



THE ROBOTICS LAW JOURNAL

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CRIMINAL LIABILITY:

'A fully autonomous device could not be held accountable for any criminal acts which it might carry out'
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EMPLOYMENT:

'Throughout this technological transformation of the workplace, there will be substantial displacement of workers.'
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CHINA:

'there are no specialists in robotics law per se, but this will likely change as the industry develops'
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ROBOT MARRIAGE:

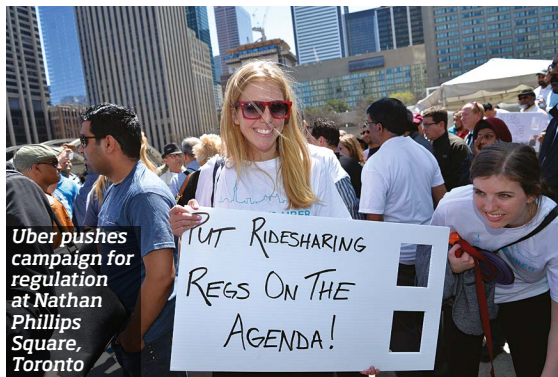
'It is inevitable that with the rise of human-robot companionship, relationships, sex and love will come calls for the right to marry their robot'
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Uber challenges could pave the way for connected cars

Cities around the world are getting a foresight of the regulatory problems they might encounter with driverless cars through the battles that are currently taking place over the Uber minicab app.

The International Transport Forum at the OECD is warning that, as with Uber, the arrival of connected cars could have a "highly conflictual entry into these markets". Philippe Crist of the Forum predicts that unless the issue is thought through in advance by city authorities they "will be mired in contentious litigation". He says: "You need to make [the regulation] future-proof so that the new uses can evolve. The cities that do that will be able to take away many advantages from the technology."

Like the Uber system, driverless cars will challenge the interests of



Uber pushes campaign for regulation at Nathan Phillips Square, Toronto

taxi drivers as the new vehicles are likely to be used both as taxis and as buses. Taxis have very particular legal rights in many cities and have frequently challenged any moves to curb their freedoms. London is currently in a state of uncertainty about Uber. The High Court has just found in favour of Uber on one particular technical issue which could have ruined the ability of Uber drivers to compete - but

the black taxi lobby has said it will appeal. The San Francisco-based organisation is the subject of new rulings from cities around the world, including the globe's two most populous countries of China and India.

Looking at the local regulations on taxis will be a crucial step in many localities. In London, for instance, drivers of the traditional black cabs spend years studying the 'Knowledge', in

order to get a detailed understanding of the city's road system. In Paris drivers can pay €500,000 to get a 'medallion' (licence). People who have invested this much need to be brought into the solution with Uber or connected cars, suggests the OECD. Citing Paris as an example, Mr Crist says: "One way is to have some kind of tax or fee on services which can be used to help buy back some of these medallions."

The Philippines passed regulations for cab services such as Uber in May this year, becoming one of the first countries in the world to regulate for app-based car-hailing services. While the OECD highlights the country as one which got to grips with the issues quickly, Uber still divides opinion there. Regulators have recently been asked to look at its charging mechanism in Manila on the grounds that its demand-based prices are excessively increased during rush hours.

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US gets advantage on EU over robotic copyright

The apparently obscure issue of who owns the copyright of works created by robots and AI could lead to substantial litigation in future - as it emerges that such rights are potentially far less well protected in the EU than in the US.

Writing in the current issue of Robotics Law Journal, Professor Madeleine de Cock Buning of the Centre for Access to and Acceptance of Autonomous Intelligence, speaks of "very complex ownership questions" within the EU. If "(partial) human authorship" is involved, she says, then ownership varies from country to country in the EU. But if someone were to claim that no human were involved, the protections available are far less clear. Since AI systems are now creating software programmes and other works and are learning from their own mistakes, they could begin to design very valuable systems. "This is the right time to start thinking about the IP issues," says the professor.

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France examines drone privacy system for citizens

Ordinary citizens would be able to see lists of drone flights that have taken place over their properties and could then ask for relevant video images to

be erased, under a system being considered by the French privacy body.

CNIL General Secretary Edouard Geffray told Robotics Law Journal that

it is considering a system in which a public website lists flights made in all local areas. People can ask to see videos made in their locality. He said: "If a

video drone has flown over you, you should be able to see the images taken. You have rights of erasure of those images..."

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Helping the drone sector take off



Dalen Tan

Singapore issued drone rules in June this year and believes there is "significant potential" for them on the island city-state. Dalen Tan, head of policy and rule making at the Civil Aviation Authority of Singapore (CAAS), discusses the rules and future plans.

Do you expect that the enhanced regulatory framework that took effect on 2 June 2015 will help create greater use of drones?

CAAS is keenly aware of the growing interest in drones in Singapore. By simplifying the rules and streamlining the approval process, the enhanced regulatory permit framework for drone operations will facilitate the use of drones while mitigating the associated aviation safety, public safety and security risks.

How did you decide on the 7kg cut-off point for recreation/research use?

The 7-kg cut-off is based on the current weight threshold in the Singapore Air Navigation Order for radio-controlled model aircraft. CAAS will review this weight demarcation, bearing in mind ICAO* and international developments and technology advances.

What do you think is the potential for drone use in Singapore? Are there characteristics of Singapore that make it particularly suitable for drones/able to benefit from them? What are the main areas of interest among Singapore drone-owners?

There is significant potential for drone use in Singapore. Singapore is land scarce and labour constrained. Drones offer the potential for firms and other users to overcome these constraints, generate new value, and further develop their businesses.

Singapore offers advantages to potential users to test bed their applications. To encourage innovation, Singapore provides ready access to investors, funding and markets, whilst our regulations are designed to be progressive. There is a growing number of drone developers and researchers working in Singapore.

Drones are already being used in Singapore for various purposes including aerial surveillance to support building

construction and inspections, security and aerial filming. A growing number of firms are also looking into developing applications for logistics and other services.

Do you expect to update the rules as and when the actual practices of flying drones develop?

Yes. The enhanced regulatory and permit framework is an interim step to address the immediate safety and security issues. We are working on developing a framework to further facilitate and promote the use of drones for public and commercial purposes. CAAS is also monitoring developments in drone technologies and international trends, particularly on the potential integration of drones into the aviation system.

How do you keep in touch with views and experience of the drone industry? How important is it to do this?

It is important for CAAS to understand the views and experience of the industry and users, especially given how quickly technology and the drone industry has and will continue to evolve. We have organised several forums on drones, and interact frequently

with the community of drone users. We regularly invite the industry to provide their views and feedback through industry and public channels. Our officers themselves fly drones.

To what extent do your rules allow for BVLOS? When do you expect BVLOS flying to start?

