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# Creating Macroscopes with Technology and Analytics: New Possibilities in Our Lives – The Important Role of Tomorrow’s Mathematics Professionals (Abstract)

Lilian S. Wu

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The Department of Mathematics at the University of Dayton presents

## The 13th Annual Kenneth C. Schraut Memorial Lecture

Saturday, November 3, 2012



### Creating Macroscopes<sup>[1]</sup> with Technology and Analytics:

New Possibilities in Our Lives –

### The Important Role of Tomorrow's Mathematics Professionals

Dr. Lilian S. Wu

Program Executive

IBM Global University Programs

#### Abstract:

Our world is increasingly computerized, interconnected, and instrumented with sensors. Massive amounts of data are being captured in computer systems about our natural environment and man-made engineered structures, processes, and systems. But it is necessary to make sense out of all this data. With new computer methods computers can in effect become macroscopes, enabling us to see the world portrayed by our data.

Already it is amazing how intelligent many of our structures, processes, and systems have become, but we are only beginning. Much of our smart world so far has been built using highly structured data; but a large portion of information today is unstructured; much is based on natural language which is often highly contextual and full of ambiguity. The sheer mass of this unstructured data makes it difficult for unassisted humans to assimilate, and we are just beginning to explore what computers can do to assist. Perhaps the Jeopardy playing machine Watson's natural language processing and Q&A capability can assist humans in useful tasks, e.g., in making medical diagnosis.

In this talk I will give examples of our smarter world today and a variety of possibilities for the future.  
About the speaker:

Dr. Wu is Program Executive, Global University Programs, IBM Technology Strategy and Innovation. She is a member of the Board of Trustees of the New School University and Fordham University in New York City, the KECK Graduate Institute for Applied Life Sciences, one of the Claremont Colleges, and the President's

Council of Olin College in Massachusetts.

She is Chair (Emeritus) of the National Academies of Science, Engineering, and Institute of Medicine's National Research Council Committee on Women in Science, Engineering, and Medicine and from 2009 – 2012 a Councilor of the Association for Women in Science (AWIS). She is a member of the S&E Workforce Committee of the Government-University-Industry Research Roundtable of the National Research Council.

Dr. Wu was a member of President Clinton's Committee of Advisors on Science and Technology (PCAST), NSF's Committee on Equal Opportunity in Science and Engineering and served on the Advisory Committee of NSF's Engineering Directorate, NSF's Committee on international Science and Engineering, and NSF's Corporate Alliance. Among her other professional services, she served on AAAS's Committee on Public Understanding of Science and Technology and DOE's Secretary of Energy's Laboratory Operations Advisory Board.

She has had a distinguished career at IBM mostly as a researcher in the Mathematical Sciences department where her focus was to develop business planning methods under uncertainty and pricing of commodities and contracts under uncertainty. She did consulting for oil and power industry customers (e.g., when the power industry changed from a regulated to deregulated industry.) After IBM Research she served as a Technology Strategy Consultant for IBM's VP of Technology. Dr. Wu's current interests are analysis of technology enabled and people intensive complex systems, particularly on issues related to the productivity of the business service sector. Today she is a member of IBM's University Programs where she manages a portfolio of major IBM-university-government research collaborations.

Dr. Wu received her PhD in Applied Mathematics from Cornell University and a Hon LHD (Honorary Doctor of Humane Letters) from Marymount College. Her major research interests are analysis of technology enabled and people intensive complex systems, particularly in the education and services sectors.

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<sup>11</sup> The term “macroscope” was introduced by Gomory (“National Productivity and Computers”, *Computer* 28 (7) , IEEE, 1995) to describe the instrument needed to visualize objects too large to see.

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