientists suggests that green building and occupant health may not de facto correspond and may even conflict (e.g. Wargo, 2010).

This presentation examines the outcomes of a systematic analysis examining how green design guidelines and criteria — as encapsulated in two green residential certification programs used in the US — reflect, neglect, or even potentially conflict with health concerns pertaining to residential structures. Since homes are where the most vulnerable populations — young children, seniors, infirmed — spend most of their time, and hence where design should be more critically attentive to health concerns, this study focused on residential buildings. The analysis adopted the WELL Building Standard for Multifamily (WELL) and the National Healthy Housing Standard (NHHS) as reference frameworks for gauging building and design characteristics that enhance and promote occupant health; and also used USGBC's LEED for Homes and Enterprise's Green Communities as the two green residential building certification programs.

The presentation provides an overview of the methods used to examine correspondence of the green building guidelines with the healthy building standards. The results of this analysis that profile the degree of alignment of green practices with health standards are described for seven building/design categories: (1) Air Quality/Chemical; (2) Air Quality/Biological; (3) Thermal Conditions; (4) Water; (5); Lighting (6); Ventilation; and (7) Accessibility and Activity. Despite some differences between the two green building programs, they both generally reflect air quality and ventilation standards related to respiratory health; but they are remarkably deficient in addressing other health concerns, particularly those related to water, thermal conditions, lighting and accessibility/activity. The presentation concludes with proposals for advancing residential building performance for occupant health through strategic use — or potential integration — of both green and healthy certification programs.

04:30PM - 06:00PM	Special Settings	Pacific Room

Moderator: Anne Schopf, Mahlum Architects

A Case for Innovative Design: Post-Occupancy Evaluation on the Impacts of School and Furniture Design on User Satisfaction and Student Engagement

Xuemei Zhu, Texas A&M University
Raechel French, Stantec
Diego Barrera, Stantec
Gwen Morgan, Stantec
Shivani Langer, Stantec
Taryn Kinney, Stantec
Terry Hoyle, Stantec

BACKGROUND AND PURPOSE: Physical environments in schools have shown significant impacts on user satisfaction and student learning. Recent trends in school design have shifted toward increased flexibility and adaptability to accommodate changing demographic and classroom needs, and to facilitate collaborative and engaged learning. But the actual impacts of such design interventions have rarely been studied.

OBJECTIVE: This study addressed this gap of knowledge by studying rare "natural experiments" in the Coppell

Independent School District (ISD) in Texas, where a new net zero school was recently opened with innovative building and furniture designs; and several other schools received new flexible furniture. The aim is to examine the impacts of collaborative learning spaces and furniture on user satisfaction and student engagement in the learning process.

METHODS: Guided by the socio-ecological theory, this study considers student behavior to be influenced by three interrelated domains — personal factors, social factors, and built environment (Figure 1). Study schools include School A, which had traditional school and furniture design but received new, flexible furniture in the summer of 2015; and School B, the new school opened in the fall of 2014 with innovative building and furniture designs that facilitate collaboration.

Figure 2 illustrates the three study components in the whole project. This paper reports results from Study 1 of this project, which compares school A (traditional school and furniture designs, before receiving new furniture) with School B (innovative school and furniture designs). Online student surveys were conducted in May 2015 to collect information about personal characteristics; satisfaction with built environments in terms of indoor environmental quality, school buildings, and furniture; and student engagement. Descriptive statistics was examined first. Independent sample t tests were then conducted for each satisfaction and engagement variable to compare two schools.

RESULTS: A total of 335 valid responses were collected with a response rate of 32%. School B received significantly higher ratings for not only satisfactions with design but also levels of engagement (see details in Table 1 and Figure 4). In terms of built environment, School B was rated higher for its acoustics, lighting, thermal comfort, view, and buildings and specific function areas; as well as furniture design. For engagement, students in School B reported greater emotional engagement, and less behavioral and emotional disaffection in the learning process.

CONCLUSION: The results supported the hypothesis about greater satisfaction and better student engagement in the newer school with innovative building and furniture designs that facilitate collaborations. These revealed differences are promising, implying the potential of using innovative design to improve student engagement and learning outcomes.

NEXT STEP: For Study 1, the next step is to use multivariate linear regressions to predict student engagement using personal, social, and built environmental factors. For Study 2 and Study 3, the same survey will be conducted at both schools again in May 2016, when School A would have been using the new furniture for one year.

Considering Health Impacts in Public School Design: Indoor Environment Quality, High Performance School Design and Operational Considerations

Geoffrey Thün, University of Michigan
Stuart Batterman, University of Michigan
Andrew Wald, University of Michigan
Cheryl Somers, Wayne State University
Feng-Chiao Su, University of Michigan
Jean Wineman, University of Michigan

This paper will report on the first phase of an EPA-funded research project entitled Environmental Quality and Learning in Schools (EQUALS), undertaken by a team comprised of faculty from the School of Public Health, Environmental Science, Architecture and Education investigating indoor environmental quality (IEQ) in both conventional and high performance (EnergyStar, LEED) schools.

While there is a significant body of literature evaluating the effect IEQ on health, comfort and productivity of occupants in offices and residents in homes, research linking IEQ to performance in the academic and physical health realms of children in schools is much more limited. This is an important gap given that children represent a potentially vulnerable and susceptible population, and since a number of studies have documented widespread IEQ problems in schools due to water damage, low ventilation rates, and maintenance, design and operational issues. Studies have demonstrated that IEQ may affect memory, academic tests, and attendance rates. In addition, students have been reported to perform more poorly and are less physically active and fit in schools that are in poor physical condition.

In the past decade, a number of school districts have constructed new or renovated existing schools to meet energy and environmental targets such as the USGBC's LEED standards However, few studies have examined the actual impact of green building measures on IEQ or on the health or academic performance of students and staff. More generally, research is needed to identify building design and operational elements that have the most significant impact on the

health, learning and productivity of students and staff, and that can inform future standards, decision-making, policy guidance and practice.

We report on a study of 40 schools and 200 classrooms where IEQ parameters were measured, as well as comfort, health and IEQ perceptions of 200 teachers in the US Midwest. All schools assessed were constructed within the last 15 years, and approximately half were LEED or EnergyStar-certified facilities. We conducted walkthrough assessments, teacher surveys, HVAC system inspections, and comprehensive IEQ analyses in each classroom. The paper discusses selected IEQ parameters (including CO_2, particulate matter concentrations, VOC concentrations, comfort variables, and noise levels) found in the schools, and compares conventional to high performance buildings.

Ultimately, this paper will present findings that will contribute to and expand upon the questions raised by this conference by offering detailed data analytics and walk-through based survey observations including: (i) How are the metrics defined by USGBC and other related agencies delivering meaningful outcomes with respect to IEQ related in executed projects? (ii) Do the current priorities and related metrics of these programs actually deliver meaningful outcomes in terms of IEQ? (iii) What are the areas where design intervention can most effectively impact IEQ in school design? (iv) What priorities relative to the scope of design services should receive further emphasis, and is the commissioning process adequate to deliver meaningful results? (v) What expanded scope of services might be required to deliver healthy educational environments beyond those currently understood as core to the design professions?

