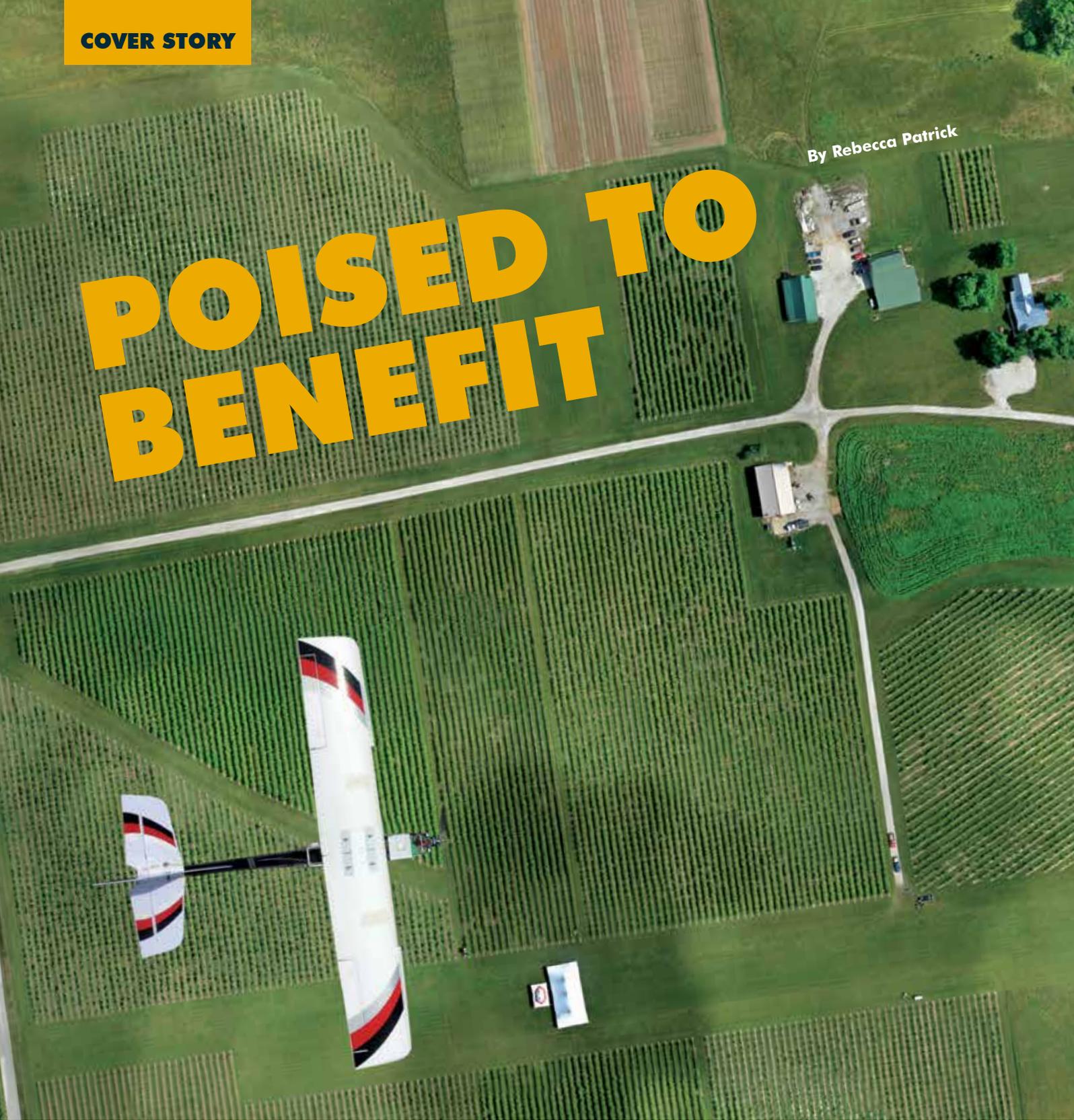


By Rebecca Patrick

# POISED TO BENEFIT



## Drones Expected to Produce Major Indiana Impact

Look, up in the sky: It's a bird...it's a plane...it's a drone!

