

# THE ROBOTICS LAW JOURNAL

Volume 1, No. 4

January/February 2016

## DRIVERLESS CARS

'We anticipate a shift from risk based on the characteristics of the driver ...to risk based on the characteristics of the vehicle'

Page 2

## EMPLOYMENT

'All kinds of alternatives to a classical full time employment relationship will increase'

Page 5

## DRONE USERS

'Companies are very nervous about sending manned aircraft there because there could be a real problem if there is an accident'

Page 9

## PATENTS

'South Korea, Japan, USA and Germany again were the biggest sales markets besides China in 2014'

Page 12

## Robotics poised for new era as US prepares to publish drone rules

The robotics sector moves into a new era in 2016 when the US's Federal Aviation Administration (FAA) issues its rules for the flying of drones.

The move will mean that the world's largest market is properly open for business. But it will also mean far more. The US rules will have huge effects on other markets around the world. Other countries which lack the resources necessary to do all the checks that lie behind researching a rule book will have a reliable template to hand. And manufacturers and specialist operators based outside the US will now find it easier to sell into North America. The other side of the coin is that some countries which have benefited from the lack of US rules - such as Canada and Mexico - will now lose



that competitive advantage.

The FAA rules will also have a wider reach than the UAV sector. The frameworks set for drones and driverless cars are expected to be the mould for the whole area of robotics law.

Lisa Ellman, co-head of the Hogan Lovells global UAS group expects a significant increase in activity after the final rules are published - probably in spring

or summer. 'As soon as we have certainty, we'll see a huge amount of movement in the sector, including venture funding,' she says.

Llewellyn Boyer-Cartwright, partner in Bahamas law firm Callenders and a former commercial airline pilot, says: 'The FAA is a massive organisation and is world-renowned. It could be that some other jurisdictions

are holding off until the FAA implements its own regulations. When the FAA does act it could make a positive impact on this new industry which is gaining a strong foothold on the world platform and which is also gaining respect and notoriety.'

The opening of the US market will be a beacon for manufacturers around the world. Hogan Lovells research shows that 70% of drones registered under the s333 exemption with the FAA are made by a Chinese manufacturer. Founded in 2006, DJI is the world's biggest producer and is based in China's Silicon Valley of Shenzhen.

Scotland-based Cyberhawk, a world leader in industrial inspection and surveying, does not yet operate in the US but will find it much easier to do so when the rules are in place. Founder Malcolm Connolly says: 'In the US, the vision of the Federal Aviation Administration is very much to make the regulation very permissive. It will be a polar change. It will likely become even more permissive than the UK.'

## Commercial sector puts rule makers under pressure

Christmas sales of drones, the launch of Amazon Prime Air delivery and experiments in Finland are among the commercial pressures that will force regulators to pave the way for further innovation on drones and other robots.

In the US, the Consumer Technology Association has estimated that 400,000 drones could be sold over Christmas - but other estimates put likely December sales as being far higher. Either way, it would be no surprise if 1 million were sold in the next few months.

Amazon Prime Air, the drone-based delivery

service, unveiled the latest model of its drone on Black Friday weekend in November, using the famous British motoring journalist Jeremy Clarkson to attract maximum attention. Amazon said: 'We are working with regulators and policymakers in many countries in order to make Prime Air a reality for our customers as soon as possible.'

The Finnish Post Office, Posti, has been testing parcel delivery over a 4 kilometre stretch between Helsinki and the island of Suomenlinna. The country came out with

new, liberal drone rules in September which allow 'Beyond Visual Line of Sight' flying in segregated airspace. Samuli Vuokila, chief adviser on flight operations at the Finnish Transport Safety Agency, says the sensors technology 'is evolving in a very rapid pace'. He adds: 'This is likely to lead to more applications which can be utilized, in a way "sky is the limit" as we see it.'

In the US, an FAA-approved pilot delivery of medicines was made to a health clinic in Wise County in the Virginia countryside in July.

## Contents

Driverless cars 2, US 4, German employment 5, Canada privacy 6, Finnish regulation 7, Africa & robotics 8, Aerial surveyors 9, Criminal liability & H&S 10, Europe and patents 12, Regulation 14, Internet of Things 15

# The way ahead



Caroline Coates

firm's Birmingham office.

**Caroline Coates heads the automotive sector group for UK-based law firm DWF. She is also executive partner of the**

**How do you think that the complicated liability issue on driverless cars will develop, be discussed and eventually be resolved?**

At DWF, these are questions that we have been discussing and debating with clients for over 18 months, particularly regarding the impact on motor manufacturers and the insurance industry. We anticipate a shift from risk based on the characteristics of the driver (such as age, driving record, and location) to risk based on the characteristics of the vehicle. Essentially this is a shift away from personal liability of the driver (to which a motor policy responds) towards issues of product liability. The issue of changing models of ownership of cars will have an impact – increased subscription or shared ownership services, point-of-use schemes such that the insurance is likely to be bundled with the car.

In terms of liability in the event of a collision, for the moment, the question still remains: what did the driver of the vehicle do or fail to do – such as turning without indicating? In the longer term, where all vehicles are driverless, the likelihood of accidents will be much reduced and the failings of a particular vehicle or its operating systems may be an issue for the two vehicles' motor manufacturers. It is in the medium term that particular challenges are likely to arise where there are multiple types of vehicles with different levels of advanced driving assistance systems (ADAS) all sharing the same road space. Liability may be more difficult to determine at that stage although the data recorded should assist in apportioning fault.

These are issues that both the UK government and the insurance industry – as well as the manufacturers – are aware of and starting to discuss now.

**Do transport policymakers and regulators need to review current rules? Do you agree with the OECD that cities which do**

**not rethink rules over taxis and public transport could find themselves mired in litigation (as Uber is, arguably, already showing us)?**

The Pathway to Driverless Cars and Code of Practice published in 2015 by the UK DoT [Department of Transport] has set out the UK government's stall to review legislation by 2017 concerning the use of driverless cars on the road (and to review liability). Further, by 2018 to start to look at international standards. There is much debate about what regulation is necessary and whether existing regulation of cars on the road is adequate.

We have a history in the UK of specifying in our legislation what is not allowed – rather than stating positively what citizens are entitled to do. It is likely that regulation on the increasing use of technology will follow this pattern, i.e. gradual introduction of new legislation or amendments of existing regulation to cope with the challenges presented.

The interaction between private and public transport in urban environments in the future is particularly interesting and certainly, together with motorways, is where we are likely to see autonomous vehicles being adopted first. Mass people transit is likely to remain as the way of bringing people into a city – and then dispersed to their end destination by 1 or 2 people vehicles. Whether that is by hire vehicle, "autovot" or "taxibot" remains to be seen and, of course, each city will have different constraints and demand. Overarching regulation by national government (in the UK at least) is likely to set the framework for how these systems coincide with local practice developing within that framework.

Clearly the opportunities that this presents must be on cities' radar – such as freeing up parking spaces, reducing congestion. However, the challenges are very real: a reduction in income from parking, local policy on the infrastructure required to support these developments and cyber security.

**What is the likelihood of human rights actions being taken if people feel they are being deprived of using driverless cars - for example, a disabled person who would not be able to use a traditional car?**

At present, human rights legislation does not provide that all people are equally entitled to use of a vehicle and it is hard to see that principle altering with the advent of the driverless car.

What is likely is that the combination of the technology and shared ownership or car on demand services will bring accessibility to autonomous vehicles to a much greater percentage of the population including disabled users and the elderly – not least due to affordability compared with current adapted vehicles.

**What do you see as the wider effects of this increasing level of automation, which will be felt across different parts of society and create commercial opportunities for many different industries?**

The use of vehicles on the road is embedded as part of almost every business from manufacturing, logistics, and retail to professional services that provide advice. The impact on society is an interesting debate – will people adopt this technology or will there be resistance?

Picking up on the themes outlined above, the way in which we use our cities is likely to change – a reduction in congestion and parked vehicles will open up swathes of city road space to use in other ways, whether that is leisure, retail or simply open public spaces. For many businesses, particularly retailers, the impact on their supply and distribution chain from automated warehousing to autonomous haulage to interaction with customers will be significant.

On a different note, the data that is collected by the autonomous vehicle presents commercial opportunities as more and more is known about the driver/user and their lifestyle and habits. Personalised advertising of retail, refreshment opportunities will increase. Further, with all that time freed up for the occupants of the vehicle during the journey, we should see productivity increase (although they could spend it shopping online).

**What kind of issues do you expect to be advising the manufacturing sector on in this area?**

In terms of the car manufacturers, as mentioned at the beginning, there are likely to be issues of product liability. Added to that the contractual relationship between the manufacturer and the software supplier – who designs and/or is responsible for which parts of the vehicle?

As you would expect, there is a need to protect innovation through patents and subsequently challenging threats to intellectual property.

Risk management of the supply chain will be at the forefront building on recent problems and the degree to

which manufacturers are reliant on a supply chain stretched globally, where not all countries are adopting the same level of autonomous vehicles.