Mapping the Hospital Environment: linking occupant behavior and environmental conditions in an acute care setting

Stephanie Carlisle, KieranTimberlake
Bon Ku, Thomas Jefferson University

The methods used in post-occupancy evaluations (POEs) of healthcare environments are usually limited to questionnaires or interviews. While these methods can provide important insight, they often lack empirical evidence and are unable to explore the rich variables that influence behavior of actors in space and which also shape the quality and nature of their experience. There is need to develop POEs that collect high resolution, spatially explicit data on how occupants--patients, providers, and clinical staff--behave in a clinic or hospital. Further, novel data collection methods are needed to evaluate occupant behavior in parallel with measurements of environmental conditions. POEs need to be generalizable to a variety of healthcare contexts and geographic locations in order for us to understand how design impacts healthcare outcomes.

We developed a novel toolkit consisting of an application-based survey instrument and customized sensors that allow us to continuously measure environmental variables such as temperature, sound, humidity and light, while also mapping the presence and movement of occupants in a defined space. All data collected using this methodology are spatially and temporally explicit, reducing the effort involved in data collection while increasing the accuracy and resolution of the resultant dataset, allowing for multivariate analysis of behavior patterns and repeatable comparative surveys. The methodology also provides a means for testing both existing conditions and targeted, design interventions in the space. This toolkit and novel methodology provide a means to explore the relationships between design of healthcare environments and the service that these spaces provide. We have provided images that are from a previous deployment of the survey methodology in an urban public space in Philadelphia.

The aim of this pilot study is to understand how different measurable variables affect the behavior of occupants in an emergency department (ED). We chose this setting because of the opportunity to improve both the patient and provider experience. EDs serve as the main entry point for hospitals but face severe challenges with rising patient volumes and space constraints. The setting for our study is an urban ED with >60,000 visits per year. We will conduct a 4 week POE using the previously described toolkit. Study coordinators will record movement patterns of providers and patients in the ED on an hourly basis using a customized application survey instrument on a tablet device. Sensors placed in different zones in the ED will capture temperature, humidity, sound and light variables.

Outcomes of the study will include time lapse of movement patterns, mapping and diagramming of ED occupants. Our findings may lead to an improved understanding of how environmental factors and design impact the delivery of healthcare in an acute care setting. Our novel methodology will need to be tested in other clinical settings to consider its utility in both pre- and post- occupancy evaluations of healthcare environments.

09:00AM - 10:30AM   **Empiricism and Evidence**   *Keoni Auditorium*

Moderator: Howard Frumkin, University of Washington

Retro-'fitbit'ting the Built Environment: Evaluating the pace of urban, suburban, rural conditions

Jason Austin, Drexel University

The 20th century taxonomy of human settlement conditions – the urban, the suburban and the rural – is no longer so clear, especially in the 21st century. The lines between urbanity, the suburbs, and the rural are becoming blurred. This blurring of previously clear divides is a function of various factors – economics, ecology, climate, convenience, physical resources, perception, cultural diversity, etc. – that directly or tangentially influence human occupation and the shaping of the human experience within the built environment.

Today, development within urban and suburban areas continues to grow within the US, paralleling global trends with populations shifting to urbanized areas. This shifting population movement has placed pressure on some of those once productive industrial-rich urban landscapes in the 20th century, healing their post-industrial scars by transforming them into hip live-work environments. Likewise, today's post-war suburbs are also feeling the stress- increasing commuter times, rising land and real estate values, and aging housing stock have contributed to suburban sprawl and/or have significantly adjusted the expectations of the new suburban lifestyle.

Despite the shifting urban population and additional burden it is (and will be) placing on the existing urban systems, there is no question that the physical health of our urbanized environments and communities – the ecological, infrastructural, economic and social well-being – is on the mend in the US and continues to be heading towards a fuller recovery. The collection of metrics most often used to compare the physical health of various urban environments is commonly referred to as a livability index. While the quantity and diversity of evaluation criteria for such livability indexes may vary from one authority to another, it is clear that evaluation criteria, across the board, are dominantly amenity-based metrics, measured on proximity and accessibility to urban amenities (i.e. healthcare, housing, transit, fresh food, open space etc.) in lieu of actual performance-based metrics. If, then, performance-based metrics, such as real-time health metrics, were to be utilized as evaluation criteria for rating the livability of an urban environment, how might we read and analyze urban environments upon the lifestyle an urban system promotes and its direct impact on the physical health of its residents? Furthermore, how might these methods and subsequent findings challenge the conventional planning principles of urban design and the strategies to appropriately retrofit our built-environment, latent with varying age and activity demographics?

This paper will present the findings of an investigative urban design exercise that utilizes wearable fitness tracking and GPS technologies as the primary means for measuring the typical daily resident experiences over a series of weeks in urban, suburban, and rural environments. The focus of the paper will include the presentation of individual health analytics in relationship to a variety of urbanized contexts using new representational strategies marrying health metrics to placemaking.

Spatial Structure as an Architectural Performance Metric

Julie Zook, Texas Tech University

While designers intuitively understand space as a distinguishing characteristic of architecture and urbanism, space itself resists description. Intuition and precedent are often used to assess the effects of the visual and spatial connections afforded by specific layouts. This session provides a review of how quantitative measures of visual and spatial structure, taken using space syntax methods, are related to well-recognized health metrics in urban and healthcare environments. Case studies are used to demonstrate links between space syntax metrics and health performance metrics, drawing on both emerging research and published, peer-reviewed research.

The session will begin by providing a conceptual introduction and overview of space syntax measures, then proceed to describe how these spatial performance metrics are correlated with important performance metrics in health. Space syntax measures forecast spatial behavior at both the urban scale, (e.g. walking behavior), and at the scale of hospital buildings and units. Health-related metrics for the latter include patient falls, patient mortality, and patterns of spatial use related to wayfinding, surveillance, and interaction. The session will summarize rules-of-thumb for design that

appropriately make use of the inherent resources of spatial configuration. It will also highlight resources for academics and professionals who wish to use space syntax metrics as part of research or design projects that involve health-related outcomes.

The Ageing Urban Brain: Changes in Brain Activity in Older People from Walking in the City

Jennifer Jane Roe, University of Virginia
Chris Neale, University of York
Peter A Aspinall, Heriot Watt University
Sara Tilley, University of Edinburg
Richard Coyne, University of Edinburgh
Mavros Panagiotis, The Bartlett, University College London
Cinderby Steve, Stockholm Environment Institute, University of York
Catharine Ward Thompson, University of Edinburgh
Neil Thin, University of Edinburgh

This paper presents the findings of a mobile neuroimaging study in 98 older adults, aged 65 plus (mean age 77) using a proprietary Emotiv EEG headset, carried out in the City of Edinburgh, UK. A subset of participants walked alone for approximately 20 minutes through one of two walking scenarios: from a busy urban street into an urban green setting or vice versa, generating two walking scenarios in total.

Affectiv suite (Emotiv software) data analyses brain activity patterns and generates four emotional parameters (i.e. frustration, excitement, engagement, meditation). This was divided into two distinct data sets with the difference in data calculated between the two walk scenarios. Correlated Component Regression (CCR) regression was then used to explore Emotiv predictors between settings on the difference data.