Okay, the thought process won't be that corny or dramatic, but undoubtedly there will be some double-takes in the not-too-distant future when drones, also called unmanned aerial vehicles (UAVs), get the green light to take to the U.S. skies for individual and commercial use.

Currently, apart from military maneuvers, UAVs are legally only supposed to be operated for research purposes and generally by universities in more isolated or secure areas. That will all change once the Federal Aviation Administration (FAA) sets forth sweeping regulations regarding usage and safety.

Spending in the unmanned systems industry is expected to skyrocket in the next decade to upwards of \$95 billion says Matt Konkler, executive director of the National Center for Complex Operations, an entity created by former Gov. Mitch Daniels to promote Indiana's national security assets.

"Not only will it positively affect Indiana's economy, but it will also affect the national economy. We are talking about an economic stimulant in billions of dollars – and all the jobs and job creation that goes along with that."

But we have to get there first.

### **Policymaking and privacy**

Ahead of any FAA ruling, a growing number of states are taking it upon themselves to police the use of drones. Illinois passed a first-of-its-kind regulation on individuals; the measure prohibits interference – most likely by animal rights activists – to hunting and fishing. Other states, Indiana among them, now have laws to restrict UAV use by law enforcement for surveillance.

Indiana State Rep. Ed Soliday (R-Valparaiso) calls additional legislation unnecessary and hopes more won't be introduced at the Statehouse in 2015.

"Last year I went to several seminars about it and heard from prominent speakers who had done a lot of research. I've heard from both sides. I don't think it's needed," he declares.

"Also why pass some stuff and then have the feds come in and pre-empt it. They control the airspace. If they take forever and we get people out flying these things around, we may have to do something (then).

"So I'm in a wait-and-see mode. Let's optimize this new technology and do the best we can to protect policy, but don't pile on more law," Soliday concludes.

He also downplays the general privacy concern. "We have plenty of laws in place that deal with invasion of privacy issues. It doesn't change whether a guy is sitting in a tree or using his UAV to observe the sunbather in his neighbor's yard; the law is no different. ... But, I'm sure a lot of people fear that (for their privacy)."

### **Making things safe**

An even greater number of people point to safety worries and how the unmanned systems are integrated into the national airspace.

"If you've seen anything on the news lately about drones, some people are flying them anyway and being told to stop by the FAA. And they are flying them without knowing what they are supposed to do on the safety issues," declares Richard Baker, Ph.D., executive director of the Center for Unmanned Systems & Human Capital Development at Indiana State University (ISU).

Soliday contends what the FAA is mandated to do is not simple. A former pilot for United Airlines, for many years he was also vice president of safety, security and quality assurance.

"How do you optimize the utility of the UAV and protect the public – and quite frankly the liability of the operator of the UAV?" he asks.

"Ultimately, I would assume that the FAA is going to say that, at a minimum, you can only operate them within so many feet of people or populated areas. The question is whether the FAA – above a certain size or within a certain area – will require some kind of certification to operate them."

Soliday was also chairman of a commercial aviation safety team tasked by Congress to reduce the number of aviation fatalities by

80% in 10 years; it was reduced by 83%. The Pentagon asked the group to do the same thing. "As soon as we put UAVs into the (Pentagon) data set, the accident rate skyrocketed. These are not exactly fault-free vehicles."

That's why liability will be such a factor. "I have a couple German cars; the first time you put a UAV through the window of my Audi, I'm probably going to want you to help pay for it. If you hurt my child, I'm probably going to want you to pay a great deal," Soliday surmises.

"We've got to figure out the risk model. ... I'm not sure I even want myself flying a UAV that weighs a couple pounds down Meridian Street (in downtown Indianapolis)."