Our regulations do allow for Beyond Visual Line of Sight (BVLOS) operations. However, such operations pose greater risks to public and aviation safety. We will therefore evaluate applications for such operations more stringently. Some of the key aspects that we look at include the integrity and reliability of the systems being employed, the competency of the operator and the implementation of a comprehensive set of safety and risk prevention measures.

Are you feeding in your approach to other regulators in other parts of the world?

CAAS actively participates in several international platforms on the subject, where we are open to sharing our experience in regulating drones with our counterparts for mutual learning.

* ICAO: International Civil Aviation Organization

To encourage innovation, Singapore provides ready access to investors, funding and markets

PrecisionHawk on prospects and the law



Thomas Haun

PrecisionHawk is a leading US-based manufacturer of UAVs and of related technologies including sensors, inflight diagnostics and AI. Based in North Carolina, it works in a range of sectors from agriculture

to mining to oceans and insurance; and it has entered into an agreement to research UAV use in rural areas with the Federal Aviation Administration. Thomas Haun is Vice President of Strategy and Globalisation.

What is the potential size of the drone market?

Estimates place 12% of the global drones demand to be commercial in the near term. In dollar terms, this would translate to anywhere between \$7-10 billion market in the next five years. Market analysts also say that precision-agriculture farming will account for more than 70% of the commercial drones market.

Is there pent-up demand now?

We have many partners and customers who are coming to us every day asking 'how can I start flying?' and 'how can it happen sooner?' The exemption process in the US is a good process today, but it does take time. The proposed rule will create a lot of value by unlocking that opportunity for more people to begin flying and collecting the data

What will happen when the FAA [Federal Aviation Administration] regs are ready? Is that enough to let the market grow or do other rules (such as state and more local rules) play a role too?

The airspace is federally managed, so the FAA rules will be the determinant of what is acceptable use. There are things in the FAA rule that I think they want to expand further, such as flying beyond your visual line of site; however, there are state rules that are coming up so it will be interesting to see how those enable broader use of UAVs or restrict the potential opportunities for UAVs. We as an enterprise would like a unified framework which would make it the most straightforward to ensure that we are doing everything we need to do to comply with regulation and to do so safely.

We have many partners and customers who are coming to us asking 'how can it happen sooner?'

How difficult has it been for you to develop and test your systems in the current legal environment? For instance, have you had to test in Mexico or Canada?

At PrecisionHawk, we are fortunate because we have global reach, so with that we have had a head start. Our early presence in Canada and Latin America has given us access to a market that is further along in their

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PrecisionHawk's Lancaster UAV weighs 4 pounds and has a 4 foot wing span

Continued from page 1
development of regulations regarding UAVs. That head start has allowed us to test newer designs, augmented functionality and push our own capabilities.

What other legal issues do manufacturers and users face?

This is where we start to get into many different legal frameworks whether they are federal, state, international. This is where a unified framework for a company like PrecisionHawk will create a lot of value and opportunity. We believe that educating our operators on all of those frameworks takes a significant amount of resources, so by operating under a unified framework we can ensure that everyone flying a PrecisionHawk

That head start has allowed us to test newer designs, augmented functionality and push our own capabilities.

UAV is trained properly and operating safely no matter the environment, both domestically and internationally.

Are there enough lawyers around with a sufficient knowledge of the areas that affect drones?

It is important to note that different governments are going to come at this with a different pace. So it is upon industry to make sure that we continue to push the market forward because if there isn't a commercial use case and a viable benefit for UAVs, or any technology for that matter, a regulator will not be willing to introduce the risk. It is upon industry to make sure we are defining that benefit very clearly and on a global scale so that regulators understand the benefit of our technology.

to make more informed decisions in a cost-effective way. In its consultation, the Authority says: 'We are particularly keen to understand how the regulatory environment can be supportive of technology-based advice models that can meet consumer needs at low cost.'

Tobin Ashley, an insurance specialist at Pinsent Masons, says that the regulator's moves represent 'an opportunity to refine some of the rules and guidance on financial advice to cope with the new kind of services made possible by technological advances'.

Pensions are one of the most complicated areas of financial services. Systems developed through robo-advice could, for instance, let someone see what pension income they could expect if they changed their retirement date or how their pension might perform at different levels of inflation and investment returns.

Global timeline: what to expect on drone regulation

December, 2015	Ireland
Irish Aviation Authority expects to update and reissue its national drone legislation pre-Christmas	
December, 2015	US
Department of Transportation hopes to launch its drone register for UAV-users, to meet rising public concern about near misses	
By end of the year	France
Privacy body CNIL expects to produce draft of new consumer guide, outlining basic rules for the public on drone use	
Early 2016	US
FAA regs expected - drone flying to be permitted	
By early 2016	Bahamas
Drone regs expected to take effect - being brought forward by Bahamas Civil Aviation	
2016	Australia
Lighter regs for commercial drones under 2kg - from Civil Aviation Safety Authority	
2016	Europe
RPAS framework - to implement March 2015 Riga accord	
2018	Global
ICAO standards - international standards for use to develop national guidelines	
2016-20	US
FAA - airborne sense & avoid systems - initial certification	
2020	Global
International spectrum identified - for LOS and BLOS C2	
2030	Global
50% of military air power could be drones (says NATO)	
Global timeline: What has happened so far on drone regulation	
2015, October	US
2,000th exemption licence (s333) given for drone flying	
2015, September	Finland
Finnish Transport Agency introduces what it says is 'one of the most liberal aviation regulations in the world' for UAVs	
2015, September	Japan
Amendments to Civil Aeronautics Act regarding drones: Regs include bans on UAV use over residential areas	
2015	Indonesia
Regulation 90/2015 from the Transportation Ministry takes official effect: Indonesian Press Council says that the rules could restrict use of drones in journalism	
2015, September	EU
End of European Aviation Safety Agency consultation on drones - Key part of moves towards EU regulatory framework	
2015, August	US
National Telecommunication and Information Administration started work on drone privacy voluntary standards	
2015, August	New Zealand
Updated drone rules - risk-based	
2015, August	US
1,000th licence (s333) given for drone flying - exemption licences to the general ban operated by the FAA	
2015, July	EU
European Aviation Safety Agency published condop - basis for EU regulatory framework	
2015, July	South Africa
CAA regs take effect: drone flying became legal	
2015, June	EU
Privacy rule recommendations from Article 29 Working Party	
2015, June	Singapore
Drone rules took effect - permit system coming into effect for commercial drones and others other 7kg	
2015, March	Europe
Riga Declaration ('Framing the Future of Aviation') signed, paving way for 'drone services everywhere in Europe as from 2016 onwards'	

UK regulator expected to endorse AI advice schemes

One of the top UK regulators is consulting on the way AI can be used to deliver advice to consumers. The Financial Conduct Authority is asking for contributions to its 'Financial Advice Market Review' consultation by 22 December. A part of the consultation relates to the use of 'robo-advice' as a way of helping individuals understand their options on pensions and other financial products. Advice given this way can, for instance, let people feed in their own details and see how their finances would perform under different scenarios.