Higher levels of excitement (interpreted as higher arousal) were found walking in an urban busy (UB) setting irrespective of when that setting was approached (i.e. excitement was higher in UB whether UB was in the first or second part of a walk sequence). This finding is consistent with restorative theory that posits arousal is higher in urban busy settings. Higher levels of engagement (interpreted as higher immersion and levels of interest) were associated with walking in an urban green (UG) setting. However this effect was conditional on previous experience. For example, the change in engagement in UG was marginal following the experience of UB and increased when UG preceded the experience of UB. This implies a range (in time and nature) over which restorative effect of natural settings might operate. Changes in frustration and meditation were non-significant.

We conclude – for older people – that there are restorative benefits of walking in urban green settings, particularly in reducing arousal. Findings will be discussed in relation to our earlier study in younger people using a similar experimental study design (Aspinall et al., 2013).

References: Aspinall P A, Mavros P, Coyne R, Roe J., (2013) Urban Brain: Analyzing outdoor physical activity with mobile EEG, British Journal of Sports Medicine, 06.03.2013, p. 1-7

| 11:00AM - 12:30PM | Health and Vulnerable Populations II | *Asia Room* |

Moderator: Sara Jensen Carr, University of Hawaii at Manoa

Deep Monitoring / Common Health+: Prototypes for Chronic Health Care Delivery for Underserved & Remote Populations

Geoffrey Thün, University of Michigan
Kathy Velikov, University of Michigan
Dr, Joe Myers, University of Michigan Health Service / Eye Health Institute
Dr, David Burke, Wayne State University
Kallie Sternburgh, University of Michigan

This paper reports on an applied research project exploring the real-world challenges of deploying, using and assessing sensor-based technologies and telematic healthcare for monitoring chronic. This paper will present a design framework and first constructed prototype, as part of a larger "University of XXX Global Challenges" grant-funded project where architecture faculty have been collaborating with faculty in Medicine, Genomics and Engineering.

Chronic diseases are the single most rapidly growing health care challenge in both the developing and developed world. The number of individuals with chronic diseases such as diabetes, kidney disease, pulmonary disease, heart disease and glaucoma, are increasing worldwide at unprecedented rates. Monitoring is critical for optimizing individual treatment and sustaining long-term outcomes, however, in many locations direct patient contact with physicians or other professional caregivers is expensive and challenging..

The practice of measuring chronic disease status in millions of individual patients, distributed over wide distances and sampled with high frequency, is referred to as "deep monitoring" This requires: 1) the novel applications of existing technologies, 2) the development of new sensor and wireless communication technologies, 3) the analysis of large data streams for health assessment, and 4) new models for the physical delivery of these services that prioritize community involvement and produce community managed infrastructures.

While wireless communications technologies and advances in low-cost diagnostic devices have enabled a range of new health service delivery models within the past decade, no single model of spatial delivery of these services can produce a universal solution, as the range of cultural, social, economic, climatic and geographic conditions requiring access to new services produces a vast range of contexts in which a single solution is impossible. A range of mobility-based solutions are currently active globally, including novel programs such as Foster + Partners' Droneport project. However, for chronic care and monitoring, this project argues for locally-situated solutions within existing communities.

The Common Health+ project utilizes repurposed commercial shipping containers to deliver technologically-enabled low-energy environments replete with climate controls (to protect sensitive technology devices from corrosion) while producing a locus that is managed and operated by local community members. In the context of the global effort to advance related solutions, the project offers a number of unique dimensions: shading structures that couple outdoor waiting and learning areas with passive cooling technologies to reduce energy demands on facilities, grid tied, or off-grid energy systems, and low-tech water processing capacity for local services, all of which are leveraged for delivery via global production and logistics-driven distribution models while attempting to provide locally inflected solutions.

At the time of this abstract submission, a first prototype has been constructed and is being assembled in Sandy Bay, Jamaica in partnership with the Eye Health Institute, Food for the Poor and the Jamaica Ministry of Health. This paper will report on the ambitions and medical technologies of the Deep Monitoring project, outline the thinking developed through the prototype, and offer insights that we anticipate will contribute to the conversations regarding the 'Acupunctural Urbanism' session of this conference.

A Fusion of Horizons: The When of Environmental Interventions for the Benefit of Health
Andrew Tripp, Mississippi State University
Even the smallest scale environmental interventions still require large scale thinking.
Based on recent simulations at the CDC, researchers have shown that the choice between expanding insurance coverage and improving health care, on the one hand, and investing in environmental or contextual interventions, on the other hand, is a false dichotomy; however, the period of time that these different kinds of intervention require to yield their full health benefits varies dramatically (Milstein et al. 829). For example, a ten-year horizon that is sufficient for understanding the effects of expanding coverage is comparable to a twenty-five year horizon for interventions in the built environment, such as new pedestrian and transit oriented developments. For architects and planners, these observations are complicated by the simple fact that in the contemporary market, the built environment is no longer a particularly fast or competitive conduit for investment – i.e., the flow of capital is frozen for the duration of any construction until its use-value can be extracted – which is an economic condition that encourages the "flexibility" and "adaptability" of plans rather than the foresight of planners. This raises a question about how to intervene in the built environment for the sake of "healthy" outcomes in such a way as to anticipate a quarter century of change, while at the same time accommodate the pressures for faster forms of economic development. Such an inquiry positions small scale health based environmental interventions at a particularly delicate point within an urban plan, and it tests the threshold at which architects can truly imagine the value of their work.

This paper is the result of recently completed research that posed this question and compared the attitudes toward "time" and "health" in four municipal urban plans for cities in the Southeastern United States: Birmingham (AL), Louisville (KY), Memphis (TN), and Nashville (TN). According to the 2015 United Health Foundation Annual Report (published by the UHF and the APHA), the Southeast includes seven of the ten least "healthy" states, and while official entities are reluctant to rank the least healthy cities, the four selected here are typically among the anecdotally least fit metropolitan areas in the country. While health oriented environmental interventions are a central part of plans for Louisville, they are noticeably absent from the others, which was an opportunity to locate the potential where of interventions within the when

of plan making. In the final analysis, it is acknowledged that environmental interventions for the sake of health, at whatever scale, requires at least a modicum of utopianism.

Moderator: Mark Fenton, Tufts University

Mobilizing for Better Health through Prototyping Park Infrastructure
        Shannon Criss, University of Kansas
        Nils Gore, University of Kansas

This paper will disseminate lessons learned regarding the improvement of public parks in Kansas City, Kansas (Wyandotte County), a low-income community and home to a population (largely made up of Hispanic, African American and Refugee citizens) with limited healthcare resources, underemployment, a large number of under-utilized parks, open spaces, neglected public ways, and abandoned, deteriorating buildings. Wyandotte County ranks at the bottom in numerous health indicators with the population at 50% pre-diabetic and with 34% of adults considered sedentary. New ideas on the creation of healthy communities are emerging, but the means to engage citizens through a participatory process, equitably involving community members, organizational representatives and partners in all aspects of the evaluation process is lacking. This project has developed methodologies to both enhance the understanding of the given phenomenon of current use and conditions of the parks, and integrate the knowledge gained with specific actions to improve the health and well-being of the community members involved.