While this is uncharted territory, the goal is to have UAVs up and flying safely by 2017.

Baker wants direction to come even sooner for certain sectors.

"We hope by the first of next year, the FAA will come out with some kind of ruling so it will at least allow for things like precision agriculture or first responders, or other things that would be used out in an area that's very rural and away from people, like



At first, students pursuing the unmanned systems minor at Indiana State University were from the school's aviation program. Now, students from other disciplines like criminology and earth and environmental sciences are showing interest.

pipeline inspections or something like that.”

The FAA will be using information collected from six test sites throughout the country in framing the regulatory standards. Some of the sites are operational now, with all slated to be running by 2015.

### Where Indiana fits

The Indiana-Ohio region was considered for one of the test sites but wasn't chosen despite a strong bid. Politics likely played a role in the final decision making, but Konkler asserts there is a silver lining to not being officially selected.

“We now have the ability to work with the test sites. Within 24 hours of the announcement being made, four of the test sites called the Indiana-Ohio partnership and requested our assistance. They knew of our assets here and capabilities, and asked us to partner with them in some of their pursuits.”

Indiana has restricted airspace and a military instillation that provide unique training and testing options. “Indiana’s Muscatatuck Urban Training Center is the only brick-and-mortar full-scale urban environment where unmanned systems can operate full spectrum sensor capabilities,” Konkler offers. “Things can be tested and evaluated at Muscatatuck that can’t be done anywhere else in the country.”

He also notes that Indiana’s advanced manufacturing and research and development facilities make it a natural fit for the industry.

“We have entrepreneurs throughout Indiana who are working on unmanned systems platforms, the sensors that go on unmanned systems. Because of those assets in Indiana, because of our workforce, because of our great research and development institutions, we’re postured well with entrepreneurs ... Indiana stands to benefit.”

In what Konkler labels a “big win,” the Indiana-Ohio region will host NASA this fall at Camp Atterbury for the Unmanned Aircraft Systems Airspace Operations Challenge.

“We are going to review and inspect sense-and-avoid systems that are not in operation yet, but are being tested. That’s one of the FAA requirements for the test sites. We have to develop a reliable and trustworthy system of detecting and avoiding other aircraft,” he explains. “A lot of that vital testing and research is going to be done here in Indiana and Ohio.”

### Out front on education

About three years ago ISU began offering a minor in unmanned



It doesn't take advanced training to get an unmanned aerial vehicle off the ground – it can be as simple as throwing it like a paper plane.

systems – the first one recognized in the country. Only three universities currently have a bachelor’s of science in unmanned systems; ISU hopes to be the fourth later this year.

As of January 2014, 146 students were in the minor program.

“Our students learn the overall system as far as sensor operators or being a pilot of an unmanned aircraft. We also do ground and marine (vehicles). We go into all aspects, but where we’ve put a lot of emphasis is on the air side,” notes Jeff Hauser, director of unmanned systems at ISU.

The goal is to have people, when they graduate, “who will know how to use the systems and technology in different areas of different industries; there can be some entrepreneurship in that as well,” Baker adds.

Also housed at ISU is the Center for Unmanned Systems, which works with commercial organizations, government agencies and other universities in research and collaboration. Hauser reports interest from Lt. Governor Sue Ellspermann, specifically in the agriculture arena.

“What we are trying to do is bring some commercialization to this technology in the appropriate way. We are actually doing a lot of collaboration with other universities (such as tapping into Purdue’s engineering and agricultural expertise), which is a little uncommon. We are all trying to work together toward a common goal of bringing business to Indiana,” he comments.

### Interest level and industries

Konkler emphasizes there is already a definite buzz in commercial circles about UAVs.

“I talk to business leaders from around the state on almost a weekly, if not daily basis, about their interest in unmanned systems. Everyone from the local farmer to large-scale agriculture enterprises to corporations to utility companies,” he says.

