SCIE: The Future of Sustainable Architecture

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The built environment is transforming from isolated structures into adaptive urban ecosystems. The SCIE framework provides a multi-dimensional approach to navigating this paradigm shift in architecture and interior design.

S (Sustainability & Structure): This dimension focuses on achieving net-zero carbon emissions and transitioning to a circular economy. It emphasizes whole-life carbon management using BIM and Life Cycle Assessments to reduce the embodied carbon of materials. Key strategies include modular construction, upcycling industrial waste, and utilizing bio-based structural materials to avoid natural resource depletion.

C (Culture & Social Responsibility): Spatial design actively shapes social equity. This dimension advocates for inclusive historic preservation that respects the heritage of marginalized communities. It promotes mixed-use affordable housing to prevent economic segregation and emphasizes Universal Design in interiors, creating barrier-free, equitable spaces that intuitively accommodate all generations and physical abilities.

I (Intelligence & Innovation): The integration of data science and AI is revolutionizing design. Generative design algorithms combined with BIM optimize environmental and structural performance. During operations, IoT sensors and digital twins enable automated, real-time energy management, while adaptive smart furniture enhances user ergonomics and health monitoring.

E (Environment & Landscape): This dimension rebuilds the resilience between cities and the biosphere. "Sponge city" principles utilize green infrastructure to absorb and purify rainwater, mitigating flood risks. Furthermore, integrating biophilic design into urban planning helps alleviate the urban heat island effect, ensuring both physiological health and climate resilience.

Conclusion: The SCIE dimensions are deeply interconnected. True sustainability is achieved by combining the rigorous tools of applied science with a profound commitment to social justice and ecological harmony.

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Experience:

1. Professional Summary

Professor Shang-Yuan Chen is a distinguished academic and researcher in the field of architecture, currently serving as a Professor and the Chair/Director of the Department of Architecture at National United University. With

a career dedicated to the balanced development of research, teaching, and service, he emphasizes a cyclical approach where research grants support education, and student competitions validate the practical value of prospective research.

His expertise bridges the gap between digital innovation and sustainable design, specializing in Artificial Intelligence (AI) applications in architecture, Building Information Modeling (BIM), Green BIM, and Circular Economy strategies. He has extensive experience leading government-funded research projects and has been recognized with numerous teaching and invention awards, including the Autodesk Education Achievement Award and global invention platinum awards.

2. Education

- Ph.D. in Architecture (2003/08 – 2007/07) National Cheng Kung University (NCKU), Taiwan
- Master of Architecture (1998 – 2000) Yale University, School of Architecture, USA
- Bachelor of Architecture (1986 – 1992) Tunghai University, Taiwan

3. Academic & Professional Appointments

National United University (NUU), Taiwan

- Professor, Department Chair, and Director (2025/08 – Present).
- Professor (2022/08 – Present).

Feng Chia University (FCU), Taiwan

- Professor (2021/02 – 2022/07).
- Associate Professor (2012/08 – 2021/01).
  - Concurrent Roles: Deputy Director of BIM Research Center (2015–2022); Director of Master's Program in Architecture (2019–2020).
- Assistant Professor (2008/08 – 2012/07).

Professional Practice

- Designer, J.J. Pan and Partners, Taipei (2000 – 2001).
- Designer, Shu Chang Associates Architects, Taipei (1996 – 1998).
- Assistant Designer, C. Y. Lee and Partner Associates Architects, Taipei (1995).