We will be guiding clients through changes to international standards and ensuring compliance with regulation. This is particularly relevant to issues surrounding cyber security.

Lastly, where adoption of new technologies is supported by government/ EU funding, we will be advising on issues arising out of provision of state aid.

### What kind of issues would you expect to be advising government and regulators on in this area?

At this stage our role is advising clients other than national government and regulators. That said we believe that our expertise, particularly on the liability issues, can assist.

### Will driverless cars increase the role of regulators (or not)? If so, should we be concerned that regulators do not have a good record on keeping up with technology?

Where the UK government has set out its stall that the UK should be an environment where this technology is encouraged to develop, it is to be hoped that the regulatory aspects do not stand in the way. The Pathway to Driverless Cars and the creation of C-CAV (the Centre for Connected and Autonomous Vehicles) suggest a real commitment to making this work.

On development of regulation to “cope” with this technology, what we would not want to see is creation of burdensome regulation, at an early stage, that would stifle innovation and may prove not to be fit for purpose. Let the technology mature before we try and regulate for every eventuality.

### Anything else you would like to say?

One of the aspects of truly driverless cars is that the route they select and the movement of the car on the road is rules based. What those rules are and how they are applied in different scenarios is an area of concern. Is it right that the software developer decides whether, in the event of a potential collision, to direct the car to crash into a wall thus injuring the driver/user or to direct it to run into the queue of pedestrians injuring multiple people? This looks like a question for an elected government to debate – and not a commercial software company.

The interaction between private and public transport in urban environments in the future is particularly interesting and certainly, together with motorways, is where we are likely to see autonomous vehicles being adopted first.

## Timeline

### Global timeline: what to expect on drone regulation

<b>December, 2015</b>	<b>Global</b>
Geo-fencing starts on products from market-leading manufacturer DJI - easing the way for enforcement of restrictions on flying near airports, prisons and other areas.	
<b>December 21, 2015</b>	<b>Ireland</b>
Irish Aviation Authority requires that ‘all drones over 1kg must be registered’ with them by this date	
<b>December, 2015</b>	<b>US</b>
Department of Transportation hopes to launch its drone register for UAV-users, to meet rising public concern about near misses	
<b>Early 2016</b>	<b>US</b>
FAA regs expected - drone flying to be permitted	
<b>By early 2016</b>	<b>Bahamas</b>
Drone regs expected to take effect - being brought forward by Bahamas Civil Aviation	
<b>2016</b>	
Amazon Prime Air delivery service in ‘30 minutes or less using small unmanned aerial vehicles’ due to start - so putting focus on practical application of drone regs on deliveries.	
<b>2016</b>	<b>Australia</b>
Lighter regs for commercial drones under 2kg - from Civil Aviation Safety Authority	
<b>2016</b>	<b>Europe</b>
RPAS framework - to implement March 2015 Riga accord	
<b>2018</b>	<b>Global</b>
ICAO standards - international standards for use to develop national guidelines	
<b>2016-20</b>	<b>US</b>
FAA - airborne sense & avoid systems - initial certification	

### Global timeline: What has happened so far on drone regulation

<b>2015</b>	
<b>November</b>	<b>US</b>
Chicago City Council passed drone regs which are a ‘draconian ordinance all but banning drones in most cases’, according to Professor Greg McNeal of Pepperdine University Law School	
<b>November</b>	<b>US</b>
2,500th exemption licence (s333) given for drone flying	
<b>November</b>	<b>US</b>
Registration by pilot (rather than individual drone) recommended by task force advising the Federal Aviation Administration	
<b>October</b>	<b>Ireland</b>
Irish Aviation Authority published first draft of proposed Small Unmanned Aircraft (Drones) and Rocket Order	
<b>October</b>	<b>EU</b>
MEPs voted to revise and develop rules for the safe use of drones	
<b>October</b>	<b>Finland</b>
Finnish Transport Agency introduced what it says is ‘one of the most liberal aviation regulations in the world’ for UAVs	
<b>September</b>	<b>Taiwan</b>
Cabinet began process to regulate use of civilian UAVs	
<b>September</b>	<b>Japan</b>
Amendments to Civil Aeronautics Act regarding drones: Regs include bans on UAV use over residential areas	
<b>September</b>	<b>Indonesia</b>
Regulation 90/2015 from the Transportation Ministry took official effect: Indonesian Press Council says that the rules could restrict use of drones in journalism	
<b>September</b>	<b>EU</b>
End of European Aviation Safety Agency consultation on drones - Key part of moves towards EU regulatory framework	
<b>August</b>	<b>US</b>
National Telecommunication and Information Administration started work on drone privacy voluntary standards	
<b>August</b>	<b>New Zealand</b>
Updated drone rules - risk-based	
<b>July</b>	<b>South Africa</b>
CAA regs take effect: drone flying became legal	
<b>June</b>	<b>EU</b>
Privacy rule recommendations from Article 29 Working Party	
<b>June</b>	<b>Singapore</b>
Drone rules took effect - permit system coming into effect for commercial drones and others other 7kg	

# US markets set for surge



Lisa Ellman

Lisa Ellman is the co-chair of the Hogan Lovells Global Unmanned Aircraft Systems [UAS] group and is based in Washington DC. She discusses with Neasa MacErlean the effect

that the publication of drone rules by the Federal Aviation Administration [FAA] will have on the US and global markets in 2016. She has three drones herself and is a hobbyist flyer.

## What will happen after the rules come out?

As soon as we have certainty, we'll see a huge amount of movement in the sector, including venture funding. It has been estimated that in the first ten years the sector will have an \$82b economic impact. There has been a high demand across the U.S. from businesses to fly, as evidenced by the more than 2,000 FAA Section 333 Petitions for Exemption that have been approved by the FAA – not to mention that a lot of people are flying illegally. We'll also see drones being used in more areas – everything from real estate to disaster response to pipeline inspection and construction sites.

## What does the industry want to see in the rules?

Companies are hoping to see at least three things in particular – movement on 'Beyond Visual Line of Sight' [BVLOS], on flying over congested areas and in evening hours.

The FAA has also asked for input on "micro-drones" weighing less than 4.4 pounds. It seems reasonable to regulate drones differently based on weight, as there are different risks involved with flying a 2 pound drone than a 55 pound drone in the national airspace. Here, the key question for policymakers is weight versus frangibility. Does a 4 pound drone represent the same risk to aircraft as a 50 pound drone -- or is it more analogous to the risk a bird poses to an aircraft? If a micro-drone has a lithium ion battery, does that make it as dangerous as a 50 pound drone? These are the questions that policymakers are asking now.

## What do you expect to see on BVLOS?

I think that the first version of the rules will only allow Visual Line of Sight operations, but we will see progress here shortly. In October in the US, an approved BVLOS flight took place and I hope we'll see more of



them soon. This was through the Pathfinder Program the FAA established [a partnership with manufacturer PrecisionHawk and BNSF Railroad] to do research and development on what technology is required for safe BVLOS flight. While the first iteration of the rules won't have what everyone wants, I do think companies will be able to get exemptions from the rules that will allow BVLOS operations if they can explain to the FAA how they will be able to ensure an equivalent level of safety. Broadly authorized BVLOS flight will come over time once the FAA is confident that the technologies are there to keep people safe, so we need innovators to educate policymakers here.

At the moment the FAA is regulating as if a drone will fall out of the sky, or fly away, at any time. The challenge for the industry is to develop technology that alleviates these concerns.

## How long will it be before BVLOS comes in?

When the FAA launched the Pathfinder Project [in May 2015], the federal government said it hoped to see operations happening within three years. We've seen great progress here so it could be sooner than that, particularly in rural areas. In cities and over people, it's more difficult. Again, the key here is technology: A transponder system, for example, would allow the systems to communicate with air traffic control.

## How do you see the issues around carrying payloads developing?

We'll see this starting in rural areas where there is little danger to people. We've already seen a medicine delivery to a health care clinic in rural Virginia.

## So Amazon will be able to deliver its packages one day?

We will get there.

## Will Amazon be able to deliver packages in cities as well?

I think so, yes. One of the keys here is the design of 'highways in the sky.' NASA is working on that, with key industry partners.

## So what will happen that will enable the payload issue to develop?

There are some really interesting companies doing really interesting things here already – Matternet, for instance. The FAA's primary focus is safety, and right now, they are focused on broad authorization of lower-risk commercial UAS activities. I expect there will be another round of rulemaking from the FAA where they tackle the payload issue.

## The US has been slower than some other countries in getting rules out. Has that disadvantaged the US sector compared to its counterparts elsewhere?

Absolutely.... One problem for policymakers has been a lack of data. In many other countries they decided to put together rules even if they were lacking that data. The US is learning from other countries. The 4.4 pound approach comes from Canada, for example. The US is also learning from the risk-based framework put in place in the UK. The countries can all learn from each other.

