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**JULIO M. OTTINO** DEAN OF THE MCCORMICK SCHOOL

**GREETINGS FROM MCCORMICK**

At McCormick, we pride ourselves on educating engineers with thinking skills that differentiate themselves from their peers. Among these are the ability to link divergent and convergent thinking, to work across boundaries, and to bring creative approaches to their work. One of the most important skills we want to impart is the ability to dissect problems to their essence, to understand the real problem behind a perceived problem. This ability to see simplicity amidst complexity is a critical competency.

Yet it isn't enough. To be successful, our students must also be able to see complexity in simplicity, to understand the many ramifications and consequences of each decision or solution. This requires an understanding of connectivity and interrelationships, which we cover in this issue of *Northwestern Engineering*.

Complex systems, which I have studied for many years, are those that have no central organizing principle; rather these systems are composed of collections of agents that connect and give rise to something entirely new. The whole is greater than the sum of its parts; we cannot understand the system simply by deconstructing it.

With new access to vast networks of data, we have the opportunity to use and develop the toolkits of complexity research to understand how subtle relationships and actions drive systems, how they react to input, and how they can fail. The research provides insights into understanding and managing the complex systems that affect our

everyday lives, such as the environment, the Internet, processes within cells, and our social networks. This growing, highly interdisciplinary area of research is a significant strength for Northwestern.

We also highlight how many of our students expanded their thinking through collaborative courses with the School of the Art Institute of Chicago and the Department of Art Theory and Practice at Northwestern. These courses provide an enriching clash of cultures. Interdisciplinary teams are challenged to create art—both to exhibit and to effect social change. The results have been fascinating.

Our Q&A this issue features Stephen Carr, our senior associate dean of undergraduate engineering. Steve has held that role for 23 years and has been a key contributor to many changes at McCormick. When he steps down from this position in June, he can do so with pride. He has guided generations of our students on their paths and helped modernize our educational initiatives. I want to thank him for his efforts that have shaped the school and for his erudite presence among our leadership.

As always, I welcome your feedback.

Julio M. Ottino  
Dean, McCormick School of Engineering and Applied Science

**On the Cover**

A subset of BitTorrent's peer-to-peer filing sharing activity during one day in March 2009. Each line represents one user downloading a file from another, and the color indicates the type of file shared.

Read more on page 14.

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Director of marketing: Kyle Delaney  
Managing editor: Emily Ayshford  
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