The regulators see this kind of system as a way of enabling consumers

Driverless cars - the issues that the regulators are missing



Philippe Crist

Philippe Crist of the International Transport Forum at the OECD (Organisation for Economic Co-operation and Development) believes that regulators have to prepare for

opportunities which remain unknown at the moment for driverless cars. An economist, he is the lead author of the Forum's report 'Automated and Autonomous Driving - Regulation under uncertainty'.

While some of the road traffic and licensing rules are being developed, it seems as if other regulatory aspects are not being developed pro-actively. Can you explain what is happening here?

There are two types of regulation. The regulatory focus, where it exists, is on the framework for operating on the roads. We are not terribly behind in that area. There is also a lot of heterogeneity in that area....Of course it could be better but it's a complicated field. But, at least, people are thinking about it.

Where we are not seeing any action is in anticipating how these vehicles will be used. It is our experience that they will be used in ways that many in the industry and in government are not anticipating. So there is a possibility that we will be blind-sided. There will be a lot of use cases that will be quite innovative but which would be illegal if the regulation does not develop. Taxis, for instance, is a very highly regulated sector. It is struggling to deal with new services, let alone new technology. It's highly likely that self-driving vehicles will be used in a fleet – so they will be running in direct competition with taxis and public transport.

The real risk is that you will have highly conflictual entry into these markets – as we are seeing with Uber. For instance, if Transport for London or Daimler want to run a fleet of self-driving vehicles they would not be able to do that in London. The same is true in Paris or Bombay and in other cities.

What should the next step be for transport regulators?

They will have to think about how these technologies will be used in cities and outside cities. They are not incremental technologies. They will be used in ways that we can't anticipate. Do not expect that you are going

there is a possibility that we will be blind-sided



GENEVA - MARCH 3, 2015: Rinspeed Budii Concept autonomous car based on all-electric BMW i3 presented at the 85th Geneva International Motor Show.

to change the technology and everything will stay the same. Everything will change. You should go back to first principles on the regulation of your public transport and taxis. You should ask if that regulation is future-proof. You need to make it future-proof so that the new uses can evolve. The cities that do that will be able to take away many advantages from the technology. The cities that don't will be mired in contentious litigation.

Taxi regulations quite often have quantitative restrictions on them. So taxi drivers purchase licences – and there can be a shadow market in the price of these licences (or 'medallions'). In Paris you can pay €500,000 for a medallion. So the transition away from that system can be difficult. One way is to have some kind of tax or fee on services which can be used to help buy back some of these medallions.

How long does it take to introduce this kind of regulation?

It can be done quite rapidly - as in the Philippines recently.

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?

In a country with the ability to file class action law suits – particularly the US – you could see that happening quite soon.

Are there any other particular approaches

you would suggest to regulators?

A lot of the discussion is focusing on the benefits and risks. On safety, it is often said

that human error is involved in 90 per cent of fatal crashes. But, with most drivers, they spend the overwhelming part of their time not crashing. The real technological challenge is to replicate all the good choices we make. I imagine that you will see new crash situations emerging. You will have to have new crash management strategies in place in order

to handle some of the negative outcomes or unexpected events that happen.

Google, for example, in its 'Self-Driving Car Project', has limited the speed to 40 km per hour. That is sensible. You don't know what crash situations might occur but you do know that a vehicle travelling at 40 kph will cause a lot less damage than a vehicle travelling at 80 kph.

How do you see the regulatory side developing for drones?

There you also have to think about unexpected things that go pear-shaped. Some locations are limiting the context in which drones can be used. Many are, for instance, limiting the weight. If something falls, it is far better if it weighs 2 kg than 20 kg.

It is an area in which we are starting to think about the safe use of public air space in cities and outside cities. It is a technology that changes the feel of cities if it is deployed. That is something we have to think about. Is it reasonable for our skies to be filled up that way or not?

Working with the industry



Edouard Geffray

How is the French privacy body, CNIL, the Commission nationale de l'informatique et des libertés, approaching the issue of drones? General Secretary Edouard Geffray explains

Are you starting to receive enquiries about drones and privacy?

We have not received a lot of complaints. But we do have a lot of calls from companies and individuals asking us for tips, advice and guidance so that they can be compliant. Our approach is more one of education and advising rather than handling complaints. We receive about 100,000 calls a year in total at our call centre. Several hundred of them are on the subject of drones.

We are not against drones, which are innovative tools and bring news services. We have to find a good balance between promoting innovation and respecting privacy.

Are you planning to issue special rules at some stage?

We don't really need special rules. There are already rules of general relevance. There is Article 9 of the Civil Code which protects privacy in a very general way and which is applicable to drones or smartphones or whatever else. Then there is the French Data Protection Act on collecting personal data which also applies to drones - for instance, when a video or a sound-recording application is placed on a drone. And there is the Internal Security Code which has a framework for the use of videos by public services (the police etc). These legal rules taken together are sufficient regarding privacy. What we do need are more guidelines and good practice statements.

Individuals want to know how they should use drones - over the gardens of their neighbours, for instance - which is forbidden! They don't know about the operational aspects.

What research are you involved in?

There are three areas. We have already met with the Direction générale de l'aviation civile, the DGAC - the French civil aviation authority. We have



produced a ten-point document with them on what you should know when you use a drone. One of those points is about privacy.

We are now working on some specific information that could be provided by manufacturers to people or companies who buy drones. So when you buy a drone for leisure use you would ask for this information which would tell you what is possible or not. We are currently working with manufacturers on this and on how it would be disseminated. We expect to issue a first draft by the end of the year.

And we are also looking at what can be done when drones fly over an area and the way in which individuals can be informed about that. If a video drone has flown over you, you should be able to see the images taken. You have rights of erasure of those images - but to make those rights effective you need to know who has flown over you. But there are more and more small drones and it is very hard to identify where the transponder is. We are thinking about a system in which a list of drones that have flown over a site is available on a website. So, for instance, as regards Brest, you would have a

complete list of drones flying over Brest that have been authorised by the civil aviation authority. You could say that X company has used a drone to make a video over my garden - so I have the right to access that video and to ask for it to be erased.

The other field we are looking at relates to investigations. The competent authority here depends on the location and the circumstances. We would be the competent authority to investigation video systems - but only if they are used in public areas. A judge would be the competent authority in a private area. We now need to find a way to ensure a smooth divide between the public and private aspects.

Do you think that sound is going to become more of an issue in data protection?

More and more systems are coupling video equipment with sound recording. So I think that it will probably. It is a point of vigilance for the CNIL.