## Will other countries learn from the US when it brings its rules out?

The complexity of US airspace is unmatched in the world. The FAA has a very strong safety record. As soon as there is a fixed set of rules, other folks will look at them. Over the last year, the FAA has also been very open to proposed solutions from the industry and I think other countries

**As soon as we have certainty, we'll see a huge amount of movement in the sector, including venture funding**

**I expect there will be another round of rulemaking from the FAA where they tackle the payload issue**

will learn something from the FAA is doing here.

**If other countries have benefited while the US was without its rules, will those other countries lose out as the US catches up?**

It will bring companies back to the US if they have left, and I see this industry expanding quickly in the US so other countries will want to keep up.

**To what extent will technology provide the answers to some of the legal questions we now have?**

To a big extent. The challenge for innovators is to work with policymakers. For every problem we have a solution. Cars have brakes. Our computers have security systems. As we are now seeing the potential policy implications for drones, we have a lot of innovators who are developing solutions. I call what we are seeing “polivation”: policy-makers promote innovation and innovators work hand in hand with policymakers.

A lot of what I do is translating between Silicon Valley and DC. Silicon Valley is focused on innovation and growth, and they don't want to see the government throwing up unnecessary roadblocks that will stifle innovation.

**How do you see the sector developing around the world?**

Countries are moving at their own pace. The UK is a great example of a country which has seen the potential and is running with it. And in Japan, some 85 per cent of crop dusting is already done with drones.

**DJI is a Chinese manufacturer. How do you think it is getting on?**

It is the world's biggest manufacturer. We will start to see more competition as more companies come into manufacturing and into the operating side. DJI has done a magnificent job in covering the drone market on the front end. In the US, they represent 70 per cent of the approved market share [through the Section 333 exemption approvals through which companies gain approval to fly]. In the US, if your vehicle has been approved by the FAA, then it makes sense to keep using the same approved vehicles. DJI has also been a leader on incorporating new technologies into its hardware. For example, following the incident of a drone landing on the White House lawn, the company installed geo-fencing on all its drones which prevents them from flying in Washington DC and in all restricted areas.

**How do you interpret the move in October of the US Department of Transportation to require registration of drones in a national registry?**

It is a natural reaction to the greater use of drones by a lot of new hobbyists who don't know about the existing rules. The key is implementation of the requirement – it needs to be done in a way that is streamlined and not burdensome to the consumer.

# Classic jobs at risk



Annabel Lehnen

**Annabel Lehnen is an employment partner at Osborne Clarke. Based in Cologne, she has particular expertise in the transport and automotive sectors and in digital business.**

**To what extent are automation and robotics developing in Germany?**

It is continuously developing; however, according to one survey currently only approximately 20 to 30 per cent of German companies have or are turning to new production processes or are intending to introduce more robotics.

**Do you think that these trends will reduce the number of jobs available - or will they change the kind of jobs offered?**

We expect that classical jobs in the blue collar business will be replaced by robotics. The number of jobs will certainly be reduced. However, if employers invest in their on-the-job-training, they might be able to grow with new challenges and to continue to work alongside or with the robotics.

**Are these trends affecting the terms of employment for affected workers or do you think they will do so in future? (For instance, will there be more of an emphasis on training and versatility?)**

Terms of employment will change significantly, e.g. job descriptions, working time models, job safety. This will also impact existing collective agreements with the responsible works councils. Working conditions will have to be newly agreed by way of modification agreements. If employees or works councils reject, redundancy measures towards the employees in question might be the consequences.

**Do you expect to see more flexible working as a result of these trends (eg more people who are self-employed or who work part-time or on contracts)?**

All kinds of alternatives to a classical full time employment relationship will increase, such as part time and limited employment models, on call duties but also freelancer contracts, supply of temporary workers or employee leasing models.

**Terms of employment will change significantly**

**How might training be affected? For instance, will that training be given at the start of people's careers (at university, perhaps) or will there be more training during people's working lives?**

New kinds of training or university studies will be offered in order to prepare students better for the changing job models. At the same time, companies will have to implement new training for existing staff in order to enable them to prepare themselves for the requested new job challenges.

**If robots can increasingly do more of the hard physical work, does this mean that older workers will be able to continue working even if they are not physically strong?**

If older employees will be able to be retrained, they may have similar chances as younger employees to continue working. Apart from that, they are protected by the existing Anti Discrimination and Dismissal Laws as well as by the legal practice of the Federal labour Court regarding the protection of older employees against performance related dismissals.

**All kinds of alternatives to a classical full time employment relationship will increase**

# Data knows no borders

**How does the Privacy Commissioner of Canada see the area of drones - and other related high-tech issues? The Commissioner's role is to act as an advocate of privacy rights and its scope does not include the making of regulation. The office of Daniel Therrien discussed the issues with Robotics Law Journal.**

### Are you starting to receive enquiries about drones and privacy?

We do receive questions from time to time about drones.

Our Information Centre, which responds to requests for information from the public and organizations regarding privacy issues, has received 22 enquiries from the public about drones over the last couple of years. Some use drones and were seeking privacy advice on best practices, while others had questions about privacy and the commercial use of drones. Some wanted general information for research purposes, whereas others were concerned about drones flying near their properties.

We have also seen a growing media interest in privacy issues and drones. The nature of the enquiries we receive from reporters varies. Sometimes the questions are in relation to a particular incident or whether we've ever investigated any complaints about drones. We also receive more general questions about privacy and the use of drones.

### How is the issue of special rules for drones being developed?

In terms of the regulation of UAVs, there are two different licensing streams in Canada: Transport Canada is the civil regulatory authority and the Department of National Defence is the military authority.

Transport Canada launched consultations in May on proposed amendments to the regulations governing the safe use of unmanned air vehicles. Our Office has provided comments to Transport Canada as part of this consultation process.

With respect to drones and privacy, we published a research paper in 2013 called Drones in Canada: Will the proliferation of domestic drone use in Canada raise new concerns for privacy?

We continue to keep an active watch on this issue. In June of 2014, we released our privacy priorities for the next five years and surveillance is one of them. Drones will certainly continue to be of interest to our Office.

### Are you researching the area still?

Under our Contributions Program, we recently funded a study on the privacy implications of UAVs in Canada. The study by the Queen's University, Surveillance Studies Centre was published in 2014. The project set out to



understand where drones came from, what they are used for and, in particular, what new challenges they raise for privacy, civil liberties and human rights.

We have allocated more than \$4 million to some 100 independent privacy research initiatives through our Contribution Program since it was created in 2004 to support independent, non-profit research on privacy, to further privacy policy development and to promote the protection of personal information in Canada. Any opinions expressed in the project summaries and reports are those of the authors and do not necessarily reflect those of the OPC.

(You can find details here: [https://www.priv.gc.ca/resource/cp/2013-2014/p\\_201314\\_10\\_e.asp](https://www.priv.gc.ca/resource/cp/2013-2014/p_201314_10_e.asp). The Queen's report itself is here: [http://www.sscqueens.org/sites/default/files/Surveillance\\_Drones\\_Report.pdf](http://www.sscqueens.org/sites/default/files/Surveillance_Drones_Report.pdf).)

What is happening on the development of rules on an international basis?

Our Office is not a regulation making body. However, given your interest in the cross-border use of drones, you may be

interested in a Resolution of Canada's Privacy Commissioners and Privacy Enforcement Officials on the Canada-US Perimeter Security and Economic Competitiveness Action Plan released in 2012. One of the issues that we and our provincial and territorial counterparts

raised related to privacy issues related to drones. As new security programs are planned and systems initiated, we called on the Government of Canada to "restrict the use of satellites, unmanned aerial or other vehicles, remote sensors and associated surveillance technologies within Canadian borders and airspace under a proper regulatory framework."

(You can find the full resolution here: [https://www.priv.gc.ca/media/nr-c/2012/res\\_120402\\_e.asp](https://www.priv.gc.ca/media/nr-c/2012/res_120402_e.asp).)

### To what extent are you liaising with other privacy bodies, abroad and at home?

Data knows no borders, and our Office recognizes that we, too, must reach out beyond ours to work with global partners and organizations to develop a global privacy framework. This is an established priority for our Office, and, as such, our Office participates in a number of key international privacy protection initiatives.

Our Office contributed to a Berlin Group's Working Paper on Privacy and Aerial Surveillance, which draws from our own 2013 research paper.

As a result of amendments to the Personal Information Protection and Electronic Documents Act (PIPEDA), Canada's federal private sector privacy law, which came into force in 2011, our Office has the clear authority to cooperate with our foreign counterparts on issues that affect individuals in other jurisdictions. In fact, we have signed written arrangements with the Dutch, Irish, British, Romanian, Uruguayan and German (federal) data protection authorities.

We are also part of the Global Privacy Enforcement Network, an informal network of privacy enforcement authorities that is intended to promote enforcement cooperation by sharing information about privacy enforcement issues and facilitating effective cross-border privacy enforcement in specific matters.

