SA+P at the World Economic Forum

A Score of Presentations Reflecting Remarkable Reach and Diversity

This year's World Economic Forum at Davos, Switzerland, featured five professors from SA+P – nearly half of MIT's entire contingent of twelve academics – delivering presentations that ranged from the future of urban development to recent advances in neuroscience, and from potentially transformational uses of social media to the creation of a fabricator that could make almost anything by 'simply' reassembling atoms. The extraordinary range of topics illustrates the remarkable reach and diversity of our faculty, a scope of particular note considering that SA+P is the smallest of MIT's five schools.

The Future of Urban Development

Most prominently at the Forum, Dean Adèle Naudé Santos chaired the Global Agenda Council on Infrastructure & Urban Development, a team of 15 experts and industry leaders from around the globe charged with identifying new approaches to urban planning, development design and management processes.

In that capacity, she announced a long-term, cross-industry effort to offer cities and the private sector new urban development models and opportunities for collaboration. To launch the project, she distributed a compilation of case studies called 'Urban Anthologies: Learning from Our Cities'(PDF), coordinated and produced by the Senseable City Lab, a research center directed by SA+P's Carlo Ratti, who was also a member of the Council.

The booklet features six stories of urban development in which a community overcame seemingly insurmountable challenges related to changing urban dynamics in a unique way.

Highlighting not only the physical outcomes of the projects but also, importantly, the catalytic and enabling factors that made the transformations possible, the case studies include:

- the successful management of rapid urban growth in Addis Ababa
- the incremental yet visionary urban upgrading project in the La Vega Barrio of Caracas
- creation of the famed Eco-District in Freiburg, Germany
- the patient reversal of urban degeneration in Hillbrow, South Africa
- the adaptive reuse of New York City's elevated High Line structure
- Shenzhen's national pilot for new energy vehicles

By June, the council aims to gather a total of 30-40 case studies, submitted both by council members and by other experts – a collection that will continue to grow online in an open-source format whereby success stories can be submitted by the public and posted for all to see.

During the Forum, Santos took part in an energy summit on sustainable cities that featured a distinguished group of national energy ministers, mayors and private sector experts exploring new energy models for urban growth;

among others, that session included the Executive Director of the International Energy Agency in Paris, Brazil's Minister of the Environment and Germany's Minister of Transport, Building and Urban Development.

She also took part in sessions on the implications of accelerated urbanization, transformational models for infrastructure and urban development and how to drive sustainable economic growth from London's Olympic Games.

In addition to a session on urbanism, Ratti – together with Mexican President Felipe Calderón and Bruno Ferrari, Minister of the Economy – unveiled the design for a large urban regeneration scheme in the center of Guadalajara called Ciudad Creativa Digital, a project developed by Ratti and SA+P's Dennis Frenchman.

Advances in Neuroscience

In a session on recent breakthroughs in science, the Media Lab's Ed Boyden presented his pioneering work on the potential of controlling neurons with light to remedy brain disorders.

By installing photosynthetic and photosensory proteins from plants and other species into specific cells – which can then be controlled by light while their neighbors remain unresponsive – researchers can now activate and silence different cells to see which are involved with specific behaviors.

The research aims to identify the precise neurological circuits that can best contribute to the remedy of specific diseases, then use those circuits as targets for drugs or for neurosurgeons to implant electrodes to improve symptoms.

Boyden's aim is to develop tools for pursuing this research, then to collaborate with as many problem-domain experts as possible to solve a range of neurological and psychiatric disorders.

Over the last five years, his group has distributed research tools to more than 500 groups around the world addressing problems in blindness, chronic pain, deafness, Parkinson's and many other disorders.

While in Davos, Boyden also took part in a session on engineering creativity, discussing how neuro-engineering could create a new science of creativity, and in a session on leadership exploring how cognitive, emotional and social factors affect decision making. He also moderated a discussion on 'good versus evil', examining what drives an individual to choose between the paths of evildoer, hero or bystander.

The Potential of Social Media to Transform Society

The Media Lab's Sandy Pentland conducted a session on how science and the idea of Natural Law can help us reinvent society to be more stable, more fair and more efficient.

While our market-oriented, economically lopsided culture is currently based on a model of human nature that emphasizes competition and the struggle for power, he says, scientific evidence suggests that pre-agricultural societies – based on private exchanges within trusted social networks – were both egalitarian and efficient.

As we increasingly use digital social networks to reinvent our society, Pentland asserts, we have the chance to shape these new technologies around a different version of human nature. By encouraging interactions within trusted relationships, rather than nameless open markets, we can build a system that is more stable and more fair

than today's market-based systems.

In user-controlled banking, for instance, one could direct one's money to favorite community projects while still controlling risk and return. Or in citizen-controlled government, one could direct where one's taxes go and shape local laws, achieving the ideals of local governance without sacrificing safety, fairness or efficiency. Pentland has developed open-source software and a legal framework to field test what he refers to as this 'New Deal on Data' at sites around the world.

While in Davos, Pentland also spoke at sessions on building creative cities; on how technology is changing the future; and on sustainable transportation. He also mediated CEO discussions on big data and on personal data and privacy.

The Future of Digital Fabrication

Neil Gershenfeld, director of the Center for Bits and Atoms, made one of his famous fab labs available at Davos this year, providing meeting participants with a hands-on introduction to personal fabrication. This is the first time that such a lab has operated in the Congress Center.

A spinoff from CBA's research on digital fabrication – ultimately aimed at developing molecular assemblers that can make almost anything – fab labs began as an outreach project for the National Science Foundation and have spread from inner-city Boston to rural India, from South Africa to the north of Norway, providing widespread access to modern means for invention.

Activities in fab labs range from technological empowerment to peer-to-peer project-based technical training, from local problem-solving to small-scale high-tech business incubation and grass-roots research. They have been used to make antennas, radios and terminals for community Internet access; instrumentation for precision agriculture and healthcare; and custom furniture, bicycles, boats and even houses.

The number of fab labs has been doubly approximately every 18 months, with about 100 labs now and 100 planned. To keep up with this growth, a Fab Foundation has been created to provide operational support, and a Fab Academy for hands-on distributed education.

At the Davos fab lab participants were offered daily tutorials, taught by a global team from the fab lab network, on vinyl cutting, laser cutting, 3D scanning, 3D modeling, 3D printing, molding and casting, electronics production and microcontroller programming. Following the Forum, the lab was donated to a facility for children of migrant salt pan workers in Kutch, Gujarat, India.

In addition to running the fab lab at the Forum, Gershenfeld gave a Beta Zone presentation on the science of digital fabrication, spoke on parallels with the disruptive impact of earlier information technologies at a Digital World dinner, discussed the experience of the fab lab team now running the city of Barcelona at a Smarter Cities event, and explored the policy implications with a team of CEOs at a session on Digital Governance.

More on the annual meeting of the World Economic Forum: http://www.weforum.org/events/world-economic-forum-annual-meeting-2012.