Are you trying to develop rules on an international basis in this area?

From the civil aviation authority perspective, the DGAC is already working with its counterparts in Europe. We are working with our counterparts, the other data protection authorities. We have adopted the opinion on drones of the EU Article 29 Working party [Opinion 01/2015 on 'Privacy and Data Protection Issues relating to the Utilisation of Drones']. That opinion converges with the CNIL position which is to work with manufacturers and users to embed privacy by design.

What are you doing regards driverless and connected cars?

We have been working on the launch of a compliance pack for about a year. We have already done this in other sectors - in the banking sector and with connected houses, for example. So now we are doing that for connected cars. We got all the stakeholders - the application developers, car manufacturers and so on - and put them round a table in January. We told them that we want to define best practice in order to develop privacy by design. Some of them were a little skeptical at first. But we told

them that their business models need to be built around protecting personal data - and that, if they did not do that, they would fail. They understand now what is at stake. We hope to have some conclusions in January or February of 2016.

Next issue: Office of the Privacy Commissioner of Canada

More and more systems are coupling video equipment with sound recording... It is a point of vigilance

Drones, sound recording and privacy



by **Mac Macmillan**
of **Hogan Lovells**

Mac Macmillan

One of the advantages of having a general data protection law, rather than sector specific legislation, is that when new technology comes along which processes personal data, there is an existing body of law regulating that processing. Working out how to comply with those rules in practice can, however, be something of a challenge. Sound and video recording via drones is a case in point.

It has long been recognised that sound and video recordings may constitute personal data and as such are regulated by the UK's Data Protection Act 1998. Businesses using call recording or CCTV are accustomed to the fact that any recording must be proportionate and for a specified purpose, the purpose must have a legitimate basis and individuals must be told about the recording.

In a static environment these requirements are relatively easy to satisfy. Callers to a call centre are informed that their call may be recorded "for quality and training purposes". Business premises will typically display a CCTV image with a legend such as "for public safety and crime prevention". Although compliance with subject access requests usually requires supporting information such as the time window in which recording of an individual occurred, the individual will usually be able to provide such information, as they will be aware of when they were recorded.

Drone operators filming or recording in an area need to consider how they will comply with these obligations. A commonly raised problem is how one can practically give notice to individuals that they may be being recorded by a small moving object, and tell them who to contact with questions. The nature of some commercial drone operations means that data protection compliance is relatively straightforward for their operators. For example drones used for monitoring railway infrastructure or agricultural activities are likely to be operating in pre-defined locations, meaning fixed signage may

be a fair means of providing notice. Such drones are also less likely to lead to "collateral intrusion", recording images or sounds which the drone operator picks up without intending to. Moving into wider public areas will still present a challenge. A television company using a drone to film a demonstration will likely benefit from the exemptions available for journalism, but no such exemption would exist for drones filming road or pavement infrastructure for maintenance purposes. How can one inform passers-by or local residents that they may be incidentally recorded in those circumstances?

Sound - extra difficulty

Sound recording raises an additional difficulty, which is that recording which captures individuals' private conversations is also likely to be harder to legitimise. Commercial use of CCTV is commonly justified on the basis that it is for a legitimate interest of the data controller (usually that of crime prevention or public safety), but this basis requires that the processing should not cause unwarranted prejudice to the rights and interests of the data subject.

Recording the content of a private conversation is far more intrusive than mere images, and so less likely to be legitimate. Even if individuals can see a drone, they may not be able to tell its purpose: is it merely delivering a parcel, or recording images or sounds?

Non-commercial uses are more likely to have unintended or unthinking privacy consequences. Readers may be familiar with the recent story of the Twitter user who

entertained herself during a flight delay by tweeting the conversation of a couple on the same flight who were in the process of having a very messy break-up (apparently followed by a drunken reconciliation). The author of the tweets appeared untroubled by considerations of the couple's privacy. One can imagine some hobbyists taking the same approach to an inadvertently recorded conversation. To date the plane break-up couple has not been identified, but the addition of sound, even without images, could be enough to enable identification by their acquaintances. What would be the legal position here?

The Ryneš case

Until recently the assumption was that a hobbyist drone operator would fall within the "domestic purposes" exemption, which says

that the EU Data Protection Directive does not apply to the processing of personal data by an individual "in the course of a purely personal or household activity". However the CJEU ruled in Ryneš¹ that "to the extent that video surveillance such as that at issue in the main proceedings [a domestic CCTV system monitoring for vandalism] covers, even partially, a public space and is accordingly directed outwards from the private setting of the person processing the data in that manner, it cannot be regarded as an activity which is a purely 'personal or household' activity" for the purposes of the Directive. This reasoning applies equally to hobbyists operating drones in public spaces. The immediate focus of discussion on Ryneš was whether operators of domestic CCTV systems (and by extension drone hobbyists) would be required to register their processing with the ICO and we are awaiting updated guidance on this point. The application of the Directive to hobbyists also requires them to ensure they have a legitimate basis for their processing. The Ryneš judgment took the view that the householder in the case might consider the protection of the property, health and life of his family and himself as legitimate interests for the purposes of the "legitimate interests" basis mentioned above, but where the drone operator is a hobbyist it seems unlikely that his or her legitimate interest in operating the drone would outweigh the intrusion on people's privacy implied by recording their conversation.

Technological solutions?

The difficulty with this apparently clear protection of people's privacy in the face of the recording is that individuals will struggle to identify the operator of a random drone, and even if they are able to do so, most EU data protection authorities do not have the resources to take meaningful enforcement action in the face of widespread adoption by hobbyists. Given this, they may adopt the approach they have taken in other areas, for example webcam security, and encourage manufacturers to look at ways of making their products more privacy-sensitive. For example a series of different coloured flashing lights could be used to indicate that video or sound recording is occurring. Such technological solutions would alert people to the existence of an intrusion but would not reduce it or assist the individual with identifying the drone operator in order to object. Ultimately we may still be dependent on developing new rules of acceptable behaviour in the drone space, a challenge which the plane break-up story shows we are still grappling with in the context of social media.

Mac Macmillan worked as a software developer before becoming a solicitor. Counsel at Hogan Lovells in London, she specializes in all aspects of IT law with a particular emphasis on data protection.

Footnote

1 Case C-212/13 Ryneš v. Úřad pro ochranu osobních údajů

...most EU data protection authorities do not have the resources to take meaningful enforcement action in the face of widespread adoption by hobbyists

How to fast track patents in the US - and globally



Linda J Thayer is a Boston-based partner in Finnegan, the IP-specialist law firm

Linda J Thayer

The patent process has gotten a bad rap in recent times. Skeptics question whether it is worth it to file for patents on fast-moving technologies like robotics when the patent may not issue for three or more years when the technology may already be obsolete or at a minimum surpassed. Recent developments in patent law before the Supreme Court, placing the validity of many existing patents in question, have not helped change this sentiment.