While, the city government, private non-profits, and diverse citizen-formed groups are very active in this area, they have developed multiple and highly varied improvement programs—sometimes in sync with one another and other times seemingly not. This project represents the results of a year of engagement with a set of local residents, students, the city's Park and Recreation department, a set of non-profit organizations and university partners to connect the various partners around a healthy park initiative. Through foundation support we have been able to hire "community mobilizers" to assist us in seeking and engaging local residents that encourage active use of the parks through walking and biking clubs—using the parks on a weekly basis. Through this collective action, insight about the specific spaces of the park and its relationship to local neighborhoods is understood and serves as a laboratory to define the needs and directions needed to make the parks fitting to the residents' needs and desires through mapping, design and fabrication of prototype elements intent on developing radical forms of collaboration and project delivery. This project will show the methods of engagement at various levels, the iterative design process that has engaged grassroots and civic leadership, the design/build prototyping process, the impacts and challenges of policy that have occurred and the documented impacts of design on park use. More than creating elements in a park, this project has created a discursive space between the residents, the civic leadership and offered up a process that is transferring leadership and good design into the control of local leadership. In a slow transformation of roles, this work is becoming a laboratory for transforming parks in small and incremental steps.

Transdisciplinary Collaboration Through Memphis Walks
        Anthony Kitsinger, University of Memphis

Memphis Walks represents an interdisciplinary, community-engaged effort to enhance health through re-envisioning the built environment. With the goal of increasing walkability in urban neighborhoods, Memphis Walks addresses many social determinants detrimental to health: crime, inadequate outdoor lighting, deteriorating sidewalks and crosswalks, dangerous traffic patterns, inadequate access to health care, and lack of walkable destinations. Walkability is at the center of most communities' quality of life index – enhancing physical health, the environment, and social cohesion. However, as our built environment has evolved, walking in the twenty-first century has become the transportation mode of last resort. As U.S cities are becoming increasingly car dependent and less safe for pedestrians, a large portion of our population cannot access jobs, goods and services without driving. Concomitantly, our lifestyles are increasingly sedentary and public health concerns, such as obesity, diabetes, hypertension, and air pollution continue to worsen.

This study contends that the simple act of walking has the potential to positively affect our physical, mental and social well-being. Through Memphis Walks we are developing walkability metrics so that communities can benchmark their current conditions and measure progress over time. Beginning in Memphis' inner-city Crosstown neighborhood, we engaged community residents through a community survey designed to gauge perceptions of crime, safety, blight, walking patterns, traffic congestion, social engagement, and health status. University faculty and students conducted environmental assessments related to crime patterns, community lighting, walkability, traffic speed, pedestrian counts, unsafe sidewalks, and physical design in the neighborhood. Active transportation and transit is critical for the roughly

4,000 residents of this diverse community. The ultimate intent is that research and dialog from this collaboration will influence public policy to support the development of more safe, walkable places to in an urban community, as well as support transdisciplinary graduate education.

This University of Memphis Design Collaborative (UMDC) is a partnership among the departments of Architecture, City & Regional Planning, Engineering, Criminology & Criminal Justice, the School of Public Health and five community partners: The Shelby County Health Department (SCHD), Office of Sustainability, the Church Health Center (CHC), Livable Memphis, and Crosstown Arts. UMDC, along with university and community partners, was recently selected as a new member of the national AIA Design and Health Research Consortium for our "Memphis Walks" initiative. This partnership worked together to plan and present a Healthy Places Summit, which included an exhibit, panel discussion and workshops to further the community conversation around our environment's effect on health.

Collaboration and trust is strengthened among these partners. For example, Architecture, Planning, and Civil Engineering collaborated in an existing conditions analysis. The School of Public Health has partnered in research with Civil Engineering to promote walking to school in urban areas. Further evidence of our University partners' commitment to collaboration lies in the multiple opportunities afforded our students for cross-disciplinary studies. Dual degrees and certificates were developed between the Master of City and Regional Planning, Master of Architecture, and/or Master of Public Health.

Who Benefits the Most from Walkable Communities? Results from a Quasi-natural Experimental Study

Xuemei Zhu, Texas A&M University
Zhipeng Lu, Texas A&M University
Chia-Yuan Yu, University of Central Florida
Chanam Lee, Texas A&M University

BACKGROUND: Growing evidence confirms that people living in walkable communities are more physically active overall than those living in less-walkable areas. In addition to the many health benefits from increased physical activity (PA), walkable environments also help create vital and equitable communities. However, more empirical studies are needed to advance beyond the current correlational evidence, and to start building causal links between walkability and increases of PA. It is also unclear which population group benefits the most from living in walkable communities, if any. Another popular doubt about the benefits of walkable communities is that residential self-selection may be the only driver for changes toward healthier lifestyle.

OBJECTIVE: This quasi-natural experimental study takes a step toward assessing the causal relationship, by examining if PA increases after people move from less walkable areas to a walkable community (Mueller in Austin, Texas). Mueller's walkable design represents a departure from typical automobile-oriented communities, featuring compact and mixed land uses, grid-like street networks, complete sidewalks, and rich green/open spaces (Figure 1 and Table 1). Meanwhile, its population characteristics are similar to the citywide average. This offers a unique opportunity to study the health impacts of moving into a walkable community. Building onto the previous analysis that showed increases in residents' PA after the move, this paper further examines who benefits the most from this move.

METHODS: A retrospective survey was used to collect information for residents' PA, and relevant multi-level predictors before and after the move. Three linear regression models (N=446) were fitted to predict changes in total PA, total walking, and walking in the community, respectively, while controlling for residential self-selection. The predictors included socio-demographic factors, the duration of living in Mueller, and variables for pre-move conditions such as the level and barriers of PA and social and physical environments of the neighborhood.

RESULTS: Across all three models, the residential self-selection for a walkable neighborhood and a lower pre-move activity level predicted greater increases in activity after the move. Some other variables also showed significant results (Table 2). Higher income, less social support in the pre-move neighborhood, and longer durations of living in Mueller predicted more increases in total PA. Lower walkscores of the pre-move neighborhood predicted more increases in total walking. Older age, higher income, and more pre-move environmental barriers for walking predicted more increases in walking in neighborhood after the move.

DISCUSSION: These results indicate the promising potential for walkable communities to serve as effective and sustainable interventions for PA promotion. Moving to a walkable community can bring especially significant health benefits to those who were less physically active or lived in less walkable environments, no matter whether they self-selected to move because of the walkable features. Future community and policy development decisions should take

health impacts of walkable environments into account.

NEXT STEP: Follow-up analyses will further explore causal pathways between environmental interventions and PA changes. Structural Equation Models (SEM) will be used to test the potential mediating and/or moderating effects of attitudinal and social factors in the PA-walkability relationship.

| 02:00PM - 03:30PM | **Healthy Youth** | *Asia Room* |

Moderator: Lehua Choy, University of Hawaii at Manoa

Learn & Grow: An Educational Garden for the Boys & Girls Club
     Alexis Gregory, Mississippi State University
     Suzanne Powney, Mississippi State University
     Joseph Witt, Mississippi State University

A collaborative team of educators and students from architecture, graphic design, health promotion, education, religion, and horticulture has joined together to design and construct an educational garden to be used by the local Boys & Girls Club. The aim of constructing the garden is to get the children at the Club excited about growing and cooking with homegrown foods. This project will educate children through growing their own food. An additional challenge of the project is to get the parents and community engaged through the education of the children at the Club. This will be achieved through educational programs that use the garden spaces to conduct classes. Current classes being conducted are teaching the children about nutrition and economics, community, safety, germination, and the health benefits of foods from the garden.

