# The George W. Woodruff School of Mechanical Engineering at Georgia Tech Presents The Annual Harold W. Gegenheimer Lecture Series on Innovation

**Featuring:**

Leo Beranek
Co-Founder, Past President, and CEO of Bolt Beranek & Newman
(now Genuity, Inc. and BBN Technologies, a department of Verizon, Inc.)

**Speaking About:**

*Concert Halls of the World and Their Design*

**Thursday, November 1, 2001, 3:30 P.M.**
Howey Physics Building, Lecture Room 4
Georgia Tech Campus, Atlanta

(Reception after the lecture)

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## Biographical Sketch

Dr. Leo Beranek received his Bachelor of Arts degree from Cornell College in 1936 and his Doctor of Science from Harvard University in 1940. During World War II he headed the Electro-Acoustic Laboratory at Harvard. He served as Associate Professor of Communications Engineering at MIT from 1947 to 1958.
He was co-founder, in 1948, of the firm, Bolt Beranek & Newman (BNN) of Cambridge, Massachusetts, and was its president for 16 years from 1953 to 1969. During his time there, he changed the business of the company from principally architectural acoustics and noise control, to an equal emphasis on acoustics and computer software. The most prominent of his efforts at BBN in the computer field was putting together the group that invented the forerunner of the INTERNET, namely the ARPANET, which was the worlds packet-switched computer network and operated from 1969 to 1989.

A lifelong interest in music led Dr. Beranek to specialize in concert hall and opera house acoustics in recent years. Following trips to more than 100 of the worlds leading halls and interviews of several hundred conductors and music critics, he wrote Concert and Opera Halls: How They Sound (Acoustical Society of America, 1996).

Dr. Beranek was the Acoustical Design Consultant for the Tokyo Opera City complex, a concert hall, opera house and drama theater which opened in 1997. In or near Tokyo, he has consulted on the Hamarikyu-Asahi Concert Hall, the Mitaka City Concert Hall, and the Tokyo, Dai-ichi Seimei Hall (to open in September 2001). He has been the consultant or co-consultant on many

other concert halls, including the Tanglewood Music Shed in Western Massachusetts, the Aula Magna in Caracas, and the Meyeroff Hall in Baltimore.

Dr. Beranek has received numerous awards, including Gold Medals from the Acoustical Society of America and the Audio Engineering Society, and the Silver Commemorative Medal from the Society of French Language Acousticians. From 1989 to 1994, he served as President of the American Academy of Arts and Sciences and was honored by them in 2000 with the first Scholar-Patriot Distinguished Service Award. This year he became an Honorary Member of the American Institute of Architects.

Dr. Beranek is a charter member of the Board of Overseers of the Boston Symphony Orchestra, honorary chairman of the Handel and Haydn Society, vice-president of the Massachusetts Historical Society, and he is affiliated with the Museum of Fine Arts in Boston. He is a fellow of the American Academy of Arts and Sciences, the National Academy of Engineering, the Acoustical Society of America, the IEEE, and the Americal Physical Society.

## Synopsis of the 2001 Gegenheimer Lecture

The first concert hall designed with some scientific acoustical principles is Symphony Hall in Boston, which opened in 1900. I will explain how this hall happened to embody all the architectural features in 1900 to rank it acoustically the highest-rated concert hall in the world today.

The search for acoustical parameters that describe how to build concert halls without exactly duplicating Symphony Hall has been ongoing since about 1950. The architects desire not to copy has often lead to the same kind of trouble that would occur if a maker of violins decided that the instrument ought to be square like a cigar box. Since architects wont oblige, the acoustical engineer faces the need to know how to recommend successful halls that dont look alike.

The first stage in the investigation that I am reporting is a series of interviews and questionnaires with conductors, music critics, and classical-music aficionados that has led to a rank ordering of about fifty well known halls in the world according to their acoustical quality. Simultaneously, leading acoustical laboratories in Europe, Japan, and the Americas have been searching for physical measures that would enable one to tell the extent to which a hall is good. We now have a set of parameters that we feel will lead to successful concert hall design. These parameters have been measured in all of the fifty halls and compared with the rank-order list. The results of the interviews and a series of photographs and drawings of good and bad designs will be presented in order to demonstrate where concert hall design stands today. Questions will be answered cheerfully.

## About the Lecture Series

The Lecture Series on Innovation was established in 1995 through an endowment from Mr. Harold W. Gegenheimer (Class of 1933) to support student programs that encourage creativity, innovation, and design. Through the lecture series and support of capstone design projects, students are exposed to processes that stimulate creativity and lead to inventions and patents. The previous Gegenheimer lecturers were:

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| 1995 | Dr. Jerry M. Woodall | Distinguished Professor of | *Necessity Is the Mother of* |

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| | | Microelectronics at Purdue University | *Invention, But Curiosity and Persistence Make It Happen* |
| 1996 | Mr. Burt Rutan | President and CEO of Scaled Composites, Inc. | *Innovation: Use It or Lose It* |
| 1997 | Dr. Jim Adams | Professor at Stanford University | *Creativity Versus Control: Their Impact on Innovation* |
| 1998 | Dr. George N. Hatsopoulos | Founder of Thermo-Electron Corporation | *Thermo Electron and the Spin-Out Business Design* |
| 1999 | Mr. Richard Teerlink | Retired President and CEO of Harley Davidson, Inc. | *Our Learning Journey* |
| 2000 | Dr. Woodie Flowers | Pappalardo Professor of Mechanical Engineering at MIT | *Innovator, Innovatee, or Somewhere Between?* |

## About the Woodruff School

The Woodruff School of Mechanical Engineering is the oldest and second largest of the ten divisions in the College of Engineering at Georgia Tech. The School offers academic and research programs in mechanical engineering, nuclear and radiological engineering/medical physics, paper science and engineering, and bioengineering. The enrollment includes 1674 undergraduates and 696 graduate students. Studies are directed by a full-time staff of 72 professors, ten joint faculty, 23 research faculty, and five academic professionals, who are supported by 43 staff members. The George W. Woodruff School of Mechanical Engineering is the only educational institution to be designated a Mechanical Engineering Heritage Site by the American Society of Mechanical Engineers. For more information about the Woodruff School contact:


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