Furthermore, we are part of the Asia-Pacific Economic Cooperation (APEC) Cross-border Privacy Enforcement Arrangement (CPEA), the Asia Pacific Privacy Authorities (APPA) and others.

The subject of drones is sometimes discussed at these forums and our Office certainly takes part in those discussions.

We have also met with other federal government departments, such as Transport Canada, to discuss the privacy implications of drones. Furthermore, we have been briefed by the Royal Canadian Mounted Police and canvassed other security agencies about UAV use and the obligations of departments and agencies to produce Privacy Impact Assessments to identify the potential privacy risks of any new or redesigned federal government program or service.

**We have... seen a growing media interest in privacy issues and drones**

**Data knows no borders, and our Office recognizes that we, too, must reach out beyond ours**

### Are you liaising with manufacturers?

We spoke at the Unmanned Systems Canada 2015 annual industry conference in Halifax in November. We spoke at a similar conference attended by manufacturers in Ottawa in 2011. Is there anything you would like to say about driverless cars (which will record a lot of information)?

The Office of the Privacy Commissioner of Canada is not currently engaged in any work directly related to driverless cars.

We are, however, actively following the issue of vehicular telematics, specifically the data collection made possible by the growing deployment of automotive sensors designed to gather data about driving habits, location, speed and other elements. Potential privacy concerns include the transparency of this collection and the use of telematics data to establish insurance premiums and/or profiling activities.

We have engaged in some discussions with industry stakeholders, insurance providers and many of our provincial counterparts. Our Office is currently looking at the privacy issues that can arise from increasingly smart devices, or the Internet of Things, and we expect to start publishing a series of research papers soon.

The research papers will look at the privacy implications of the Internet of Things and Canada's regulatory environment, among other things.

Returning for a moment to the subject of automobiles, you may also be interested in a project funded by our Office called "The Connected Car: Who's in the Driver's Seat". This research project was conducted by the British Columbia Freedom of Information and Privacy Association.

(For more information, visit: [https://www.priv.gc.ca/resource/cp/2014-2015/p\\_201415\\_06\\_e.asp](https://www.priv.gc.ca/resource/cp/2014-2015/p_201415_06_e.asp).)

Under the same program, we are also funding another project on vehicular infotainment platforms. (See the third project from the top at this link, for a description: [https://www.priv.gc.ca/resource/cp/2015-2016/cp\\_bg\\_e.asp](https://www.priv.gc.ca/resource/cp/2015-2016/cp_bg_e.asp).)

### Is there anything else you would like to add?

You might be interested in the results of a survey question regarding drones in a 2013 poll we commissioned. The survey results suggest that most Canadians are very comfortable with the use of Unmanned Aerial Vehicles to help with search and rescue missions (81%), to patrol the border (66%), and for law enforcement investigations (54%). However, they appear to be less comfortable with the use of UAVs for more general monitoring of the public, such as at events or protests (42%), or for general surveillance of public spaces (35%). For uses related to public monitoring, one in five or more (19-24%) said they were not really comfortable with this at all.

The poll can be found here: [http://www.priv.gc.ca/information/por-rop/2013/por\\_2013\\_01\\_e.asp](http://www.priv.gc.ca/information/por-rop/2013/por_2013_01_e.asp).

# A liberal regime

Finland introduced a new set of regulations for UAVs in September, describing the new rulebook as 'one of the most liberal aviation regulations in the world'. Samuli Vuokila, chief adviser on flight operations at the Finnish Transport Safety Agency answers some questions about the rules.



Samuli Vuokila

### What is the demand for drones in Finland? In what ways are UAVs being used?

Increasing, presently most common use appears to be photography, both still photos and videos for multiple use including real estate, media, zoning, film industry, building inspections etc. There is a growing industry in power line inspections and other beyond visual line of sight operations.

### Will there be many users of small UAVs?

This is a very likely scenario. We are receiving presently declarations from operators conducting commercial activities with increasing numbers.

### How are you dealing with issues on 'Beyond Visual Line of Sight' flying?

At the moment these operations can be performed in segregated airspace. This is rather simple to arrange in Finland due to our flexible airspace policy and efficient airspace management procedures.

### How did you go about designing your rules? Did you borrow ideas from abroad? Did you work closely with the industry?

We did work very closely with the industry and other stakeholders such as the air navigation service provider and model aircraft association. We did not borrow ideas too much as our approach is rather liberal and highly both risk – and performance based.

### How do you expect the issue of payloads to develop?

The technology on various sensors and

other devices that can be attached to an remotely piloted aircraft is evolving in a very rapid pace. This is likely to lead to more applications which can be utilized, in a way "sky is the limit" as we see it.

### What kind of experimentation are you expecting to happen?

We believe the real business is in the beyond visual line of sight operations. This is, however, a big challenge in near term but solutions are being developed by the industry in Finland and elsewhere to address this.

We believe the real business is in the beyond visual line of sight operation

### Will you be working with other regulators - especially in the Nordic area - to harmonise rules and to help each other?

We are in continuous contact with the other regulators and harmonization is seen as an important element to facilitate cross border operations. At the same time we highlight the importance of local circumstances. Operating environments are different and can provide varying operations depending on the location.

### What sort of enforcement issues are you seeing?

This is a new area and will involve a lot of new actors to this aviation segment. Authorities involved are also multiple depending on the scope of their authority – the aviation authority on aviation-related issues, police on general law enforcement etc.

# Danger, robotics and Africa



Benjamin Rosman

Dr Benjamin Rosman discusses the way robotics will develop in Africa and how some of the legal issues impinge. He is a senior researcher

in the Mobile Intelligent Autonomous Systems group at the Council for Scientific and Industrial Research, South Africa.

### How is the robotics sector developing in South Africa and the rest of Africa?

The embracing of technology seems to be slower in the developing world, particularly with hardware, than in the developed world. Hardware would typically require more infrastructure. There are also challenges about the uptake of robotics in the perceived subsequent loss of jobs.

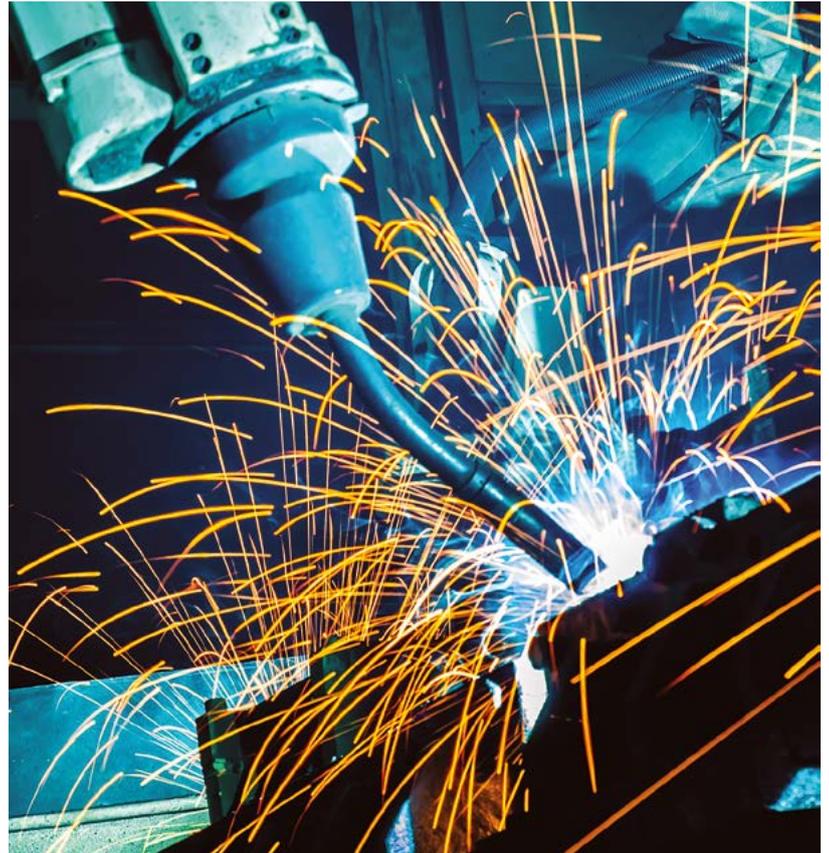
People talk of the 'three Ds' as application areas in relation to use of robotics rather than humans - Dull, Dirty and Dangerous. Dull and Dirty applications tend to be avoided in the developing world because we have a substantial workforce here and employment is a major concern. So the primary roles for robotics in Africa are, typically, around Dangerous work, or providing services that can't otherwise be provided.

One of the major application areas in Africa is mining. The conditions on mines tend to be very difficult for humans, often with poor and dangerous conditions.

There are many things that people do better than robots - tasks that require dexterity, for example, and certain kinds of reasoning. Humans are more flexible physically and intellectually. We deal better with challenges that are unanticipated. Robots are good at repeatedly performing one well-defined activity all day and all night.