Also, classes are being developed to use the built spaces to educate students about architecture and art. Project activities include art classes where the students are exposed to artists like Andy Goldsworthy and his use of natural materials, design classes where students study elements of color, form and juxtaposition in the garden and then create designs of their own using what they are learning about nature. We will also have classes about architecture using the new built garden structures to inspire the children to think about the spaces and environment in which they live and learn.

We are similarly creating outreach events for the parents of the children at the Club, and the community. This includes events like art workshops, educational workshops on how to design your own garden at home, and healthy cooking workshops. It also includes promotional materials that are sent out to the community, local papers, and using social media to support the educational garden and its programs. The project intent is to reach out to an underserved population, which are not typical participants in other similar programs. The children and families of the Boys & Girls Club tend to be low-income and African-American, and we are interested in engaging this population to better educate and encourage them to participate in gardening and healthy habits. Despite having recently experienced significant decreases in prevalence of overweight (16.5% in 2011 vs. 13.2% in 2013) and stability in obesity estimates (15.8% in 2011 vs. 15.4% in 2013) among its adolescents, our state continues to fare worse than the United States on many obesity-related measures for its youth population. Only 19.8% of youth from our state report eating fruit and vegetables five or more times per day during the past seven days.

The educational garden is intended to educate about food and nutrition and how artistic fields like architecture and graphic design can create spaces that foster these healthy habits. Furthermore, our university president has listed food security as a primary research focus for the university and this project becomes part of a discussion of food security at a local level. This allows us to help empower the underserved in our state to achieve healthy habits using architecture and art.

Methodologies for health-driven materials research: Addressing sensory challenges for children with autism through the design of textile-based playscapes
     Sean Ahlquist, University of Michigan

The sensory experience of environment, in its scale, materiality and activity, can be significantly disruptive for people with autism spectrum disorder (ASD), affecting their ability to communicate, socially interact and regulate their emotions. Often cited more specifically as a sensory processing disorder (SPD), a "traffic jam" or overload of sensory input leads to an overwhelming experience of space. The result is a state of physical and emotional dysregulation, where behaviors required for social interaction or means of communication cannot be properly modulated or delivered at all. When looking more closely at this condition in children with autism, the dysregulation caused by a negative response to environment inhibits the proper state of attention, motor control and engagement needed for activities related to learning and play. In

practice, addressing the sensory experience is segregated from activities of learning and play. A state of regulation is sought through halting the activity and introducing a sensory-satisfying experience. The physical and emotional state of the child is reset through the use of a separate "multi-sensory" room containing grand sensory activities such as swings, tactile surfaces, strong visuals and muted sounds. The quality and magnitude of the sensory experience is often tailored to the child's profile which can range widely from under-responsivity and sensory seeking, to over-sensitivity.

This research seeks to resolve the environmental imposition onto physical and emotional dysregulation by merging calibrated sensory experiences fostering a state of regulation and focus with activities related to learning and play, within a single spatial and interactive architecture. This is developed through advanced research in lightweight structures and custom fabricated textiles, developed with CNC knitting technology, to form spatially articulated, elastically deformable environments, and tactile, pressure-sensitive interactive surfaces. Integrating depth-sensing technology, through the use of the Microsoft Kinect and bespoke software, textiles are transformed into surfaces for tactile, visual and interactive feedback where the amount of pressure applied produces a calibrated visual response corresponding to the inputs of location and pressure.

Sensory experience with the textile technology, at the level of the hand, provides means to addresses challenges in the grading of movement, the motoric control for providing a precise physical response to a sensory input or task. At the scale of the body, the architectures serve to blend activities of socially-oriented play, referred to as "collaborative play", with the experience of movement, visual feedback and auditory responsiveness. This paper will describe aspects of three prototypes which have been developed to engage varying levels and scales of multi-sensory experience and facets of learning, social interaction and play. This will include the design and fabrication of the physical structures, the interaction design and the embedded diagnostic tools being utilized to study the efficacy of the technology. The methods by which the projects are designed in their physicality and their means of interaction will be discussed, providing a framework for researching the challenges for children with autism and interdisciplinary research which embeds their behavior and profiles as a key facet to design process.

Take It Outside! Creating and Assessing a Nature-based Learning Environment
Pamela Harwood, Ball State University

In this project Nature Play, students from architecture, landscape architecture, childhood education, and natural resources and environmental management researched, designed, developed, constructed, and assessed a nature-based outdoor educational environment for 300 preschool age children at a local Head Start. We examined the links between use of the outdoors, access to natural play spaces, and human health. Nature is missing from most adult-designed play areas, even though it has been shown that children take pleasure from being in natural spaces and that particular natural features can increase their physical and creative play. As we face contemporary health challenges, particularly a growth in levels of obesity, diabetes, and stress-related illnesses, medical researchers, physiologists, and designers have turned to examine the outdoors and natural spaces' potential for alleviating such health problems. A positive correlation between contact with nature and the mitigation of attention deficit hyperactivity disorder symptoms has been shown. Our research relates to understanding the links between children's use of outdoor natural spaces and health outcomes. Children regularly playing in a natural outdoor environment are more able to learn about their body's movements, overcome their fears and release stress, increase self-esteem and self-belief, and use their imagination and creativity more fully.

Nature Play's primary goal is to re-connect children with the natural world by making developmentally appropriate nature education an enriching and sustainable part of the daily lives of children. The project's objectives are to increase physical activity, problem-solving, and creative play in natural playscapes; to provide access to this unique environment to the community; and to promote a conversation and coordinated vision to address health and wellness needs. The concept of "playscape" describes a different kind of outdoor environment where play structures, activity settings, and features are uniquely designed into natural habitats. Building the playscape into areas such as woods, wetlands, prairie, or meadow supports the cognitive, physical, and social development of children. We developed simulation workshops for teacher-training designed to strengthen teachers' understanding of the possibilities for curriculum design, and increase their awareness of the positive impact nature play can have on children's health and well-being.

Specific identified outcomes measured for Head Start children using the certified outdoor Nature Play classroom include the following. 1. Children have an increased understanding of nature evidenced through increased time spent outdoors, scientific inquiry skills, knowledge of the characteristics of living things, knowledge of the Earth's environment, ability to use tools to perform tasks, and expressed interest in understanding the natural world. 2. Children improve health and wellness as evidenced through increased levels of physical activity, and decreased obesity levels and at risk body mass index. 3. Children increase problem-solving skills and creative play as demonstrated through increased levels of problem solving, showing curiosity, and motivation and inventiveness in thinking, engagement in socio-dramatic play, and ability to

think symbolically. Working with Head Start teachers and families and University students, we have transformed the Head Start playground into an ecologically rich environment, setting a new benchmark of design for educating a creative, healthy, eco-literate generation.

Moderator: Nicola Szibbo, University of Hawaii at Manoa

Collective Sensing for Urban Health Policies
        Biayna Bogosian, University of Southern California
        Maider Llaguno, ETH Wohnforum
In the advent of rapid urbanization, and increasing concern for urban health, the formulation of urban strategies to improve urban air quality are becoming critical. This is especially true for dense urban environments where air quality is most compromised.