Does this have to be the case? Is there a way to have your patent application granted quickly? Fortunately, there are many techniques for expediting the process of obtaining patents from the U.S. Patent and Trademark Office (USPTO).

1. Know Before You Go (Ahead)

Well-drafted patents and claims have a much easier time succeeding before the patent office. Patent counsel that knows both the patent legal landscape and the technological field of your inventions well can help your inventors isolate the company's crown jewels and craft claims to have just the right scope. Pre-filing searches can reduce costs in the short term by identifying applications that perhaps not be filed. If the decision is made to proceed with filing, pre-filing patent search results are also very useful in determining focus and patentable subject matter. While it is not possible to locate and pre-empt all challenges to validity, searching for and addressing prior art before filing will make for a stronger patent and help reduce the odds that your patent will be invalidated later on.

2. Use Track One Prioritized Examination

Once you have decided to file and identified key technologies, it pays to use the shiny new tools being offered by the USPTO. Touted as "America's competitive edge", the USPTO introduced in 2011 the new "Track One" program which provides accelerated examination to anyone



who pays the fee, and completes the few requirements. The fee is \$4000 for large entities, but only \$2000 for small entities (those entities with less than 500 employees). Under Track One, the USPTO guarantees examination and issuance of a patent (if the invention is worthy) within one year. The author has obtained a patent in 8 months from filing, which is on par with the USPTO's advertised average for this program.

Track One gives your application special status with fewer requirements than the current accelerated examination program and without having to perform (and explain) a pre-examination search, a requirement that plagued other types of prioritized examination. Applications may have only thirty claims, four independent claims, and no multiple dependent claims. Applicants also must agree not to take extensions of time. But if you are looking to accelerate grant of a patent application, this is a great option!

3. Interview the Examiner

Ideally, your well-drafted application speaks for itself, and the examiner understands immediately the novelty of your inventions. The written word, however, is rarely as effective

as personal communication. To encourage patent applicants, through their counsel, to talk to and educate the examiners about the invention and the prior art in the relevant field, the Patent Office has initiated cost-free programs designed to advance compact and efficient prosecution. Under the First Action Interview Program, participants may talk to the examiner before the examiner issues a first communication. Such one-on-one conversations at the beginning of the prosecution process often facilitate early allowance of an application. As of July 2015, roughly 30% of all applications using this program were allowed after the interview. With no fee associated with the program, what's not to like?

4. Use Allowances As Springboards to Build a Global Patent Portfolio

If your business is global, you may consider filing for patent applications in other countries. After you get at least one claim allowed in a first country, you may request accelerated examination in a second country by using the Global Patent Prosecution Highway (GPPH). Both countries must be members, but by July 6, 2015, the GPPH program included 21 member countries, including most robotics hotbeds. Using the GPPH, patent applications filed in Korea (after an allowance in the U.S.) enjoy higher allowance rates (89% v. 66%) and are granted more quickly (in 5 months v. 21 months). Applications filed in Japan after an allowance in the U.S. are processed much more quickly and issue in about seven months instead of over two years.

5. Fast Allowance Equals Competitive Advantage

Pursuing an aggressive strategy to obtain patents quickly can help a company develop (or maintain) a competitive advantage. Using the Fast Track program on a first application is especially helpful in determining the scope of patentable subject matter. The prior art found during the search and the examination process can steer subsequent applications in a fruitful direction, and these applications are then more likely to issue quickly too.

Issued patents can help companies get funding, or increase company value during acquisition. Issued patents can be a tool for erecting fences around a market segment. Even if your company is litigation-adverse, it is better to be the one building the fence than the one being fenced out.

...it pays to use the shiny new tools being offered by the US Patent and Trademark Office

Is the EU exposed on the copyright of robot creations?



Madeleine de Cock Buning

Some robots are capable of designing software programmes and even (although this will be disputed) of contributing to the creation of works of art. But, under current laws, such works may not have copyright protection in the EU. Madeleine de Cock Buning is Professor of Media, Communication & Copyright Law in The Netherlands and also works at the Centre for Access to and Acceptance of Autonomous Intelligence (CAAAI.eu). She discusses some of the copyright issues

relating to works created by robots with Neasa MacErlean.

How important is it to start addressing now the issues of ownership of works created by robots, AI systems and other forms of robotics? How much is at stake from a commercial perspective?

It's very important. This is the right time to start thinking about the IP (Intellectual Property) issues. Rights can be very valuable, as can be the output. More and more robotics and Autonomous Intelligent Systems (AIS) systems are now able to create or invent. Recent advancing technology in the domain of AIS has led to machines that are capable of learning and creating. Although creativity is a property that is traditionally reserved as a human value, the advancement in the level of complexity of AIS seems to be making human intervention in the process of machine creation more and more redundant. Some of these systems are able to create works of authorship, software and some are even capable of inventing better versions of themselves.

Let me mention a few examples:

Researchers in Cambridge and Zurich recently developed a robotic system that can evolve and improve its performance. The robot learns to build a better version of a simple "baby robot", consisting of plastic cubes with a motor inside, each time it attempts the process. The mother robot assesses how far its babies are able to move and – with no human intervention – improves the design so that the next one it builds can move further. The mother robot has built ten generations of children, with the final version moving twice the distance of the first before its power ran out. The work is published in the journal PLOS One1 The researchers want to develop robots that are capable of innovation and creativity.

In May this year, two scientists from

the University of Tokyo published a paper² in which they introduced an algorithm that can reconstruct – or create – an image based on a "Bag-of-Visual-Words", a technique whereby images are dissected into groups of pixels that are given a visual word. Google uses this technique to sort through images. The two scientists turned this process around, constructing images from different words. The algorithm managed to reconstruct images, but was also able to create entirely new images based on descriptions such as 'boat on a beach' or 'bus on a field', although the images are not yet very clear.³

*The Painting Fool*⁴, developed by Simon Colton challenges our perception of creativity as a human quality.⁵ Colton aims to research whether software can be accepted as creative in its own right.⁶ In an exhibition called "You Can't Know my Mind"⁷, a program painted portraits of the visitors. The portraits were influenced by the 'mood' the program was in, which in turn was influenced by newspaper articles it had read that day. If the newspaper articles were generally positive, the atmosphere of the painting would be positive (more vibrant colors); if the newspaper articles were negative, the painting would be gloomy. On some occasions, the program was in such a bad mood, it actually refused to paint. The program sets itself a goal at the start, and attempts to achieve that with the painting styles it has. After completing the painting, the software self-assesses to see whether it has achieved the goal it set itself.

It is therefore very important to address these issues now. Not too early, not too late. When robots are functioning autonomously, the whole IP area has to be re-evaluated because,

under current rules, there has to be human influence in the output. If there is no human influence, there is no copyright protection.

