



## Episode 696

### **Jie Zhao, PhD Head of Delos Labs, EVP at Delos**

How modern buildings are integrating IEQ controls, lighting, acoustics and more to make work environments healthy and high performing

This week IAQradio+ welcomed Jie Zhao, PhD Head of Delos Labs for a show on how modern buildings are integrating IEQ controls, lighting, acoustics and more to make work environments healthy and high performing.

Dr. Zhao is the Head of Delos Labs and an Executive Vice President at Delos. Delos is a wellness, real estate and technology company headquartered in New York City. As the creator of the WELL Building Standard, Delos develops products, programs and solutions that transform our environments into vehicles for improving health, well-being, performance, and resilience. Jie leads the research team to support product innovations and market strategies. He is also a lecturer in the Weitzman School of Design at the University of Pennsylvania. His research focuses on Human-building Interactions, including total building performance, occupant behavior in buildings, sensing and controls in buildings, health, comfort, and productivity of building occupants, as well as building energy efficiency and sustainability. Jie received his PhD Building Performance and Diagnostics from Carnegie Mellon University.

### **Nuggets mined from today's broadcast:**

As a child, Dr. Jie Zhao, PhD grew up in China where he experienced firsthand the rapid growth and urbanization of China. The building

boom resulted in the deterioration of environmental quality both outdoors and indoors. This piqued his interests in: lowering pollution, improving health, bettering building performance and enhancing diagnostics with the goals of optimizing occupant health, happiness, productivity and sustainability.

His undergrad and Masters' Degree are in Electrical Engineering and his unique PhD is in Building Performance and Diagnostics from Carnegie Mellon University.

### ***Who is Delos?***

Delos is a leader in science-backed solutions for healthier indoor spaces. Informed by nearly a decade of research on the impact of indoor environments on human health and well-being, Delos and its subsidiaries offer an array of evidence-based products, programs and solutions for residential, commercial and hospitality spaces. Delos is the founder of the WELL Building Standard™, the premier standard for buildings, interior spaces, and communities seeking to implement, validate, and measure features that support and advance human health and wellness. Its subsidiary, the International WELL Building Institute, administers and continues WELL's development and drives market adoption. Delos founded the Well Living Lab, the first research center dedicated exclusively to integrating health and building science to discover how to improve indoor spaces where people live, work and play, in collaboration with Mayo Clinic. Delos has offices in: US, Canada, Australia, China, Dubai and Europe.

***What is Delos' biggest contribution to the art and science of IAQ?*** Delos' biggest contribution to society is the WELL Building Standard, which is available to everyone free of charge, is trusted and utilized in over 100 countries. The WELL Building Standard has grown into the healthy building movement.

***How important are lighting and acoustics?*** While air, water, temperature, and noise have been studied and are more understood from a public health perspective for decades [The Institute for Health Metrics and Evaluation (IHME) is an independent global health research center at the University of Washington which studies the burden of disease. <https://www.healthdata.org/>]. Lighting is an emerging science that only recently was closely linked to human health. Light is the most important external factor on regulating human circadian rhythm. Light triggers melatonin production. New research in how eyes function in circadian rhythm won a recent Nobel Prize. No artificial light can be as bright as the sun. The sun has the most complete spectrum of light. Bright light in the morning is important to health. Exposure to daylight and sunlight is best (or from an energizing mirror) in the morning with reduced light after sundown.

Five Factors of Light:

1. intensity
2. color (spectrum)
3. when exposed (frequency)
4. history of the light
5. duration of the expose

***Is the direction windows face on a building important?*** Yes, computer modeling simulations of day light versus shade was an important component of his PhD research at CMU.

***Does Delos track the health of building occupants?*** Studies have been done to evaluate occupant health and well-being before and after implementation of the WELL Building Standard. See the recently [published paper](#).

***Does Delos study melatonin levels of building occupants?*** Not at this moment. We learn from studies done by other scientists in the world.

***Is all noise the same?*** No, harmful noise is generated by factories, airports, shooting ranges, etc. Harmful noise has been identified by the Global Burden of Disease Data Base.

The trend to open offices has resulted in more office noise and less speech privacy. Balance the ability to hear with need for speech privacy.

Noise is annoying, can result in hearing loss, increase stress, and makes people tired.

Delos evaluates acoustic products that are in the marketplace (i.e. acoustic insulation panels, green walls, chemical moss, electronic sound masking)

***People as pollution sources?*** The goal of building buildings is to make occupants safe, healthier and happier. When the building is examined mathematically occupants are the biggest “disturbances” as sources of pollution contributors include: heat, CO2 production, particulate matter, VOCs, cooking, cleaning, etc.

Delos is raising awareness and offers practical mitigation solutions such as monitoring and recommendations to augment range hoods with air purification devices.

***Air movement and airflow in buildings?*** We now know that COVID was spread by airborne particles. Delos has studied skilled nursing home rooms and found significant reductions (60%-70%) within rooms and 90% between rooms.

Delos also uses computational fluid dynamics to study airflow in buildings and with air purification devices. Delos measures airflow patterns in physical spaces in buildings using tracer gas.

***Z-Man signing-off***

***Trivia:***

Name the biochemical oscillator that cycles with a stable phase and is synchronized with solar time. This oscillator's in vivo period is close to 24 hours.

Answer: A circadian clock, or circadian oscillator

Answered by: Don Weekes