It’s pretty apparent, however, that agriculture is the low-hanging fruit in Indiana and other parts of the country.

“People may not think about farming being data intensive, but it’s an extremely technological market. They need to do things efficiently because if they don’t there is the potential for huge loss,” asserts Lia Reich, spokesperson for PrecisionHawk, a company that provides a platform to gather data in UAVs. It has offices in Toronto, North Carolina and Noblesville.

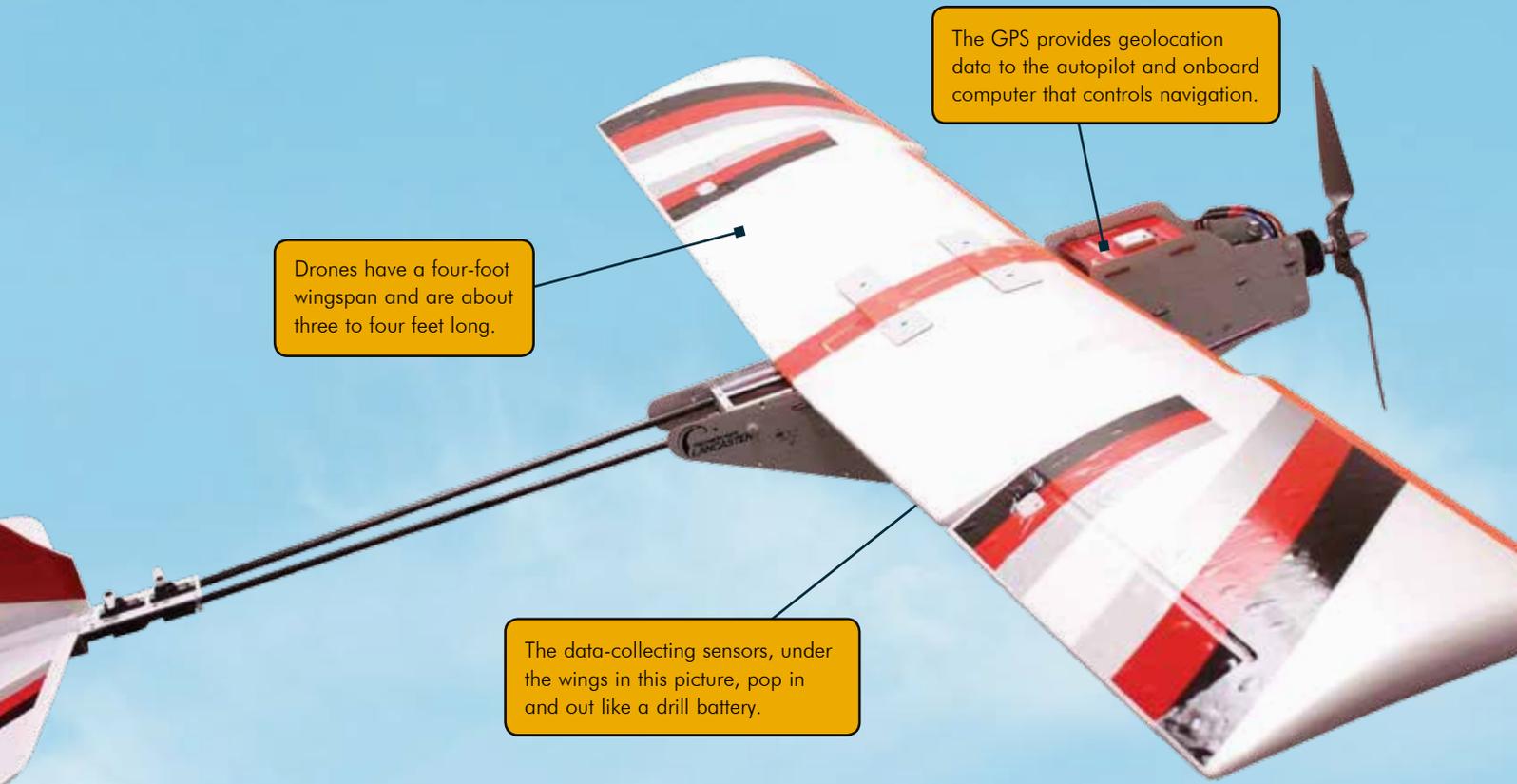
“Right now, farmers are paying absurd amounts of money to get satellite images of their fields. What we are presenting will allow farmers to get better and more targeted information. You can know when you’re going to need to add more fertilizer to your field, or know if an area of your plants are sick before you actually see visible signs.”