Urban air quality is influenced by ambient wind, atmospheric stability, solar radiation and anthropogenic pollutant emissions. Thermal pollution and chemical pollutant concentrations peak in cities, as opposed to the countryside, due to the high and localized anthropogenic emissions, as well as to the topographical and surface materials properties of the urban fabric. Luke Howard, a British meteorologist, was one of the first scientists who addressed this evidence in the 1830s; and since then, the research on urban air quality has been ongoing. In the last decade, many cities have adopted policies to control the emission of pollutants to the atmosphere as well as to promote sustainable urban developments. However, due to the lack of availability of urban air quality data, these regulations often fail to respond to specific local needs.

To be able to better monitor air quality, we must gather higher spatial resolution urban environmental data to capture the variability of the heat and contaminant concentration levels across the city. Such high resolution environmental data cannot be obtained from weather stations or current sensory networks. Thus, to capture air quality data at a finer spatial resolution, an exploration of alternative modes of data acquisition is necessary. This article argues that participatory environmental data gathering is an ideal method for achieving high spatial resolution environmental data. Through citizen engagement for the data collection process will result in obtaining sufficient geotagged databases which will inform research on urban microclimatology as well as the formulation of urban policies.

This assertion is supported by a case study conducted in the city of Los Angeles which focuses on the acquisition of high spatial resolution urban air quality data, utilizing readily available environmental sensors coupled to dynamic devices. Custom air quality sensor kits are mounted to bikes for acquisition of pedestrian level microclimate data. The same sensor kits are attached to a number of Unmanned Aerial Vehicle (UAV) for the vertical air quality measurements. For further analysis, the crowd gathered air quality data is compared with the metropolitan scale GIS data to identify air quality trends and their relationship to urban design attributes. The novelty of this process lies in the ability to think about urban strategies which respond to site-specific urban air quality data.

The working methodology advocated here emphasizes the importance of spatial resolution of microclimatic data acquisition and takes advantage of accessibility to sensors and mobile devices. This method would not only provide finer-grain data for environmental scientists, but would also elevate the public's health consciousness and climate change literacy through active participation. The goal is to amplify the reading of the climatic data for the formulation of locally informed urban policies and increase sensitivity towards the built environment.

Creating a Roadmap for Legislated Environmental Change: Design Thinking and Making California's Carbon Credit Work on the Ground
        Robert Todd Ferry, Portland State University
        Sergio Palleroni, Portland State University
In the fall of 2013, our university center was approached by the Sacramento Area Council of Governments (SACOG) to begin the process of exploring how public interest design could be used to address the needs of some of Sacramento's most disinvested and environmentally impacted neighborhoods. This collaboration began at a crucial time, as California was in the process of passing the first Cap and Trade legislation in the Western Hemisphere. Anticipating that the legislation would be passed, SACOG began with support from the California Foundation and Sierra Health Foundation to establish a methodology and strategy for implementation in what would be one of the pilot areas for the new legislation in California, the complex cultural environment of the central valley of the state. This area contains culturally diverse

communities living in a patchwork of agricultural and urban environments. The challenge for our center and SACOG became how to effectively reduce greenhouse gas emissions and their impact through strategic reinvestments in poor affected communities through design and envisioning processes Creating a series of participatory design and development strategies, methods, and approaches that would guide future investments in affected communities in the COGs of the state was the end goal.

The process has in the last two years played itself out in two communities chosen for both the level of environmental impact and the presence of strong non-profit community organizations that will continue to implement the strategies long-term. The development of these strategies has involved several design studios and graduate research seminars over the course of two years. In these courses students had the opportunity to travel to Sacramento and meet with community leaders, government officials, and project stakeholders before beginning the process of proposing design responses ranging from recreation centers and business incubators, to street improvements and systems of occupying vacant lots with pop-up shops.

The projects that the stakeholders strategically chose to move forward with include the development of a series of transit stops that also provide amenities chosen by the community; the design of a tournament sports center and neighborhood park that can become an economic stimulus for the area; and the reclaiming of a closed elementary school as a shared center for several nonprofit organizations serving the health, education, and legal needs of the community. This case study will reveal many of the challenges and opportunities of collaboration with community organizations, as well as the physical and digital tools our center created to ensure greater participation and empowerment of the community. It will also illustrate strategies for maintaining student participation in a meaningful way that is beneficial to both the student and the community that they serve in a public interest design process.

Health is Material to Design
George Bradley Guy, Catholic University of America
Tanya Mejia, Perkins Eastman
Nancy Hulsey, HKS Architects
Lona Rerick, ZGF Architects

The manufacture, use, and disposal of building products has profound effects on human and natural ecosystems health and is the realm where the architect can exert the most singular control. In the broad intersection of health and design, material selection is one of the most critical issues today, and can serve a vital role as a portal for comprehensive design for well-being. The majority of owners, clients, and design professionals in education, housing, landscape, office workplace, and urban design do care about the health of people and the planet, and the drive toward chemical content and human health impact transparency of building products has made the goal of reducing and eliminating the toxicity of building products achievable.

However, it is often difficult for either the designer or the client to understand how to incorporate the value of "healthy materials" into their "bottom line". The array of simpler prescriptive best practices for materials design can be overwhelming to even an experienced designer. From pre- to post-occupancy, it is necessary to incorporate and institutionalize evidence-based measures into the design process and not rely on generic prescriptive measures.

This proposal considers the practice of incorporating the health impacts of building products into architectural design. It is necessary to develop methods for a materials use health and well-being design process so that it can become a standard part of architectural practice and ultimately provide a quantifiable value.

The methods to be proposed and analyzed include a tactical approach whereby the client and design team set at least one clear goal during pre-design to implement and measure through design to post-occupancy. This concept of limiting variables will also enable the development of a clear set of case studies for the impacts of material selection on human well-being without the confounding effect of too many parameters and will allow for a platform upon which to develop qualitative and quantitative economic, social, and environmental knowledge around the process and outcomes.

A set of sustainable design experts in architectural practices will provide their experience on design projects in various sectors that have attempted or succeeded in addressing materials health . In addition, a broader stakeholder survey will be conducted of designers and associated case studies and current design firm practices in order to develop metrics for tactical project applications. From this review of current sustainable design practice, methods of institutionalizing the value of health and well-being will be proposed via practical real-world steps.

One example for illustrative purposes is to set a goal for a senior living or school design to eliminate asthmagens through

material selection, and measurement could include data collected on the materials selections and their applications and possible correlations to indoor air quality as well as designer and occupant surveys. In contrast to a "best practices" approach, which often includes dozens of strategies that appear to have worked in the past, a performance-based approach isolates goals to track and evaluate specific relationships between practice and outcome.

04:00PM - 05:30PM   **Health and the Human Scale**   *Asia Room*
Moderator: Laura McGuire, University of Hawaii at Manoa

Cyborgonomic Architecture, Chromosapien Space
        Mary-Ann Ray, University of Michigan

"Cyborgonomic Architecture, Chromosapien1 Space" is the title of a graduate options studio taught at _____ in the fall of 2015. The studio explored, in an intensive manner, new potentials for ways in which a wide range of bodies interact with topographies, spaces, surfaces and objects. The bodies in the case of the studio were part of a culture of disability that was unfamiliar to the students, and it required that they open themselves up to obtaining a deep understanding of a wide spectrum of bodies, disability practices and disability theories.

