

who have worked closely with ITER officials.

ITER's schedule continues to slip, which will push up costs. ITER has said its reactor will power up for the first time before the end of 2020, but that date is widely discounted. "We don't have a realistic, believable, very high quality schedule," Iotti says. The council is now planning to announce

an updated schedule at its meeting in June 2015. "We need to be sure," Iotti says. "Once we have a schedule, then we can talk about cost." ITER leaders fear that further delays, combined with the damning assessment, could cause backers to pull their funding; the United States has threatened doing so more than once.

Despite the problems, Iotti is optimistic. "The project is making progress; things are being built," he says. This summer, the first items of hardware will start arriving on site. "When stuff comes together, you will see a completely different attitude ... [but] there are still going to be difficult times ahead."

—DANIEL CLERY

## SOCIAL SCIENCE

## Twitter Offers Entire Data Pool, but Some Wary of Diving In

Earlier this month, the social media company Twitter offered academic researchers a chance to play with a vast treasure trove of data—all 500 million of the 140-character "tweets" its 200 million users generate daily, as well as all tweets on record going back to Twitter's creation in 2006. Many scientists, eager to study social dynamics on a massive scale, are scrambling to apply by the company's 15 March deadline. But some, scrutinizing the

Massachusetts, used the API to harvest 604,000 tweets from people in New York City. Users of Twitter's mobile app have the option to reveal their location when they tweet, and about 3% do so. By analyzing the sentiment in those geolocated tweets, the team mapped out the city's emotional landscape in time and space in exquisite detail. Conclusion: New Yorkers love parks and hate transportation.

When he learned last week that Twitter was granting researchers access to the full "firehose" of its data, Bar-Yam was thrilled. "Twitter data is an incredible resource," he says. "We want to use it to understand society, and also to help solve problems ranging from violence to pandemics."

But the 1% of tweet data now available through Twitter's free API is too limited for some research projects, says Nick Obradovich, a political science Ph.D. student at the University of California, San Diego. Obradovich wants to compare sentiments about climate change in U.S. geolocated tweets with local temperatures; according to one theory, unusually hot days make people more open to the idea that the scientific consensus about climate change is correct. Given that only a small proportion

of tweets are geolocated, and an even smaller portion pertain to climate change, he needs a deep dive into Twitter's data.

The contract that researchers must sign to apply for the program, however, includes language that some find troubling. Simply by applying, it states, "you are granting Twitter an unconditional, irrevocable, non-exclusive, royalty-free, fully paid-up, fully transferable, perpetual and worldwide license to evaluate, use, copy, perform, display, publish, transmit, or create derivative works ... [and] hereby waive all copyright, trademark, trade secret, patent and other intellectual property right claims you may have against Twitter" related to that content.

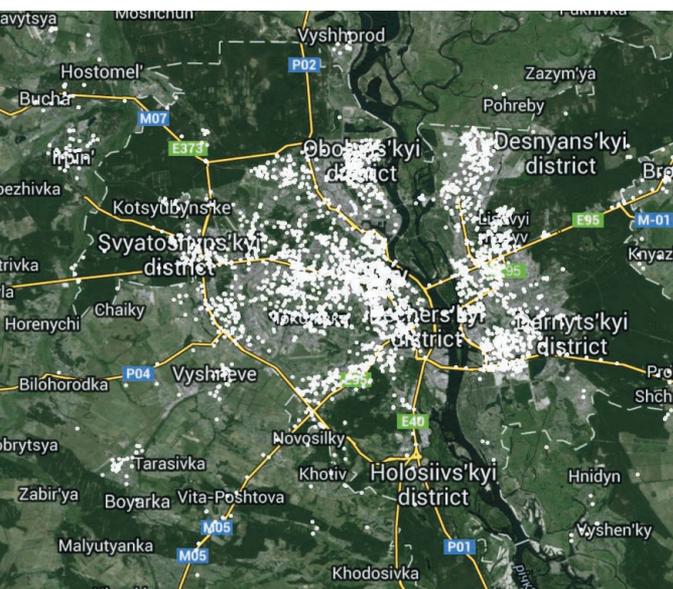
Some researchers interpret that as handing ownership of their ideas to Twitter, even if their applications are turned down. In principle, Twitter could then publish those ideas, sell them to third parties, or develop technologies based on them without compensating or even crediting the researchers. "These types of data are useful for my research, but I am not applying because of concerns about the Ownership & License section of the agreement," says Sarita Yardi Schoenebeck, an information scientist at the University of Michigan, Ann Arbor. "It does indeed read like they want to own the ideas," Obradovich agrees, "and any potential derivative ideas they choose to pursue, which is somewhat troubling." But he plans to apply nevertheless.

A Twitter representative did little to clarify the situation for researchers, writing briefly in an e-mail to *Science*: "Just as users own their Tweets, researchers own their ideas. This program is no different: the license pertains to our ability to further explore the contributions of the research community and advance our offerings to the community as a whole."

The confusion over Twitter's legalese is part of a wider debate about intellectual property (IP) and academic research, Bar-Yam says. "The question here is not whether there is IP but who gains the rights." If another company owns your ideas, it's nearly impossible to get commercial funding, he says. "The whole purpose of IP is to allow people with ideas to build on them. ... Without IP protections, investors don't give resources to develop those ideas."

Still unclear are Twitter's terms for actual access to its full data trove—the debate so far has been over just the application process. "Since applying is the first step, the submission agreement is the only available agreement at the moment," the company representative notes.

—JOHN BOHANNON



**Social unrest.** Social scientists can analyze tweets during protests, such as these 7458 from Kiev region over 2 days in mid-February.

fine print of the application, worry about legal strings that seem to grant Twitter ownership of their research ideas. "This would be a non-starter for us," says systems scientist Yaneer Bar-Yam, who is among those reluctant to apply for Twitter's full data set.

Twitter has for several years provided free access to 1% of tweets through an online application programming interface (API). For many research projects, that's enough. Last year, for example, a team led by Bar-Yam, president of the New England Complex Systems Institute in Cambridge,

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