Building sustainable systems together

As the global population continues to grow and pressure on natural resources increases, it has become progressively more important to develop effective strategies to ensure critical systems such as food, energy, and water are protected. Together, these three essential systems form the Food, Energy, and Water (FEW) Nexus. This is a relatively young field of research initially triggered by the 2005 United Nations Initiative “The International Decade for Action: Water for Life.” At present, research in this area tends to focus on one element of the FEW Nexus, rather than studying all interlocking components. Previously, less support has been provided by the United States for research meetings than in other countries.

Professor Steve Padget of the University of Kansas seeks to facilitate interdisciplinary research to contribute towards effective design. As a part of this effort, he has led a workshop allowing architects and researchers to collaborate. Researchers and architects are not well connected currently, and the workshop allowed for better interaction between these two groups of extremely important contributors. This approach can serve as a model for combining the analytical skills of the scientific researchers to be with the synthesis skills of the architects at the formative stages of design.

This workshop project was led by Professor Steve Padget, University of Kansas, who currently works as a member of the architecture faculty. He combined his skills and knowledge with a comprehensive understanding of the multidisciplinary nature of research. Throughout the development of the workshop, Professor Padget was assisted by four Co-Principal Investigators; Dr. Eric Rath, Dr. Rachel McDonald, Dr. Paola Sanguinetti and Dr. Kelly Kindscher, also from the University of Kansas. Dr. Dietrich Ehmhart, and Dr. Belinda Sturm of the University joined the co-principal investigators to complete the organizing committee. The research was supported by a grant from the National Science Foundation, as well as financial support from the University’s General Research Fund, and Strategic Initiative Fund.

WORKING TOGETHER WORKSHOP
The three-day workshop took place from the 21st to 23rd January 2016 and included 74 professional participants and 48 student participants representing a diverse balanced workforce. Researchers attended from the fields of Humanities, Social Sciences, Physical Sciences, Economics and Design Professions. Participants were asked to collate opinions from their peers prior to attending. Though this diverse team of researchers can understand FEW Nexus problems thoroughly, architects and other designers are needed to act as agents of change in the built environment to combine the theories with design.

The workshop took place in two parts, a research symposium and a design charrette, and culminated in collaborative discussions. During the symposium, researchers, and designers participated in a series of presentations, panels and discussion groups. The design charrette section of the event allowed for an intense period of creativity in which architecture students proposed solutions to tackle threats to Food, Energy and Water systems in the built environment. A feedback loop was then created during the collaborative discussions when designs could be evaluated in light of the research symposium findings. Researchers offered their suggestions and provided academic context to the architecture students who were then able to modify their designs, or explain the limitations of the researcher’s suggestions, accordingly. The opportunity for interdisciplinary cooperation provided by this workshop are unique and allow for new methods of analysis and design to be developed.

Events at the workshop were each allocated to one of the three key themes; architecture, landscape architecture, and agriculture can be sympathetic towards the natural world. The Collaboration theme had an emphasis on Food and Energy and contained presentations by Dr. Kathleen Branan, Dr. Sarah Jacobson and Dr. Joel Gerard Burkam.

The workshop had four specific aims. Firstly, it intended to identify new and important opportunities for multidisciplinary research and design in areas related to Innovations at the Nexus of Food, Energy and Water Systems (INFEWS). Secondly, the workshop aimed to look for examination of how recent advances in technology and design can be employed in or adapted to INFEWS-related development and solutions. The project also aimed to identify multidisciplinary research, design and development challenges, knowledge gaps, and INFEWS-related research needs. Finally, the workshop would identify documentation methods to disseminate multidisciplinary research findings for future design development.

Ultimately, this workshop seeks to provide answers to two important questions; “What is needed, and what is possible?”

Research, Design or Collaboration. Within the Research theme, presentations were delivered by Dr. Ashlynn Stitwell, Dr. Kelly Fielding and Laura Losinskiwski, RA. The presentations focused on understanding the integration of water in the built environment and public perception of water issues. In the Design theme, Dr. Tim Crews, Jeffrey L. Bruce, ASLA and Steve McDowell, FAIA delivered presentations which sought to demonstrate how
workshop were ten key recommendations which were produced calling for research support. Three of the recommendations related to the development and utilisation of specific criteria to be applied to projects already developed in the built environment. To utilise the criteria, the recommendations also suggested a widespread programme of applying post-occupancy evaluations and an easily accessible database to gather and share examples of projects in the designed environment which meet the performance criteria. Further recommendations discussed specific methods which should be supported in future projects. For example, projects which looked at the upstream and downstream effects of INFEWS developments over time, and projects which explored the human factors related to FEW Nexus designs. Development of feedback devices was another important part of the recommendations. This included supporting the development and inclusion of easily accessible performance feedback tools for users, researchers and designers of projects in the built environment. Another recommendation encourages research into the best use of the feedback devices and exploring how their use changes human behaviour. Unsurprisingly, the remaining recommendations express support for future multidisciplinary research. For example, research into the best techniques to motivate users to apply best management practices developed throughout the workshops. The team also expressed support for multidisciplinary research into the effect of government policy on the performance of the designed environment. If found to negatively impact the environment, then researchers would also support further work to refine government policies to make the best of FEW Nexus initiatives. Future work in this field certainly seems set to benefit from the comprehensive multidisciplinary trial conducted by Professor Padget and his partners. So far, the structure of the workshop has already been integrated into the teaching programme of several courses at the University of Kansas. It is anticipated this will encourage current students to approach future interdisciplinary collaborations with a positive attitude. Another outcome of the workshop was an open house event for design students to share their proposals with the rest of the university cohort and the local community. Sustainable development now and in the future will benefit the global population but will be particularly important for those made vulnerable by their socioeconomic status.

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Bio

Prof Steve Padget, RA, LEED AP has been a member of the Architecture faculty at the University of Kansas since 1978. His research, design work, and teaching have resulted in multiple awards, grants, and publications. Professor Padget has degrees from the University of Kansas and the University of London.

Research Objectives

Professor Padget’s workshop was designed to allow researchers and architects to work together using their own unique skills to develop design ideas with strong evidence-based support. The workshop seeks to produce not only designs to tackle current problems but also to produce networks of researchers from multiple disciplines to tackle future problems.

Funding

National Science Foundation (NSF)

Collaborators

The following members of the University of Kansas faculty collaborated on the project:
• Dr Eric Rath (History)
• Dr Rachel McDonald (Psychology)
• Dr Paola Sanguinetti (Architecture)
• Dr Kelly Knobech (Ecology, and Kansas Biological Survey)
• Dr Dietrich Earnhart (Economics, and Environmental Policy)
• Dr Belinda Sturm (Engineering)

References


Personal Response

What do you anticipate will be the greatest benefit to society of using an approach which addresses all three systems (Food, Energy and Water) at once rather than tackling them individually?

Synthesising the three realms of People-Planet-Prosperity (aka “The Triple Bottom Line”) has long been employed by designers considering the design of sustainable environments. “To thinking provides a way to better understand a design problem and works as a technique to track a solution’s progress across interdependent objectives. It serves as a foundation for the “Research of Design”. This suggests a parallel method for research into the interdependent systems of Food/Energy/Water (the Nexus). This could provide a “Design of Research” technique which would make for better understanding of this Nexus. This, in turn, could inform the best practices in the design, and the management of the environment, to the benefit of everyone.