There is a misconception that robots and computers are systems in which large numbers of rules have been constructed. These days tasks are rather solved using machine learning, which allows us to specify examples of desired and undesired behaviour, and leaves determining the rules which best describe these to the

You can't blame the driver because he might be in a passenger seat reading



system. Importantly, no human is then directly responsible for the resulting performance of the system.

### Where will we be in five years?

I predict that we are going to start seeing more and more of these developments happening on a small scale. There will be more companies offering drone services, for example, and working in war- and disaster-ravaged areas. I would expect this to happen incrementally - but I could also imagine in the right circumstances something just exploding onto the scene.

The drive for automation in manufacturing is another key difference between developing and developed economies. A country such as the USA has significant motivation to streamline manufacturing processes for competitive reasons, which inevitably leads to greater automation. On the other hand, developing economies can typically rely on a larger, relatively cheap, workforce.

Regarding autonomous cars, you will see that happening everywhere but I don't think you will soon have large fleets of autonomous vehicles in Africa.

### How are the legal issues developing?

We are already seeing some of the legal issues developing around driverless cars. Similar questions are being asked

about drones. The main question is: when something goes wrong, where does the responsibility lie? It is not clear in general what the answer is. It is likely that the answer will be different between the application areas. This same question applies across the board to all aspects of robotics and autonomous systems.

Concretely, with driverless cars, who's responsible if something goes wrong? You can't blame the driver because he might be in a passenger seat reading. If you place the responsibility on the developer of the technology, you are discouraging development. If it was an obvious fault in the system you could hold the manufacturer responsible, but if there is some unusual confluence of events and the car behaves in a slightly unusual way, what do you do? This is particularly relevant question for learning systems.

You can design a driverless car so that it drives safely, politely, and conservatively but that is not necessarily how people drive. People display a lot of complicated signals, with these differing between places and cultures - and other drivers understand the unspoken protocols of the way you drive. If driverless cars aren't able to encapsulate these protocols, it would almost be as if they were foreigners unaware of local customs when on the road. So if something went wrong in these circumstances, who do you

blame? You might have a car designed in the US which you take to other parts of the world. What happens when they misinterpret the signals that are given by other cars on the road? There is much scope in the legal world for discourse on these issues.

More discussion is needed about robots in factory and domestic settings. A current hot topic of research is now into 'compliant' robots. If they hit you, these robots have some 'springiness' to absorb some of the impact, and they also realise that they have hit you and they stop. These robots are designed to be safer around humans than traditional non-compliant robots [large pieces of machinery, usually cordoned off from humans in factories] but there are, inevitably, going to be issues.

For example, if a robot's job is to put knives into a box what should you do to protect humans in case a knife slips? Many modern robots can now be trained by workers in the factory, rather than being pre-programmed by the developers. In these cases, a worker may drag the robot's arm around the knives and show it what actions to take to pack the knives, and how to do so safely. But, if something goes wrong, is it the designer's fault... or is it the fault of the person in the factory who trained the robot?

**There is concern that programmes and other works designed by robots might not be protected by copyright. What are your concerns in this area?**

I can imagine general settings where a robot is given some requirements for a problem, and resources available, and is asked to come up with a solution. This is a standard optimisation problem, and to solve it, the robot could come up with something different and new. Without copyright protection, this could pose another huge question. Who owns that product? Giving the rights of that product to a piece of software doesn't make sense. Giving them to the company which asked the robot to solve the problem may not make sense either, as all it did was ask for a

problem to be solved. Similarly, many researchers work on problems such as automated music composition or artwork generation. This would affect those areas too.

There is a tendency for people who go into computer science to prefer the notion of open source, and to not care strongly about the ownership of these kinds of works. Many would say that what they produce should be available to all. You would not want a predatory company coming along and somehow obtaining rights to these automatically generated products, and then charging people to use them. That would be harmful to the entire industry, if not society more broadly.

How much of an issue is the fear of job loss in the development of this area?

I don't see it as a major stumbling block at the moment - but it could be soon. Honestly, it isn't the case that we don't have robot butlers in our houses because of the social issue. This is still more because of the technological issues. However, in the future, these problems will relate more to the legal, financial and social issues.

On the financial side, costs of the equipment required for driverless cars, for instance, are coming down now. The legal aspects are still a major issue. On the societal side, there are other issues relating to the acceptance of new technologies. For example, Google Glass was plagued by various privacy concerns. Within a generation, I can imagine that won't be an issue anymore: people will be more used to being constantly filmed and documented.

But now, you can have a start-up anywhere in the world which acquires funding and starts producing some new world-changing technology. Society is welcoming this kind of innovation. This is the right time for us to be asking these questions.

*Dr Rosman is also a Visiting Lecturer in the School of Computer Science and Applied Mathematics, at the University of the Witwatersrand, South Africa.*

# View from the aerial surveyors



Malcolm Connolly

**Scotland-headquartered Cyberhawk says it is the 'world leader in industrial inspection and land surveying using ROAVs'. Founder Malcolm Connolly talks to Neasa MacErlean.**

**What is the growth potential of your market?**

For industrial inspection work, it is huge. The vertical sectors in which we operate include renewables, oil & gas, rail infrastructure and power transmission. Each of those markets is growing very, very quickly. Wind, rail and transmission are the biggest ones in terms of overall market size. Oil & gas and utilities have been the main areas where Cyberhawk has focused its efforts in recent years.

We are an inspection company, focused on the provision of information. We are engineers. We collect data - and that could be done by using a drone or by having a man on the ground. We process that data. We add a lot of value by processing it and producing reports and analysis. For instance, we will look at a power line with 300 towers and assess every individual component, before inputting this information into a map-based asset management system.

In certain applications, our inspection techniques save

millions of pounds on each individual inspection. An example of this is when we do flare inspections at oil refineries. The flare is a safety critical part of the process plant, designed to burn off all of the hydrocarbon inventory in a process plant if there is a problem - this is called a blowdown. Traditionally, the only time a flare could be inspected is during a planned

**The biggest frustration is the difference in regulation between different countries.**

process shutdown. However, this can cause an extension to the shutdown period for the plant if a problem with the flare is discovered.

With our ROAVs, we can look at the flare whilst the plant is still live, which allows the plant operator to plan any repair or maintenance work that the flare requires prior to shutdown, rather than getting a surprise during the shutdown itself. Tens of millions can potentially be saved, when you consider an example of seven days of shutdown on a plant, at a cost of £2m a day.

On a transmission inspection, these inspections would normally

*Continued on page 10*



**Saving costs on pylon inspections**

*Continued from page 9*

been carried out by a technician climbing up the pylon tower. They normally turn off the power on one side of the pylon to do that - and this could only be done for a short amount of time at certain periods. We can undertake the entire inspection while it is on line.

In the wind sector, our model for inspecting wind turbines is around four times quicker compared with traditional methods such as rope access.

### You work in over 20 jurisdictions. What are the issues you face on regulation?

The biggest frustration is the difference in regulation between different countries. It's different in each jurisdiction. Some are quite similar to the UK but, even in Europe, there are massive differences. In some countries there are prohibitions. In the Netherlands, for instance, it's not legal to fly a drone commercially but we have an exemption. We got the exemption because we are safe and take people out from working at height. The Dutch government is happy with that.

Having to work within visual line of sight is another issue. Some projects - like doing a pipeline inspection - would mean going outside the line of sight. But you can't do that now in the places we operate - with the exception of France. It's going to be a while before we see it. There are hundreds of millions of miles of pipelines where this could be used. Typically, it is now done by guys driving along or by manned helicopters, however those are very expensive operations. And in Canada, for instance, there are huge pipelines going through the wilderness. Companies are very nervous about sending manned aircraft there because there could be a real problem if there is an accident. They are very keen to use drones as an alternative.

### How do you view the specific plans to harmonise laws in Europe?

EASA [the European Aviation Safety Agency] is coming up with a framework for harmonisation, based on the Riga Declaration. What we have seen on paper looks quite sensible. It's a good balance between making sure there's a high level of safety, without having very

prescriptive legislation that can stifle a business's chances of operating successfully.

The next goal is to get something in the ICAO [International Civil Aviation Organization]. That will probably be more of a challenge because there are 192 member states to corral with very different views, and each state has a veto. There are massive, massive opportunities in the US, for instance, but there have been big difficulties in entering this market. We have addressed this by partnering with people operating UAVs there

instead, which allows them to capture the data required whilst we can analyse and report on this data from our inspection centre.

### How much of an issue is privacy now?

Not so much. Oil refineries are not generally next to houses. The only places that we potentially have privacy challenges are where there are members of the public in the area. It's only been a challenge for us on a couple of commercial jobs such as building inspections in public areas.

But data protection is going to become more of an issue. There is a lot of knee jerk lobbying. A lot is aimed at the hobby users of UAVs and, maybe, at journalists using drones to snoop on people. We could unfortunately get disrupted by the same legislation.

### How will aviation enforcement issues develop?

Over the next few years aviation authorities will probably wash their hands of the smaller systems (sub 4kg) and push enforcement of that onto the police because the volume of traffic is going to be hundreds of times that of unmanned aircraft. In five years we will be seeing drones everywhere.