Emergency responder needs are also a natural fit for UAVs. Soliday cites how beneficial – not to mention much less expensive – they can be in hostage situations, fires and more.

“In larger cities you put a helicopter up, which probably takes an hour, and you have to find a pilot and you have to maintain it. Whereas with a UAV, you can have it airborne for very little money and very quickly, with low risk to the person flying. And you can put it up in all kinds of weather.”

PrecisionHawk was contacted to assist in the aftermath of the devastating landslide that happened recently in Oso, Washington.





The GPS provides geolocation data to the autopilot and onboard computer that controls navigation.

Drones have a four-foot wingspan and are about three to four feet long.

The data-collecting sensors, under the wings in this picture, pop in and out like a drill battery.

“We created 3D models of the terrain that they were then able to compare with the terrain prior to the landslide,” Reich shares.

“We can do applications like that after tsunamis, after landslides, after tornadoes. You’re able to look at the land and see how you can start the rebuilding process after a natural disaster.”

Baker says drones are being used for logistics in other parts of the world – so the well-publicized Amazon plan for delivery definitely has some legs.

Adds Hauser, “About anything you can think about can use an unmanned system. You can use the technology in almost every industry.”

### Nuts and bolts

Reich reports that the UAVs in use by PrecisionHawk are designed to be easy to operate.

“You literally throw them like you throw a paper airplane. They are very light – fully loaded they are only 5-5.5 pounds – but very durable. It collects your information, which automatically then goes into the cloud (network),” she describes.

“You will be able to see all of the rough images on your iPhone, iPad or on your

computer. That’s kind of insurance for you to be able to see if you got what you needed/ came for. And within a few hours, you will have a full mosaic (fully processed) on your computer that you can start looking at in more detail and analyzing.”

PrecisionHawk sells the UAV platform and then either rents or sells the sensors – what collects the information – based on need and timing.

Soliday says a person or business can buy a UAV that is fairly sophisticated for less than \$2,000. He’s not a fan of the “little ones you buy at Radio Shack; those tend to come out of the sky in the wind.”

PrecisionHawk is doing consistent flights with Indiana University, ISU and Purdue. It began the education process through flight demo days, where it partners with a university or a large farm to show UAVs in action and their capabilities.

### When the floodgates open and beyond

“When the FAA says everybody can fly, you will see many UAVs for a while. Many being maybe two or three a day in areas in which they are approved to fly. I think there will be a peak of sightings once they open the

airspace,” Baker predicts.

“But after a while, the novelty will wear off and the use will improve so you will probably see them only when needed. People will get over the novelty and start using them for business. They are not toys.

“And I think the ones approved for business are going to be expensive enough with the vehicle and the sensor that not everybody is going to buy one,” he determines.

Konkler is more optimistic about the sector taking hold with the public over time, comparing it eventually to the automobile industry.

“Someday I think every family will own an unmanned system of some sort. Whether that’s an air system, a ground system or a maritime system. There are people now who have an underwater robot that cleans their pools for them. That’s basically an unmanned system.”

Reich looks at the future from an agriculture point of view. “UAVs are really going to be part of a farmer’s everyday workflow. We want this to be a tool the same as their John Deere tractor. We really believe that will be the case.”