What is the current situation regarding ownership of works created by robots? How much does it vary from country to country?

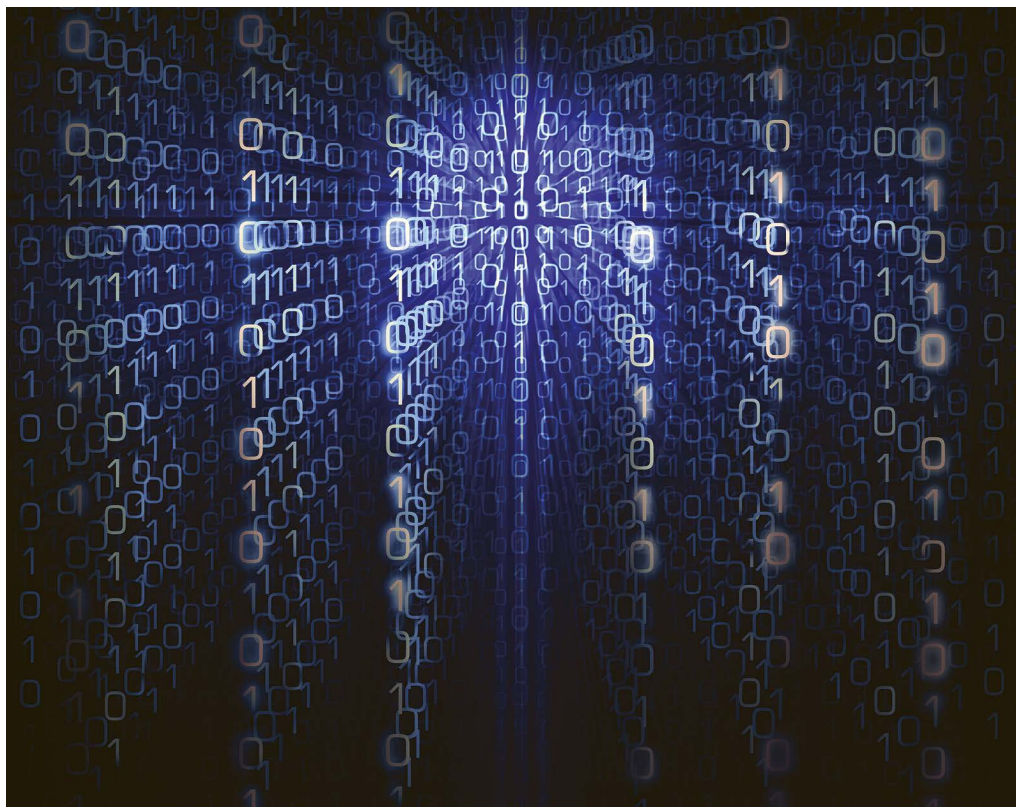
Obstacles arise immediately if a creator or inventor is an AIS rather than a human being. Questions arise both as to the protectability of independent autonomous creations against plagiarism and as regards the ownership of rights for such works. For instance, what are the legal requirements for copyright protection of a robot creation? And who would be the owner of such work? Since various European directives have over the years largely harmonized the national IP regimes, the European legislative framework and the case law of the European Court of Justice (ECJ) are the main sources for answering these questions. In line with the ECJ decisions on the Infopaq case, the threshold of protection for copyright is harmonized by the requirement that the authors own intellectual creation: this implies the need for human authorship. Also, some form of human authorship can probably be established in the current AIS output since these systems do not yet constitute fully autonomous, general-purpose artificial intelligent creative agents - as they lack the complete planning capabilities that would be needed and the capacity to start initiatives from scratch. Developments are going very fast, however, as the examples I mentioned show.

In so far as (partial) human authorship is involved in the creation of works, the ownership of them will vary from country to country since rights ownership is not harmonized within the EU. It can either be the creator of the software who is deemed the owner of the rights; or it could be the owner of the software; or it could be both. It can also be the entity or person who invested financially in the software. This topic leads to very complex ownership questions. New rights can however not be created by national states since copyright belongs to the *acquis communautaire* as confirmed by the CJEU (European Court of Justice) in the Football Dataco case.

Could the EU lose out to other jurisdictions because of the uncertainties over copyright?

The threshold for copyright is lower

It will be easier to protect anything which is created (partially) autonomously in the US. That puts the US at an advantage.



in the US. So it will be easier to protect anything which is created (partially) autonomously in the US. That puts the US at an advantage. This situation could be an incentive for Europe to start protecting these works. IP is largely harmonised in Europe but, for instance, the ownership aspect is not harmonised. It would be better if we could deal with it in a harmonised way.

Your organisation specialises in this area. What do you do? What are you looking for?

At our organisation, the Centre for Access to and Acceptance of Autonomous Intelligence (CAA.AI.eu), we are working at the forefront of the interface between law and disruptive technology. We answer questions from industry and from Brussels. We focus on the constant need to evaluate the law as it is affected or overtaken by developing technology. We are looking at models for optimization of the legal framework by answering questions such as; is innovation hindered because the law is being left behind? Are authors and inventors provided with enough incentives to create and invent? Are consumer interests being sufficiently protected? All these aspects have to be considered for consumer acceptance of and full access to these technologies which are extremely valuable for society.

What would be the best way of resolving the issue? Should robots themselves

be given rights to own their works - or should it be the owners of the robots?

That is a good question with no easy answer. Generally speaking adaptation of the legal framework to the introduction of disruptive technologies has become an ever larger challenge because change is happening so quickly. It is important not to legislate before the technology is sufficiently developed because you can easily get things wrong and we want to avoid innovation being blocked by legislation. But we have had more than just a glance at this new technology. Furthermore, we can learn from earlier developments in law caused by the introduction of technology. This is especially true for copyright. Think of the introduction of photography and software within the copyright framework. What we will see is that after the importance of copyright protection is first generally denied, with the coming of economically valuable output of AIS there will be a lobby

for its protection. When this moment arrives we will be better placed to come up with sound ideas for protection regimes and to avoid the difficulties of correcting mistakes as were made with the introduction of photography where unfounded exemptions were made that denied the full potential of photography. If we do not want to rush to legislate then contract law, self-regulation and case law are becoming relevant as never before. In my view, European and national legislators should build on technology neutral laws that are primary designed to guarantee fundamental rights, striking a balance between intellectual property protection, consumer privacy and freedom of expression and innovation.

And please note that should we want to give robots rights, they should be legal entities. And there is a long way to go before we will be there. Before that, we should question whether protection is needed or not and how this relates to the foundations of copyright. Do robots need incentives to create? Would it be unfair or unreasonable not to grant them rights? These are the foundations to copyright protection. We could also imagine that other IP rights - such as patent rights or database rights - can play a role here. We should also consider a sui generis right such as a database right that protects the inventor and/or patent protection of the robot.