Students in the studio designed at a range of scales from the landscape to urbanism, architecture, surfaces, furniture, everyday objects and graphic/identity/wayfinding design. The students invented topographies, spaces, surfaces and objects that attempted to take the stigma of the "dis"- out of the "disabled" bodies living in and interacting with them. The studio proposed constructs that are both speculative and highly practical, realistic and far-fetched, and for the studio, these were not seen as mutually exclusive or as binary modes of operation, but rather as inclusive qualities that each project was striving to achieve. This allowed the work to break through pre-conceived boundaries or territories of the base requirements of the Americans with Disabilities Act and to produce projects that might be elevated beyond.

The Cyborgonomic Architecture, Chromosapien Space Studio participants traveled to Ilsan in South Korea and lived for one week on a site with nearly 300 people with a wide range of disabilities both cognitive and physical that had been literally left at the gate, abandoned by society. In this segregated community- a not for profit organization called Holt Korea- what those of us outside label as "dis"-abled was just the norm, and difference was not a condition consistently reinforced by either the environment or the more general public. We found it to be an almost euphoric village of children and adults growing, living, and working, and moving toward living as independently as possible given the particular constraints of their disabilities. Holt Korea has produced a kind of hyper-functional community of persons that in the "normal" city would be operating as and defined as "disabled" not only by other citizens, but by the infrastructures and details built into the environment itself.

The specific project the students worked on is a real project Holt Korea is undertaking for housing for 20 specific families with disabilities to live independently on a 3 acre site near their current facility. The research for the studio work was two-fold, involving both the firsthand experience of living at Holt Korea for a week and studying disability theory, performance art and other texts on the medicalization of architecture, the body and technology.

1 "Chromosapien" is a term invented by Robert Adams to dissolve the binary structure produced by the use of the terms "abled" and "disabled" and to substitute for the genericized and sanitized term "universal"

Sanatorium Zonnestraal and a case for a nuanced approach to light exposure
        Aki Ishida, Virginia Tech

Jan Duiker's Sanatorium Zonnestraal (1928-31) near Hilversum in the Netherlands is an exemplar of modern architecture designed as a machine for hygiene. The photograph of its long horizontal lines of flat roofs and balconies, with tree canopies beyond seen through the long horizontal windows, is a striking icon for sanatoria from the early 1900's. Good architecture of Dutch Functionalism, to which Zonnestraal belonged, was imbued with ideal of light, air, and hygiene. Its name, the Dutch word for sunbeam, honors the healing power of the sun. The building has continued to be recognized for its significance not only for its modern construction methods and materials but also as an emblem of healing architecture in the times of tuberculosis.

Despite its architectural significance on multiple fronts, the building was designed at a time in which scientific proofs of healing through architecture were relatively unchallenged. As Margaret Campbell claims in her paper 'What Tuberculosis did for Modernism', the breakthrough in triple drug therapy in the 1950's "ruptured the direct association between architectural design, treatment, and physical recovery." While one could argue that the discovery of drug therapy rendered

Zonnestraal obsolete, there are lessons from this exemplary building. A critical analysis of this building provides insights into a more complex mode of thinking about light exposure - one that responds to specific contexts and time by synthesizing daylight with electric light and by embracing a range of light exposure from filtered to bright, from direct to indirect.

This paper examines Zonnestraal through the notion of light exposure. Zonnestraal was designed as a medical instrument of exposure to sunlight and air. Reinforced concrete slabs and columns enabled long span and unobstructed views, and steel frames facilitated ribbon windows which allowed daylight to stream into the buildings. The plans of patient rooms were configured as fingers that reach out to the landscape for exposure to light. The building's adherence to modern principles resulted in spaces that did not, however, bring about human comfort. As with many modern buildings of this era, thermal breaks in the glass curtain walls were poor by today's standards. Unlike the vernacular northern European masonry buildings which could protect the occupants from heat during the day and stay cool at night, the expansive glass windows resulted over- or under-heated interior.

Although the explicit reference to light was limited to the sunlight, it is important to examine the role played in the sanatorium by electric light. Industrialization brought about proliferation of electric light bulbs in daily lives. Edison's 1879 invention made bulbs available for consumers. In 1903, physicist Niels Finsen won a Nobel Prize for his work on treatment of lupus with artificial light. Zonnestraal was designed in the context of such discoveries that gave hopes for future in electric light. Control over light quantity and quality was relatively primitive. In contemporary practice, such limitations could be seen as possibilities to more complex lighting schemes that are attuned to the solar cycle and conducive to healing.

The Ergonomic Frame: Humans, Nonhumans, and their Spatial Ontologies
Michael L. Beaman, Rhode Island School of Design

"The critical ontology of ourselves… is at one and the same time the historical analysis of the limits that are imposed on us and an experiment with the possibility of going beyond them" - Michel Foucault

The prehension of the human physiology, and later cognition, as a spatial referent precedes any formal definition of architecture. From the virtual dimensions of proportionality to the actualized qualities of haptics, humans, as spatial design antecedents, have had as long a history with architecture as architecture has history. It is a history of assemblies; bodies, spaces, the relationships between them, and the information and processes that form those relationships. And yet, as the de-centering of humanity as the sole subjective lens through which spatial organizations and material constructions find relevance and value wanes in the wake of global environmental issues of climate and ecology, the vector of our human-spatial relationship is likewise called into question. For spatial designers who address this question either through positive or negative formulations, an examination of what it means to design for humans within a post-humanist milieu might be in order.

Within this agenda lies a course of inquiry running parallel to that of ergonomics and human factors. A close examination of both endeavors reveals that they are inherently rooted in the spatial, spanning extensive and intensive qualities, behaviors, and relationships.

Ergonomics and Human Factors (E/HF), which emerged as titular terms through regional and lexiconical preferences, refer to the same overarching body of research, set of practices and modes of application. Both emerged as organized disciplines in the 1950s based in large part to post-WWII investigations into issues of safety and performance between humans and mechanical systems carried out simultaneously in the US, Russia and throughout Europe. Despite current connotations among design professionals and the general public that ergonomics and human factors is concerned with the fitness of objects to bodies, neither term nor their subsequent codification into research objectives, practices and applications are limited to or defined by this narrow reading.

More appropriate would be an understanding of both terms as "primarily concerned with how human beings interact with technological systems in all their various forms". This includes spatial technologies, affordances and manifestations. This turn in definition, away from objects and toward systems, allows E/HF to escape the artifice of industrial practice and fully embrace the relational aspects of the human-technological assemblages and the human and non-human actants that comprise them.

This paper examines six frames through which architectural discourse is able to appropriate ergonomics to analyze its own statements on humans, nonhumans, and their spatial ontologies: the Appropriative, the Diacritical, the Mechanical; the Capacitive, the Cybernetic, and the Ecological. Through an analysis of spatial artefacts and cultural practices both

impacting and impacted by design, each frame is explored through its preeminent status in design thinking and discourse. It will be argued that this analysis reveals both evolutionary and incongruent approaches to building spatial ontologies within architectural and extra-architectural practices.