### Which are the best places to operate from a regulatory point of view?

The UK is up there, without a doubt. It's got one of the most permissive and pragmatic approaches to regulating. A lot of countries are trying to mirror what the UK has done.

In the US, the vision of the Federal Aviation Administration is very much to make the regulation very permissive. It will be a polar change. It will likely become even more permissive than the UK.

**Companies are very nervous about sending manned aircraft there because there could be a real problem if there is an accident**

**Fact: Using drones for energy sector building checks can save £millions a day**

# Health and safety in the age of killer robots: The criminal liability of robots in a workplace environment

Brian O'Neill QC and Rob Dacre of 2 Hare Court examine the issues.



Dacre



O'Neill

It may seem like the stuff of science fiction, but the criminal liability of robots in the workplace may become legal fact in the not too distant future. Boston Consulting Group has predicted that by 2025 up to a quarter of jobs will be replaced by either 'smart software' or robots; researchers from Oxford University suggest that 35% of jobs in

the UK are at risk of 'automation' by 2035. Accidents in the workplace, and the legal fall-out that results, will increasingly involve questions about how liability is shared out if and when those accidents involve robots.

In other jurisdictions such questions are already being posed and not in a hypothetical way. In February this year a worker in a Volkswagen car factory in Germany was killed when a robot pinned him against a wall. The robot was a mechanical arm that moves car parts into place. It was capable of functioning entirely without a human operator. A police investigation is on-going, and state prosecutors have yet to confirm whether (in the words of a press officer) 'anybody was at fault'.

The press officer's statement may well

**If a robot is capable of functioning entirely without human operators, does this insulate companies from liability for robots that cause accidents?**

encapsulate the key issue for courts dealing with workplace accidents where robots have been involved. If a robot is capable of functioning entirely without human operators, does this insulate companies from liability for robots that cause accidents? And where is liability likely to go if companies can rely on a new defence based on a robot's ability to function on its own. This article looks at two areas of English law where these questions about robot liability may be posed, and resolved, in the near future: corporate manslaughter and health and safety regulations surrounding the use of machinery.

In England and Wales, fatal workplace accidents are dealt with in the criminal courts under the Corporate Manslaughter and Corporate Homicide Act 2007. Section 1 reads as follows:

- (1) An organisation to which this section applies is guilty of an offence if the way in which its activities are managed or organised –
  - (a) causes a person's death, and
  - (b) amounts to a gross breach of a relevant duty of care owed by the organisation to the deceased.

Section 1(3) restricts the liability of corporations by prescribing that only if the way in which the organisation's activities are 'managed or organised by its senior management is a substantial element in the breach referred to in subsection (1)'. In order, therefore, for a company to be criminally liable for fatal accidents, the courts must find first that an accident was caused by the way in which the company has been, managed and organised; second that the accident resulted from a 'gross breach' of a relevant duty of care; and third that organisation or management by senior management is a 'substantial element' in the breach arising.

Had the German worker been killed in an English factory, problems may have arisen in relation to all three limbs of s.1. First, proving causation where a robot is capable of functioning entirely without human operators will be difficult. If, in essence, a robot has 'decided' to behave in a manner that causes an accident, it may not be possible to establish that senior management practices have been a cause of the breach, as opposed to the 'decision' made. Second, the courts may be reluctant to find a duty of care to prevent autonomous machines, which operate entirely independently of their human controllers, from behaving in a way that is (by its nature) unexpected. Third, even if the prosecution courts



can establish limbs one and two, the 'substantial element' caveat will cause further problems. If it is difficult to establish causation at all where a machine is autonomous, it will be even more difficult to establish that mismanagement at a senior level was a 'substantial element' in causing the breach.

Fears about a robot lacuna are, however, probably misplaced. All of the above, of course, assumes that the robot in question is capable of entirely autonomous behaviour, or capable of making decisions, moving and performing its functions without any input, at any stage, from human controllers. It is likely that the robotic arm in the German factory, or its equivalent in an English factory, does not quite reach this level of sophistication: it was capable of independent operation, but in a way that was uniform and predictable. Plainly, where the use of the robotic arm gives rise to foreseeable risks of injury to employers, the courts will be quicker to accept that fatal accidents have been caused by mismanagement, and that corporations owed a relevant duty of care.

Even if a company can establish that a robot acted entirely of its own volition, and in an unpredictable way, that does not mean that there will be no causative link between injury and a breach of health and safety duties. Section 2 of the Health and Safety at Work Act 1974 places a duty on employers not just to provide safe equipment (or non-lethal robots), but also to provide appropriate training and supervision with that machinery. Employers must ensure so far as is reasonably practicable - 'the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees'.

It will not be enough to demonstrate

that the robot was acting on its own if there are other identifiable breaches (such as a failure properly to train employees) that were a cause of the accident. Some of the duties prescribed by European regulations are set out below, but it is not difficult to imagine cases where employers have breached any number of duties in relation to employee safety in interacting with robots, even if the robot is capable of making decisions independently. Moreover, as the number of accidents involving autonomous machines increases (as it no doubt will), so too will the foreseeability of risk, and in time, the number of regulations governing health and safety when using robots.

Health and safety regulations currently in force would similarly prevent companies from avoiding liability where an accident has been caused by a robot's 'decision'. The Provision and Use of Work Equipment Regulations 1998 ("the PUWER regulations") provide best practice regulations for the use of

**It seems highly unlikely that an employee will be caused injury by a robot without some failure to abide by regulations concerning their safe use**

machinery in workplace environments. The Health and Safety Executive also publishes an Approved Code of Practice to comply with the regulations which, whilst not given statutory authority, can be persuasive to courts in establishing whether duties have been breached. Under these regulations, it will be very difficult

for companies to hide behind a robot's 'decision' as the sole substantial cause of an accident. The PUWER regulations prescribe best practice in preventing employees having access to dangerous parts of machines, training in their use and in risk management, and proper maintenance. It seems highly unlikely that an employee will be caused injury by a robot without some failure to abide by regulations concerning their safe use.

Companies which use robots cannot hope to rely, therefore, on an infallible new robot defence in the very near future. It is still possible to imagine a scenario in which an entirely autonomous robot makes an entirely unforeseeable decision which causes an accident; and where no breaches of health and safety regulations can be identified. But that lacuna is very small indeed: at least for now, that legal and philosophical problem remains in the realms of science fiction.

# IP developments in Europe - the next challenges for the robotics industry

## How Industry 4.0 will affect the sector

by Dr Jan Phillip Rektorschek



Artificial intelligence and robotics are two of the most innovative fields of technology, with many companies investing tremendous

sums in researching and developing new products. Therefore, three of Germany's largest industry associations have launched the "Industry 4.0 Platform", a joint project with the German Ministry for Economic Affairs and Education and Research Ministry cementing Germany's position as a hub for sustainable production technologies. To protect their investments, the businesses have to remain alert not only to data protection and (product) liability issues but particularly also to intellectual property developments. Innovative companies depend on using technical IP rights to survive in the market. Germany and Europe are currently experiencing a number of different developments in patent legislation that innovative companies should urgently consider at this early stage. In particular, the recent developments in handling standard essential patents and the planned introduction of a Unitary European Patent Court System will become very important. In the following, these issues will be discussed due to provide an overview on the commercial and legal developments arising for companies which are active in the robotics industry on the European, in particular German, markets.

### Industry 4.0

Germany remains a pioneering force in automation technology and networked industries. Several of the major manufacturers of industrial robots are from Germany or the European Union. According to a press release of the International Federation of Robotics (IRF Statistical Department, 23 March 2015), of the 225,000 industrial robots sold worldwide in 2014 (+ 27% over 2013), 56,000 went to China, resulting

in a 50% growth rate over 2013. South Korea, Japan, USA and Germany again were the biggest sales markets besides China in 2014. China in particular is more than keen to outrun the established manufacturing powers in the robotics segment, not only as one of the largest buyers of robots but also as one of the biggest manufacturers. That last aspect will of course increase Chinese exports and give another boost to the already very strong worldwide competition.

The German industry and politicians have recognised this trend and chose the Hannover trade fair in April 2015 as venue to present their "Industry 4.0 Platform", a project dealing with the development and implementation of future information, communication, automation and production technologies. The project involves the German Ministry for Economic Affairs and Ministry of Education and Research as well as the three industry associations as initiators, plus several research institutes, universities and virtually all major German industrial enterprises.

The project's list of high-profile participants shows how important this topic has become and that even now, the development of robotics, smart factories and advanced manufacturing is exposed to significant market pressure and lively competition.

As the pressure of competition is likely to increase further, IP rights and most notably patents are a means to distinguish oneself from competitors in technical areas such as robotics. The industry has spotted this potential: Studies conducted by Fraunhofer IAO and IAT Stuttgart University have shown that over the recent years, companies especially from China, the USA and Germany filed considerably more patent applications in technologies relating to robotics and Industry 4.0, such as artificial intelligence, network wireless communication or power supply.

