Transcript of the Daily Brief with Amy Morris, Federal New Radio
An Interview with Joshua M. Epstein, Senior Fellow, The Brookings Institution and Director of the Center on Social and Economic Dynamics
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Interview Story Text:

Josh Epstein: This [US version of the Large-Scale Agent Model] is a so-called agent-based computational model. And what that means is that there are no equations; it's literally an artificial society in a computer, with every individual represented as a single cyber person in computer code. So it has 300 million individuals; they are kids, workers, parents, and so on. Every household, every school, every workplace is included in the model and routine travel from zip code to zip code for the entire US is also included. So we can start an epidemic in children in California and get a good impression of how it would spread across the entire country.

Amy Morris: How you were able to put this together I can't begin to fathom. Did you use data, census statistics? How did you do this?

Josh Epstein: Well, we used national census data and our own cluster of computers. It was a formidable, technical achievement headed by Jon Parker, who's my Assistant Director here for Software. And we won the 2008 NTSA National Training and Simulation Award for Outstanding Achievement in Analysis because it's such a formidable, technical problem. In fact, the Award is for an even bigger model: the actual so-called Large-Scale Agent Model is an environment that permits modeling 5 or 6 billion individuals. The US Model is actually one implementation of it, so the technical achievement is actually even more impressive from that standpoint. But yeah, it includes census data, travel data (so Department of Transportation, Department of Census)…many, many databases are fused in the US Model.

Amy Morris: So, this would eliminate the need then for sample type modeling to figure out how an epidemic would spread, or how an attack might impact the nation. It would eliminate the need for the sampling because you have the whole country - everybody's represented in there. I mean, I'm in there, you're in there.

Josh Epstein: Well, yes and no. Well actually, let's start that answer over. You'd still need sampling to determine the transmission rates, the so-called – you know, the contagiousness of the bug, the lethality of the bug. And you'd still need to know what vaccine effectiveness was and whether people were observing quarantines and all these other things. So, you'd still in the case of a real epidemic, you'd of course still want a sample to arrive at a good biomedical and other data about whatever virus or pathogen you were worried about. But in terms of thinking ahead about preparedness, about communicating risks, about projecting emergency requirements and so on, yes, it's an invaluable tool that permits us to - as you say - "get our brain around" these really enormous questions.

Amy Morris: Would federal agencies then be able to build artificial populations that are taking a page out of your book and maybe doing it on a smaller scale? How would this work with federal agencies?

Josh Epstein: Well, some of it has been funded by federal agencies. Well I mean there are two grants that I am a part of. One of them is the National Institutes of Health MIDAS program, which is Models of Infectious Disease Agent Study – MIDAS. And MIDAS also won an award in 2006 from the Secretary of Health and Human Services – the Public Service Award - for precisely this kind of modeling. I direct the Global Epidemic Modeling at MIDAS and we have a planetary scale model including travel from continent to continent. So you could study what would be the use of international travel restrictions, for example, in containing a Pandemic Flu outbreak. So, federal agencies like Health and Human Services, NIH are using these approaches. Second application

where this Large-Scale Agent Model was funded is the so-called PACER Program. PACER stands for Preparedness and Catastrophic Event Response. That is funded through the Johns Hopkins Medical School in a Department of Homeland Security University Center of Excellence. So Homeland Security is also interested, NIH is interested, HHS is interested. We have routine contact with Centers for Disease Control. These are – I think everybody agrees – are very powerful techniques and we are very interested in applying them practically to immediate policy questions and more longer term issues like Pandemic Flu.

Amy Morris: Does is also help resolve solutions, show you speed bumps in solutions that maybe we thought would have worked, but perhaps might have run into glitches we weren't aware of before the actual event happened?

Josh Epstein: Yeah, I think one of the things about modeling is that it helps you appreciate the uncertainties. I mean I think people are often victims of groupthink in high-level policy discussions. And models have a way of engendering quite a bit of humility about how things really might unfold, and all the uncertainties you face. Especially regarding things like behavior – I mean, for example, I think there's a widespread assumption that if Pandemic Flu broke out and the Government were able to quickly produce a vaccine, everyone would simply take the vaccine. And that's not at all clear. I mean there are large communities who may not trust the Government and may not be willing to take a vaccine produced on a crash basis. So, behavioral aspects loom large in the whole question of – in designing a containment strategy. And the models can help you think through how those uncertainties matter – which ones matter most and so forth. But we've worked closely with the Government in thinking about how to contain Pandemic Flu. I would recommend the work of Ira Longini, and Neil Ferguson, and others - Stephen Eubank - in designing a program called Targeted Antiviral Prophylaxis, and in also studying social distancing and other ways of controlling Pandemic Flu. So, there's a community of people doing this kind of modeling, but most of us are involved in this MIDAS network, to be honest.