04:00PM - 05:30PM   **Well-Being in the Studio II**   *Pacific Room*

Moderator: Shannon Criss, University of Kansas

Health for Human, Animal, Environment and Economy: Implement the One Health Concept in an Interdisciplinary Design Studio

     Zhipeng Lu, Texas A&M University
     George J. Mann, Texas A&M University
     Chanam Lee, Texas A&M University
     Macharia Waruingi

INTRODUCTION: This presentation introduces an interdisciplinary design studio that implemented the One Health Concept. This concept involves a holistic view of health that emphasizes: (1) healthy living for all - HUMAN, (2) biological diversity and ecological integrity - ANIMAL, (3) sustainable and low-impact development - ENVIRONMENT, (4) economic and cultural development - ECONOMY. The project, UBRICA ONE, is a sustainable medical city to be developed on a 4,330-acre land in Nakuru, Kenya. It will include a medical campus, a biomedical research district, residential communities, a pharmaceutical industrial park, and a hospitality and recreational District. UBRICA ONE is designed to foster healthy living for medical tourists and people residing and working there. A total of 52 undergraduate students were engaged in this studio, including the second-year and the fourth-year architecture students, and the fifth-year landscape architecture students. The multidisciplinary instructor team included two architecture professors, one landscape architecture professor and a physician.

OBJECTIVES: The studio aimed to provide students with (1) deeper understanding of the One Health Concept, (2) an opportunity to work on a real-world project at various scales (urban design, landscape, and architecture), (3) an environment to develop self-learning skills and ability to handle complex problems involving interdisciplinary strategies, and (4) a team with members with diverse backgrounds and skills.

PROJECT PROCESS: To create a collaborative environment, the studio acquired a space that accommodated all of the students. Thirteen teams were formed, each of which was composed of at least one second-year and one fourth-year architecture students, and one landscape architecture student. The team chose the project type based on their interest. The project underwent a series of steps: (1) site inventory and analysis, (2) case study and research, (3) program development, (4) concept development, (5) site design, (6) architectural and landscape architectural design, and (7) design documentation. Guest lectures were frequently offered to students on various topics (e.g., public health, healthcare and urban design). Weekly individual team meeting was held to critique the progress and design approaches. The final review was organized during a three-day conference in relation to the project, with over 100 guest reviewers.

LESSONS LEARNED: This interdisciplinary project provided excellent opportunity for students to examine health issues from different perspectives in great depth. Multiple lessons were learned: (1) One Health is a relative new concept that needs further developed and defined; (2) It was challenging for students to take into account multi-facets of health during design; Related lectures in public health, veterinary and economy should be delivered; (3) It was critical for students to forget their majors and get fully involved in the project; (4) Collaboration was emphasized, which required all team members should work together as much as possible in the studio; It was found that those teams who worked together more often, compared to those who did not, delivered better quality results; and (5) Communications were extremely important for collaboration, not only for students but also the multidisciplinary instructor team.

Toward Healthy, Sustainable and Just Communities: responses from the academy

     Michaele Lea Pride, University of New Mexico

In recent years, design, building, and development sectors have become increasingly interested in the individual and population health impacts of environmental design and planning. This interest is the latest phase in a long tradition of architects' and planners' attention to (and responsibility for) the health, safety and welfare of the general public. Indeed, back in the early- to mid- 20th century, infectious disease was the primary health challenges that building and zoning regulations were designed to address. These concerns were eventually integrated into the architect's practice, codified in planning and building codes, and are so internalized that we barely remember the public health objectives and challenges

upon which these regulations we based. The architect's responsibility for "health, safety and welfare" has been focused on safety, with an emphasis on structural integrity, emergency egress, and fire suppression. Today infectious disease is well-understood and controlled, while preventable injury and chronic illness top the list of diseases correlated with premature death. In particular, obesity is one of the fastest growing and most disconcerting health challenges in the western world today.

Jackson, Frumkin, Dannenberg and other public health professionals brought the health impacts of the built (urban) environment to our attention through their work on Designing Healthy Communities, which was accelerated by their engagement with design and development organizations (CNU, ULI, AIA). Today, these organizations have all identified health as a professional priority (and/or a strategic market).

Among current concerns are health disparities correlated with place—one's zip code is a greater determinant of health outcomes and life expectancy than one's DNA code. Investigation and consideration of the intersections between place and health span a spectrum from healthy buildings and interior environments (now assessed with the Well Building Standard) and Health Impact Assessments of development policy proposals (HIA) to urban design strategies intended to support active living (e.g., Active Living Standards, NYC).

How do we ensure that today's architecture/design and planning students develop the skills and knowledge base to enter tomorrow's workforce well-prepared to address/improve the health impacts of their professional work, especially for those communities that experience health disparities (low-income, rural, and/or communities of color)? While professional organizations have readily adopted public health objectives, the academy is slower to move. That said, several design and planning schools have developed health initiatives in response to the new demands of practitioners, clients and the general public.

This paper provides an overview of recent trends in environmental design disciplines to explicitly address, measure, and predict the health impacts of the built environment. Design/architecture-based initiatives at three public institutions—University of Minnesota, University of New Mexico, and the University of Washington—will be highlighted as examples of the various ways in which the academy is adapting to meet new concerns and new demands coming from the professions and the public.

Access to Healthy Food and Neighborhood Walkability: Insights through Inter-Professional Curricula
Shannon Criss, University of Kansas

Within the same university, the School of Preventive Medicine and Public Health and the School of Architecture, Design and Planning developed a cross-disciplinary collaboration to improve population health outcomes and health equity. This course was initiated through the production of two professional courses that share syllabi, methodology, literature and other resources, survey methods, and an online teaching site toward the development of a shared community-informed Design & Health Project in two neighborhood communities. This approach recognized that sharing these resources assisted both public health students and architecture students to acquire insights, tools and vocabularies of the other profession and to effectively learn through creative thinking and problem solving. Our program provided students the opportunity to substantively integrate perspectives and approaches by overlapping portions of our respective courses in each department—while providing each student with a strong foundation in their primary field.   This approach has fostered innovation and transformative professional practice in both fields by creating a spectrum of opportunities for cross-disciplinary training that integrates population health concepts and concerns through community-based engaged scholarship.

Ours was an approach that utilized coursework to engage a broad range of partnerships and coalitions among neighborhood organizations, public and private organizations, and city health department programs while aligning future initiatives around healthy food access and walk-able neighborhoods with specific needs and interests of the community members in a nearby urban community. Through interdisciplinary and collaborative approaches, our students supported collaboration between community members, reinforced their leadership skills, found ways to increase availability of healthy eating options in the built environment, and promoted safe and engaging walking routes for residents. The goals of the project were 1) to support the development of a core source of shared knowledge with an explicit focus on producing and measuring population health outcomes; 2) to connect residents and various existing initiatives through a community-based participatory research method; 3) to inventory and maintain the community's input on their internal knowledge base and healthy community assets with an explicit focus on producing and measuring population health outcomes (biological, behavioral, social and environmental determinants); and, 4) to engage resident partners and coalitions among representative groups that share accountability for population health outcomes. We also prototyped

and made visible policy and physical elements for citizen feedback thus empowering them to advocate for changes in local policy. By bringing our two professional degree programs together, in a way that has not been done before at our university, we believe we have created a new educational practice, programs, policies, and systems that positively impact population health education and our local community through an engaged scholarship process. This unique experience produced a more well-rounded and community-engaged student who is ready to engage in real world adaptive, innovative and integrated approaches for understanding how the built environment impacts public health. As faculty members, this project also enabled us to develop a deeper understanding, knowledge, and respect for the values and perspectives of one another's disciplines.