### Standard essential patents

What are the implications for the

participants in the robotics industry? Although only a fraction of the above mentioned patent applications have been issued to date, this will change in the foreseeable future and some technologies will be monopolised by single players.

Wireless communication technology will play a prominent role in robotics, regardless of the specific functions of each product, as robots depend on wireless communication to operate, be it in industrial production, medical technology or logistics contexts. The essential wireless technologies must be standardised to link robots to different devices, for example to control or service them remotely. Communication among robots, for example at complex assembly lines, requires standardisation of network components across different manufacturers and users. This field will be particularly prone to patent litigation, in the way mobile communication technology in smartphones is already today.

To implement these goals on the technical level, standards must be introduced for the technologies: Specific industry standards will become established that have to be used by everyone seeking to operate in a particular market in order to make a marketable product. By way of example, technical standards in wireless communication usually comprise several thousand patents, which are essential because it is not possible for technical reasons to make standard compliant products without infringing these rights.

Disputes about standard essential patents (SEPs) involve not only the "ordinary" questions of patent litigation (is the protected technology actually being used?) but also an entirely different, vital question: Is the proprietor required by antitrust law to issue a license on FRAND (fair, reasonable and non-discriminatory) terms? For patentees, this means they can participate in their competitors' sales to some extent (of a fair, reasonable and non-discriminatory royalty) but have no right anymore to forbid others to use their patent, at least as long as the users comply with the legal requirements imposed on them.

Over the past years, there have been many lawsuits, especially between the major smartphone companies, on how the duties should be distributed among the patentee and the user of the patent. Many of these cases revolved around SEPs, arguing who has to meet which requirements to ensure that the patentee can still enforce his patent

"South Korea, Japan, USA and Germany again were the biggest sales markets besides China in 2014"



rights by way of an injunction or that the patent user can plead royalty payments on FRAND terms.

Recently, the Court of Justice of the European Union (CJEU) defined EU-wide rules on how this has to be done (ruling of 16 July 2015, case C-170/13). In particular, the patentee is subject to significant duties in relation to the user of his SEP, which the patentee has to fulfil before he can enforce any claim for injunctive relief in court. The ruling impacts licensing practices throughout the EU. According to the CJEU, as a first step, the patentee must approach the patent user with details of the alleged infringement and offer him a license specifying the amount of the royalty and its calculation corresponding to FRAND terms. The CJEU does not describe, however, the exact way in which this is to be done. On receiving the information the patent user must inform the patentee without delay whether he accepts the offer. If the patent user refuses the offer he has to promptly submit a counteroffer that corresponds to FRAND terms likewise. In addition, the patent user has to provide a security (such as a bank guarantee) to secure the patentee's claims.

The specific elaborations of this procedure are highly complicated but will directly concern a major part of companies engaged in robotics, not least because many of the relevant technologies covering the communication of the interacting devices involve standard essential patents in some form or other.

### Unified Patent Court System

Also the already enacted introduction of the new pan-European patent system will be of extraordinary strategic importance inter alia for robotics companies: Until now, one could only file a collective application (EP application) to obtain a bundle of different national patents. Once the new system comes into force (currently envisaged for the end of 2016 / early 2017) applicants only need one single application to get one Europe-wide patent with unitary effect (one-stop shopping). According to the European Patent Office, the fees for the complete term of the unitary patent (20 years) will be reduced by more than 70% over the comparable fees for a European patent (EP) for the contracting Member States.

Thus, on one hand, patentees will have a cost-efficient alternative of obtaining comprehensive patent protection within the EU and enforcing the patent Europe-wide in a single procedure before the new Unified Patent Court, to be established over the next one to two years.

On the other hand, the new system of course also involves the risk of the patent being revoked with Europe-wide effect, in one single pan-European action for revocation, whereas the current system requires a separate action for revocation for each Member State once the deadline for filing notice of opposition to the European Patent Office has expired.

This applies also for all existing

EPs and EP applications, which will be transferred automatically into the new system, in other words converted to unitary patents, unless their proprietors have opted out from the unitary system (there will be a "sunrise-period"). The opt-out has to be exercised for every single EP and EP application and incurs an opt-out fee of EUR 80 in each case. A patentee who has opted out and later wishes to re-join the new system, for example for Europe-wide enforcement purposes, can do so by "opting in" for a fee of EUR 80 as well.

What does all this mean for innovative companies? Well, these companies have to develop a strategy deciding what they will do with their existing patents once the new system has come into force, either dealing with the new system or even return to national patent applications to avoid the risk of Europe-wide revocation. Since there are not yet any experiences how the new Unitary Patent System will work in practice and because the written law, consisting of the EU Regulations (EU) No 1257/2012, (EU) No 1260/2012, the Agreement on a Unified Patent Court and the Rules of Procedures, contains numerous ambiguities and contradictions, companies already owning European patents or patent applications or are planning to enter into the European market should be aware of the chances and risks of the new European patent system and start to define their patenting strategies for Europe right now.

### Conclusion

For companies active in the robotics sector, IP rights are extremely important and will become more so for reason of their increased use to meet networking requirements. IP rights can be an enormous competitive advantage for innovators with wide IP portfolios. When enforcing patents that qualify as standard essential, however, they have to be sure to satisfy the criteria that the CJEU has defined for the EU. Companies have to become aware of the implications of the ongoing reform of the European patent system and the introduction of the UPC and devise appropriate filing strategies now. Once the new system has been introduced, it may be too late.

*Dr Jan Phillip Rektorschek is a German qualified lawyer in TaylorWessing's Munich office and specialises in patent litigation. His work for Taylor Wessing is concentrated on advising and representing international and German clients in court and out-of-court disputes. He is member of UNION-IP and gives lectures for Intellectual Property Law at the Munich Business School.*

# Are the regulators ready to deal with the robotics world?

Regulators are set to play a crucial role in curbing the potential dangers of robotics – but how confident can we be that these wise people are ready to hold the reins in this complex area?



by Neasa MacErlean

The aviation and wider transport sector are our leading experts on safety and they tend to err on the side of caution.

But are these regulators ready for the abundance of issues that will affect drones and self-driving cars? Cyber security, for instance, will become a crucial issue on our road and air highways. VIPs in particular could become targets in self-driving cars. If they have given away too much information about themselves in public, they could put themselves at risk of having their car controls taken over on the road by hackers.

And will regulators keep up with the more subtle developments of robotics? For example, without clear rules, we could see the frail and elderly deprived of human contact as AI is increasingly used to care for them. Similarly, regulators struggle to contain the development of surveillance at the moment – and could be taken unawares by the use of nearly invisible mini-drones in sophisticated espionage.

Recent regulatory issues do not bode well. Emissions-cheating technology is believed to have started to be used in auto manufacturer Volkswagen in 2008 – but was not exposed, despite clear warning signs, until seven years later.

To create and maintain adequate regulation, there are clear steps that need to be taken – investing in the system, for instance, developing flexibility and speed and educating the regulators themselves. Luis Franco – a lawyer at Perez-Lorca in Madrid who has a particular interest in robotics – says: 'It is going to be a matter of governments investing enough resources so that they can keep ahead of people breaking the law.'

Speed of learning and response will be necessary to control the high-speed development of AI and robotics. Many countries will need to rethink their (time-consuming) reliance on parliament to bring in new rules. Spain, for instance, has bodies of experts which study certain areas of law and can fairly quickly draft amendments which are then presented to the Congress

**Many countries will need to rethink their (time-consuming) reliance on parliament to bring in new rules.**

to be passed. Franco thinks that AI/robotics would need to call upon a similar panel in order for the sector to work effectively. He would also like to see the creation of 'core regulations establishing the guiding principles (not subject to too many amendments)' which would 'clearly establish and authorise the amendment and detailed



regulations of more technical-related matters to be governed by means of lower rank legal instruments'.

Looking at the issue more broadly, countries which rely on a civil code may also want to rethink their approach in this area if they do not want to be left behind by those that can use case law to give quicker responses through the law.

More resources and, perhaps, greater

## Low pay regulation

One of the main areas where regulators and law-makers will find themselves looking at issues around robotics is that of setting a minimum wage. 'If you raise the minimum wage, you're going to make people more expensive than a machine,' said Marco Rubio, one of the Republican candidates for the presidential nomination in a debate in November with other candidates. 'And that means all this automation that's replacing jobs and people right now is only going to be accelerated.' Mr Rubio might not have taken the issue through to its logical conclusion in this debate but the fact that he makes these comments in the hustings shows just what an important subject it is with the public.

In the UK minimum wage rates have erupted as a major issue over the last year (albeit slightly disguised in the form of a national debate on a subsidy, Tax Credit, which many of the low-paid receive). Views have been polarised on the topic. There is little disagreement over the fact that the gap

between rich and poor has accelerated in the last decade. For example, the Sunday Times Rich List of the wealthiest 1,000 people showed that they were twice as well-off as they had been a decade before. But there are apparently irreconcilable disputes about how low pay should be handled.

