improvements to the ways we train our young scientists if we are to bridge the science/policy divide more effectively.

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Wet drones

In "Sea Power in the Robotic Age" (*Issues*, Winter 2014), Bruce Berkowitz describes an impressive range of features and potential missions for unmanned maritime systems (UMSs). Although he's rightly concerned with autonomy in UMSs as an ethical and legal issue, most of the global attention has been on autonomy in unmanned aerial vehicles (UAVs). Here's why we may be focusing on the wrong robots.

The need for autonomy is much more critical for UMSs. UAVs can communicate easily with satellites and ground stations to receive their orders, but it is notoriously difficult to broadcast most communication signals through liquid water. If unmanned underwater vehicles (UUVs), such as robot submarines, need to surface in order to make a communication link, they will give away their position and lose their stealth advantage. Even unmanned surface vehicles (USVs), or robot boats, that already operate above water face greater challenges than UAVs, such as limited line-of-sight control because of a two-dimensional operating plane, heavy marine weather that can interfere with sensing and communications, more obstacles on the water than in the air, and so on.

All this means that there is a compelling need for autonomy in UMSs, more so than in UAVs. And that's why truly autonomous capabilities will probably emerge first in UMSs. Oceans and seas also are much less active environments than land or air: There are far fewer noncombatants to avoid underwater. Any unknown submarine, for instance, can reasonably be presumed not to be a recreational vehicle operated by an innocent individual. So UMSs don't need to worry as much about the very difficult issue of distinguishing lawful targets from unlawful ones, unlike the highly dynamic environments in which UAVs and unmanned ground vehicles (UGVs) operate.

Therefore, there are also lower barriers to deploying autonomous systems in the water than in any other battlespace on Earth. Because the marine environment makes up about 70% of Earth's surface, it makes sense for militaries to develop UMSs. Conflicts are predicted to increase there, for instance, as Arctic ice melts and opens up strategic shipping lanes that nations will compete for.

Of course, UAVs have been getting the lion's share of global attention. The aftermath images of UAV strikes are violent and visceral. UAVs tend to have sexy/scary names such as Ion Tiger, Banshee, Panther, and Switchblade, while UMSs have more staid and nondescript names such as Seahorse, Scout, Sapphire, and HAUV-3. UUVs also mostly look like standard torpedoes, in contrast to the more foreboding and futuristic (and therefore interesting) profiles of Predator and Reaper UAVs.

For those and other reasons, UMSs have mostly been under the radar in ethics and law. Yet, as Berkowitz suggests, it would benefit both the defense and global communities to address ethics and law issues in this area in advance of an international incident or public outrage—a key lesson from the current backlash against UAVs. Some organizations, such as the Naval Postgraduate School's CRUSER consortium, are looking at both applications and risk, and we would all do well to support that research.

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Robots aren't taking your job

Perhaps a better title for "Anticipating a Luddite Revival" (*Issues*, Spring 2014) might be "Encouraging a Luddite Revival," for Stuart Elliot significantly overstates the ability of information technology (IT) innovations to automate work. By arguing that as many as 80% of jobs will be eliminated by technology in as soon as two decades, Elliot is inflaming Luddite opposition.

Elliot does attempt to be scholarly in his methodology to predict the scope of technologically based automation. His review of past issues of IT scholarly journals attempts to understand tech trends, while his analysis of occupation skills data (O-NET) attempts to assess what occupations are amenable to automation.

But his analysis is faulty on several levels. First, to say that a software program might be able to mimic some human work functions (e.g., finding words in a text) is completely different than saying that the software can completely replace a job. Many information-based jobs involve a mix of both routine and nonroutine tasks, and although software-enabled tools might be able to help with routine tasks, they have a much harder time with the nonroutine ones.

Second, many jobs are not informa-

ALICE AYCOCK, *Spin-the-Spin (Park Avenue Paper Chase)*, Painted aluminum, 18′ high x 15′ wide x 20′ long, Edition of 2, 2014. The sculpture is currently installed at 55th Street on Park Avenue.

tion-based but involve personal services, and notwithstanding progress in robotics, we are a long, long way away from robots substituting for humans in this area. Robots are not going to drive the fire truck to your house and put out a fire anytime soon.

Moreover, although it's easy to say that the middle level O-NET tasks "appear to be roughly comparable to the types of tasks now being described in the research literature," it's quite another to give actual examples, other than some frequently cited ones such as software-enabled insurance underwriting. In fact, the problem with virtually all of the "robots are taking our jobs" claims is that they suffer from the fallacy of composition. Proponents look at the jobs that are relatively easy to automate (e.g., travel agents) and assume that: (1) these jobs will all be automated quickly, and (2) all or most jobs fit into this category. Neither is true. We still have over half a million bank tellers (with the Bureau of Labor Statistics predicting an increase in the next 10 years), long after the introduction of ATMs. Moreover, most jobs are actually quite hard to automate, such as maintenance and repair workers, massage therapists, cooks, executives, social workers, nursing home aides, and sales reps, to list just a few.

I am somewhat optimistic that this vision of massive automation may in fact come true perhaps by the end of the century, for it would bring increases in living standards (with no change in unemployment rates). But there is little evidence for Elliot's claim of "a massive transformation in the labor market over the next few decades." In fact the odds are much higher that U.S. labor productivity growth will clock in well below 3% per year (the highest rate of productivity the United States ever achieved).

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Climate change on the right

In Washington, every cause becomes a conduit for special-interest solicitation. Causes that demand greater transfers of wealth and power attract more special interests. When these believers of convenience successfully append themselves to the original cause, it compounds and extends the political support. When it comes to loading up a bill this way, existential causes are the best of all and rightfully should be viewed with greatest skepticism. As Steven E. Hayward notes in "Conservatism and Climate Science" (*Issues*, Spring 2014), the Waxman-Markey bill was a classic example of special-interest politics run amok.

So conservatives are less skeptical about science than they are about scientific justifications for wealth transfers and losses of liberty. Indeed, Yale professor Dan Kahan found, to his surprise, that self-identified Tea Party members scored better than the population average on a standard test of scientific literacy. Climate policy rightfully elicits skepticism from conservatives, although the skepticism is often