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Randolph Kirchain, co-director of the MIT Concrete Sustainability Hub

## Concrete Sustainability Hub names Randolph Kirchain as co-director

Engineer studies materials' role in manufacturing and infrastructure.

**Department of Civil and Environmental Engineering  
October 29, 2014**

Randolph Kirchain — an engineer who researches the environmental and economic implications of materials selection in the manufacture and lifespan of products from electronics to pavements — has been named co-director of the MIT Concrete Sustainability Hub (CSHub). Professor Franz-Josef Ulm, faculty director of the research center, announced the appointment Oct. 15.

“Randy has done important work that sheds light on how design, materials, and process work together over the lifespan of a product,” says Ulm. “His expertise, informed by strong connections with industry, has guided the CSHub’s findings about concrete’s impact on infrastructure.”

Kirchain is a principal research scientist in the Materials Systems Laboratory, part of MIT’s Engineering Systems Division. As a member of the CSHub, he has conducted studies on the economics of different types of pavements in varied climate and traffic scenarios over decades

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of use, and on how to estimate the cost of damage from hazards such as hurricanes over the life cycle of a house or building.

The CSHub is a research center established in 2009 in the Department of Civil and Environmental Engineering with grants from the Portland Cement Association and Ready Mixed Concrete Research & Education Foundation. Its aim is to accelerate emerging breakthroughs in concrete-related research and swiftly transfer those advances into industry.

Concrete is the most widely-used building material on Earth. One goal of the research center is to find ways of reducing the carbon footprint of concrete's basic building block, cement, through manipulation of the material at the nanoscale and through more sustainable practices in use of cement. Another goal is to quantify the ways in which building and infrastructure materials — including concrete — affect environmental and economic costs over a structure's entire lifespan, including its decades of use.

"There is a lot of discussion in the U.S. and worldwide about efficient and effective ways to manage infrastructure and sustainable cities — and our ongoing work in the CSHub aims to provide the tools needed to address that challenge," says Kirchain, who received a PhD in materials science and engineering from MIT in 1999.

Scientists and engineers from the departments of Civil and Environmental Engineering, Chemical Engineering, Materials Science and Engineering, Nuclear Science and Engineering and the Engineering Systems Division participate in CSHub research. The center recently began a new five-year phase in which it will:

- build on its breakthroughs regarding the composition of concrete in order to optimize the material's durability while minimizing its carbon footprint;
- integrate life-cycle thinking into building design; and
- implement the CSHub's findings into the engineering of infrastructure.

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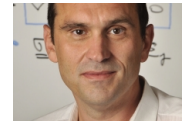
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