Regulators are involved in more subtle ways than just setting the minimum rate.

Enforcement of the minimum wage is an area that can easily be neglected by governments

which allocate few resources to this cause. Enforcers in the UK, for example, have been handing out penalties which average just £685 to employers which are caught paying under the minimum wage. By contrast, the financial services regulator, the Financial Conduct Authority, hits its targets much harder. Fines

in the millions are common. The Bank of New York Mellon was given a record penalty in 2015 when it was fined £126m for not keeping client accounts fully separate from the bank's own money.

**'If you raise the minimum wage, you're going to make people more expensive than a machine,' - Marco Rubio**

open-mindedness about the recruitment of regulators could bring more knowledge about the fields they oversee to regulatory panel. But the practical problems here can be immense, says Adam Samuel, a London-based expert in financial services compliance. 'One would always like this,' he says when asked if regulators should be better educated in their fields. He adds: 'However, if regulators were that well resourced the cost would destroy the industry that they were regulating. Regulation is always a compromise in this respect.'

One of the complicating areas for regulators now is the range of aims being set for them. Some are under increasing pressure to take economic issues into account. Officials in Britain's Office for Nuclear Regulation are said to be concerned at being told in 2014 to take into account a 'duty to have regard to growth' while regulating 37 nuclear sites, according to The Independent newspaper. Many regulators are very much aware that they can attract new business to their country by making their regulation attractive – and the World Bank's 'Doing Business' tables (headed currently by Singapore) highlight this. The possible dangers of making regulation over-friendly may well increase on the back of growing globalisation. 'There is always a risk of regulator-capture by the big players in any industry,' says Adam Samuel. 'On top of that, the threat to move businesses to the least regulated venue has been with us for much of the last hundred years. Revolving door set ups create similar risks.'

In a complicated world, there are some optimistic signs, however. Technology can provide answers to many questions that regulators will ask. Anti-collision technology, for example, will make drones safer and could do away with the need for pages of rules. In an interview with Robotics Law Journal (published in this issue), Lisa Ellman, co-chair of the Hogan Lovells global UAS group, speaks of 'polivation' as a way forward. She says: 'As we are now seeing the potential policy implications for drones, we have a lot of innovators who are developing solutions. I call what we are seeing "polivation": policy-makers promote innovation and innovators work hand in hand with policymakers.' And Luis Franco makes a similar point, calling for regulators who understand mass data processing and other IT issues. But he also wants the industry to play its part. He says: 'You will need to have designers who have some knowledge of law.'

# The Internet of Things - revolution and destruction

**The Internet of Things has raised such complicated practical issues that, experts suggest, it may have been delayed by a decade. But innovation is starting to solve some of these problems - and there are now forecasts that over 30 billion devices will be connected in to Internet of Things (IoT) networks by 2020.**



To say that the potential for lawyers is huge is almost to mis-understand what is happening. It is a bit like saying that the Bible's Great Flood offered great opportunities for boat-builders when, in fact, it destroyed all those who did not realise what was happening. As with the arrival of the internet itself, the IoT will be so revolutionary that lawyers will find their work practices and work agendas overhauled by the changes. Not only will lawyers be giving advice in different ways but they will also be seeing a growth in demand in particular areas (such as patents advice and privacy).

The examples which are normally given about the IoT include the smart fridge which can stock take on your behalf and place orders with your local supermarket when you run low. Robotics will play a growing role – as both AI and robots will be used to co-ordinate and deliver the services that the IoT will provide.

One of the big technical issues that has held back the IoT is connectivity – linking up the sensors that will be built into fridges, parking spaces in Smart Cities and other locations to a network that is accessible to individuals through their smartphones. The arrival of 5G mobile phone technology is expected to catapult us forward on that. We are now in 4G – and the much-debated 5G is still in embryo. Telecommunications body 3GPP held a workshop in Phoenix, Arizona in September to plan the new (mobile broadband) standard which will

be the basis of 5G.

Standard-setting is the IT world's practical version of laws. And lawyers who are involved in creating them put themselves at the heart of the business community. 'Standards are... an extremely important part of market creation,' said David Willetts, Visiting Professor in Policy Institute at King's College London, in a discussion on IoT this year. The former UK government minister went on to explain how influential organisations can be if they take a role in 'shaping standards'. That can 'help you maintain a key role,' he added. 'Well, actually, you can argue one of the reasons for the success of Vodafone is that mobile phone standards were written in a way that supported Vodafone.'

The IoT is also bringing together in the same supply chain two sectors – electronics and software – which have very different legal traditions. Electronics tends to use patent law – hence the emergence of monopolies for first-movers with strong legal teams. Software relies far more on copyright – a set of laws which does far less to protect innovators.

As for privacy, imagine a world in which each of us is typically carrying over a dozen electronic tags. New smartphones typically have 14 sensors – relating to location, touch, the angle at which they are being held and other variables. The debate about how we avoid moving into a Big Brother world has barely begun.

**'Standards are...an extremely important part of market creation'**

# NEXT ISSUE

## MARCH FEATURES INCLUDE:

**Employment:** The British trade union movement reappraises robotics

**The elderly:** Care robots, driverless cars and human rights

**Taxation:** Why robotics could lead to a worldwide shift towards property taxes

**California:** How drone laws are developing in one of the heartlands of technology - from Globalaw's Hanson Bridgett

If you would like to become a country correspondent for The Robotics Law Journal please contact Claudia Tan [claudiatan@globalcitymedia.com](mailto:claudiatan@globalcitymedia.com)

Analysis and insight for the industry - lawyers, regulators, manufacturers and users

# THE ROBOTICS LAW JOURNAL

# SUBSCRIPTION INFORMATION

The Robotics Law Journal provides lawyers and others working in the industry with a clear understanding of the increasing opportunities that are now presenting themselves to manufacturers and users of robotics and AI - and all the regulation that this needs and entails.

Central to the journal is the focus on the drone sector - predicted to become an industry which will be bigger than that of manned aviation.

## YOUR ANNUAL SUBSCRIPTION TO THE ROBOTICS LAW JOURNAL WILL BRING YOU:

The Robotics Law Journal delivered to you bi-monthly (6 per year) in a digital pdf format via email.

A paper (hardcopy) edition mailed to you (optional)

Full access to the Robotics Law Journal online service (launching January 2016) which will include:

- Latest issues and archived issues
- All premium editorial content
- Regulation update
- News alerts bringing you the latest breaking news
- Timeline of key industry regulatory and other milestones
- Drones Focus

For more information on how to subscribe please contact [subscriptions@globalcitymedia.com](mailto:subscriptions@globalcitymedia.com) or call +44 (0) 20 7193 5801

**www.roboticslawjournal.com** Editor: Neasa MacErlan, [neasamacerlean@globalcitymedia.com](mailto:neasamacerlean@globalcitymedia.com). Reporter: Victoria Basham, [victoriabasham@globalcitymedia.com](mailto:victoriabasham@globalcitymedia.com). Events Director: Maria Sunderland, [mariasunderland@globalcitymedia.com](mailto:mariasunderland@globalcitymedia.com). Commercial Director: Baris Agun, [barisagun@globalcitymedia.com](mailto:barisagun@globalcitymedia.com). Head of Asia: Claudia Tan, [claudiatan@globalcitymedia.com](mailto:claudiatan@globalcitymedia.com). Head of Digital: Elanganathapillai Sivakanthan, [siva@globalcitymedia.com](mailto:siva@globalcitymedia.com). Marketing Exec: Sonia Fernández-Ponce, [soniafernandezponce@globalcitymedia.com](mailto:soniafernandezponce@globalcitymedia.com). Social Media Exec: Thomas O'Brien, [thomasobrien@globalcitymedia.com](mailto:thomasobrien@globalcitymedia.com). Design: Paul Carpenter, Stimulus Design. [paul@stimul.us](mailto:paul@stimul.us). Publisher: Mary Heaney, [maryheaney@globalcitymedia.com](mailto:maryheaney@globalcitymedia.com). Chief Operating Officer: Ben Martin, [benmartin@globalcitymedia.com](mailto:benmartin@globalcitymedia.com).

**Subscriptions:** T: +44 (0) 20 7193 5801. [subscriptions@globalcitymedia.com](mailto:subscriptions@globalcitymedia.com). While all reasonable care has been taken in the preparation of this publication, no liability is accepted by the publisher nor by any of the authors of the content of the publication for any loss or damage caused to any person relying on any statement or omission in the publication. All rights reserved, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electrical, mechanical, digital, photocopying, recording or otherwise without the prior written permission of the publisher.

**Published by:** GCM Publishing, Global City Media Ltd, 86-90 Paul Street, London, EC2A 4NE, United Kingdom. T: +44 (0) 20 7193 5801 © 2016 Global City Media Ltd. All rights reserved.

GCM | PUBLISHING