Could there be tax implications in the future based on the decisions made now? For instance, many large companies have based their HQs in jurisdictions such as Luxembourg because of the tax advantages.

Yes. Tax implications are always relevant as regards the establishment of entities. It is not just Luxembourg that has tax advantages, of course. Large media companies such as Netflix are established in The Netherlands because of regulatory reasons as well as for the tax advantages. It could also be that the strong tradition in IP law could be an advantage of establishment in the Netherlands, let alone the beauty of our capital Amsterdam!

Footnotes

- 1 Brodbeck L, Hauser S, Iida F (2015) Morphological Evolution of Physical Robots through Model-Free Phenotype Development. *PLoS ONE* 10(6): e0128444. doi:10.1371/journal.pone.0128444.
- 2 Hiroharu Kato & Tatsuya Harada, 'Image Reconstruction from Bag-of-Visual-Words', <http://arxiv.org/pdf/1505.05190v1.pdf> (hereinafter Kato & Harada 2015), last visited on 04-06-2015.
- 3 Kato & Harada 2015, p. 11.
- 4 See: <http://www.thepaintingfool.com/index.html>, last visited on 08-06-2015
- 5 Simon Colton, 'Creativity Versus the Perception of Creativity in Computational Systems', http://www.thepaintingfool.com/papers/colton_aaai08symp.pdf (hereinafter Colton 2008), last visited on 08-06-2015.
- 6 'Artificial artists: when computers become creative', *Wired* 07-08-2013, <http://www.wired.co.uk/news/archive/2013-08/07/computers-be-creative/viewgallery/306906>, last visited on 08-06-2015.
- 7 See http://www.thepaintingfool.com/galleries/you_cant_know_my_mind/ for examples of its work.

Who (or what) is to blame when things go wrong?



Scott Ivill



Brian O'Neil

Brian O'Neill QC and Scott Ivill of 2 Hare Court, Temple in London, look at the individual and corporate criminal liability of robots.

Amid a current belief in various quarters of the media that the UK will shortly enter – in some form – substantial military action in Syria, or perhaps even other parts of the Middle East, the thorny issue of which persons or corporate entities may be liable for the acts of any drones or robots used in any such action remains unresolved.

And in a week when a legal storm is already brewing over the use of an RAF drone strike to kill an Islamic State fighter from Wales (<http://news.sky.com/story/1548309/raf-drone-strike-killed-cardiff-is-fighter>), the UK Government may have to look for answers to the vexed question more quickly than it might have anticipated.

Whether either the Government or the courts will be able to get to the answers – or whether the answers will be what individuals or corporations necessarily want to hear - is another matter entirely.

A lacuna in the law

Within the past 12 months, concerns have been growing about an apparent lacuna in the law – both in the UK and internationally - relating to criminal responsibility for actions carried out by artificial intelligence entities which have no apparent direct human involvement. As outlined by Chris Green of the Independent in an article published on 9.4.15 (<http://www.independent.co.uk/life-style/gadgets-and-tech/news/killer-robots-no-one-liable-if-future-machines-decide-to-kill-says-human-rights-watch-10165653.html>), a report by the combined forces of Human Rights Watch and the International Human Rights Clinic at Harvard Law School warned that under current domestic

and international law, liability for unlawful deaths or injuries will be unattributable.

Robots acting on their own volition

The academic research contained in the report raised a number of serious issues around accountability. For example, if a military commander instructed a 'killer' robot to act in a way which amounted to a criminal offence, the commander could be convicted. However, if the commander were to successfully argue that the robot had somehow acted of its own volition, he/she would be unlikely even to face prosecution, still less the prospect of conviction.

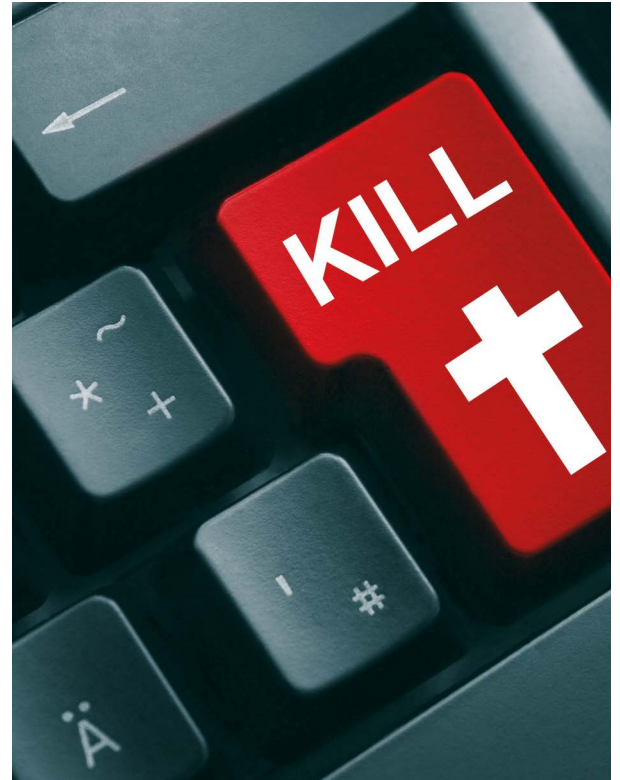
And the conclusion of the report was that, although civil proceedings could be pursued against either the robot's manufacturers or operators, this would of course only result in compensation. This, the report argued, is no substitute for criminal accountability.

As Chris Green also reported back in April, ministers in the UK had argued that there were currently no plans for Britain's military to develop or use robots, drones or other weaponry which were capable of autonomous acts of killing. But that is not to say that such weaponry is not already available, or at least at an advanced stage of development.

Robots that track human targets

Green's article highlighted three different examples of weapons in respect of which the issue of criminal liability may arise if deployed from or by the UK:

- (i) Taranis (a prototype stealth



combat drone for the conduct of surveillance, target marking and air strikes, which is said to be capable of fully autonomous activity);

- (ii) SGR-1 (a guard robot with the capacity to track and engage human targets with a grenade launcher or machine gun, which is said to be currently in use on the North/South Korean border); and,
- (iii) X47-B (an unmanned combat aircraft with a full-sized weapons bay, capable of taking off and landing from an aircraft carrier without "human intervention").

And of course, whilst combat weaponry is the most high profile potential use of robotic equipment, the use of automated equipment is also becoming more widespread across all spheres of everyday life. The issue of driverless trains has caused a storm of protest from transport unions, and driverless cars may soon to be appearing on our roads. Increasing automation in industrial premises of all kinds is taken as read: robots are already programmed to operate in manufacturing industries. Some of you may already own a 'robotic' vacuum cleaner.

Supposedly all of this equipment will make our lives safer, cheaper, easier more convenient. But what happens when something goes wrong and who would we be able to hold responsible?

a guard robot with the capacity to track and engage human targets with a grenade launcher or machine gun...is said to be currently in use on the North/South Korean border

Destroying the evidence?

We return to the current military questions. According to Green's analysis, if an automaton of any kind were to commit a war crime, its commander would have a number of escape routes from justice. Chiefly, as Professor Noel Sharkey (renowned roboticist at Sheffield University and co-founder of the International Committee on Robot Arms Control) told the Independent, the key evidence could simply be destroyed. "If you wanted to use an autonomous robot to commit a war crime, the first thing you'd do is blow it up, so nobody could do any forensics on it."

And if matters progressed as Sharkey anticipates, in the not too distant future warfare will be conducted by robotic gun ships engaging the enemy by communicating between themselves to select targets for a 'kill' – without the need for any human intervention to control the individual 'kill' decision.

Campaigners fear that even if human commanders knew that a robot drone was about to commit an unlawful act, in a number of circumstances the human could be powerless to intervene against the machine once it was set on its course.

So where does this leave man's defence against machine?

This is the topic being given anxious scrutiny by Government and corporate lawyers following the publication of the Human Rights Watch report (Mind The Gap: The Lack Of Accountability For Killer Robots, 9.4.15).

Legal obstacles

The report outlines a variety of legal obstacles which HRW says make it likely that humans associated with the production or use of such weapons – and thus by analogy, automated equipment deployed in commercial and other security situations as well as during warfare – would escape liability for any injury, suffering or damage caused by the equipment.

Firstly, what about the question of the relevant mens rea, a key element of the majority of offences which would be likely to arise? A fully autonomous device could not be held accountable for any criminal acts which it might carry out, since the autonomous device would be incapable of forming any relevant mens rea.

And even if jurisdictional amendments were made so as to expand the description of 'natural person' to somehow encompass a machine, a robot would not be deterred

by any punishment because it could not appreciate its meaning. Computer says no!

Unless deliberate misuse of the automaton could be established on the part of, for example, a commander or programmer, the HRW report argues that, in most cases, it would be unreasonable to impose criminal punishment on a programmer or manufacturer who might not intend, or be unable to foresee, the unlawful acts of a robot.

Actions against the government?

Equally, attempts to use civil mechanisms for establishing liability could be just as problematic. Which ordinary individual could afford to sue the UK Government, for example, or an international manufacturer of arms or even household products? Of course, such difficulties would arise not just on cost grounds but because, for example, in the US the military and its defence contractors have an immunity which would amount to an "almost insurmountable" hurdle to civil accountability; there is also the issue of the technical complexity of unravelling the programming and production methods of any particular automaton, particularly if created for military use.

Before long either the Government, by legislation, or the courts are going to have to grapple with the liability issue. Some interesting ideas have been propounded in recent years by the academic Professor Gabriel Hallevy. As far back as 2010, Hallevy published a paper entitled *The Criminal Liability Of Artificial Intelligence Entities*, in which he examined the question of how criminal liability could be imposed on an artificial intelligence entity and, once such was established, how to address the question of 'punishment'.

Hallevy proposed three alternatives: the Perpetration-by-Another liability model; the Natural-Probable-Consequence liability model; and, the Direct liability model. Of those three, all have potential pitfalls.

Intellectual negligence?

In the Perpetration-by-Another model, Hallevy pointed out that the identity of the perpetrator-by-another could be a key difficulty. Would this be the computer programmer, or the end user? With the Natural-Probable-Consequence model, complex issues of 'intellectual negligence' are envisaged, such as when an automaton commits a criminal act which should have

been envisaged by the reasonable programmer or user, and was, therefore, preventable by them.

As Hallevy argued, this is fraught with difficulty – for example, what happens when programmers or users were negligent but lacked any criminal intent? Only if the programmers or users deliberately 'set' the entity to commit an offence, willfully and knowingly, could criminal liability arise.

In examining the Direct Liability model, Hallevy focused on the artificial intelligence entity itself. As he expounds, to be found criminal liable, a person or corporation must be shown to have both committed the actus reus and any relevant mens rea of a particular offence: there are no other criteria required, whatever "further capabilities" might be present.

Hallevy posed the question: How could an artificial intelligence entity fulfill the requirements of criminal liability? Only if the entity could be demonstrated to have completed both the 'physical' and 'mental' elements of an offence. How could this happen? By design? By programming? By operation? By a combination of all of the above? The legal knots into which arguments about those possibilities could tie up a court could be impossible to unravel. Think about, for example, if one artificial intelligence entity were to have been remotely programmed by another AI?

Ultimately, back in 2010 Hallevy concluded that, with some adjustments, the criminal liability of an AI entity, using a direct liability model, could be made to work in the same way that such liability could attach to persons or corporations. He also suggested that all three models could be used in conjunction as "none is mutually exclusive". His theories bear closer scrutiny and he is far from being the only legal academic to grapple with potential solutions for what seems, at first glance, an almost impossible conundrum.

Whether, five years on from Hallevy's paper, the laws or the courts in the UK will be able to keep pace with the rapidly evolving development of artificial intelligence entities for all aspects of our lives, is what lawyers really want to know. And no one has, as yet, written that programme.

For the full text of the Human Rights Watch report, see: <https://www.hrw.org/report/2015/04/09/mind-gap/lack-accountability-killer-robots>

For the full version of Professor Hallevy's paper, see: <http://ssrn.com/abstract=1564096>

This article was written on 11th September 2015

If you wanted to use an autonomous robot to commit a war crime, the first thing you'd do is blow it up, so nobody could do any forensics on it

Why employers need to prepare for a new age



Garry Mathiason is the founder and co-chair of the Robotics, AI and Automation Industry Group at the global employment and labor law firm of Littler Mendelson.

Garry Mathiason



Many people are worried that increasing automation will reduce the number of jobs we have. What would you say to them?

For the near future, people can relax. If you look historically, the effect of automation and technological advance has been the opposite - that jobs have been created. Whole industries get created. Most of the jobs that are created are at a higher level. There is also a secondary level of job creation - those that follow in the servicing of the growth. I perceive that in the next ten to twenty years, the historical trend of job creation will continue.

Throughout this technological transformation of the workplace, there will be substantial displacement of workers. Within about ten to twenty years, according to one study, 47 per cent of jobs in the U.S. currently performed by people will be done by robotics and software. As this occurs,

I believe there will be new jobs to take their place. It's going to require retraining and a lot of work to handle the displacement.

The productivity increases that come through robotics and AI will be so substantial that it could enable us to lift the bottom two billion people out of that poverty during the next two decades. The challenge will be finding a path that uses a portion of the coming abundance for this humanitarian purpose.

With this great increase in productivity, there inevitably will be a reduced need for human labor, even at higher levels of skill and education. The "40-hour week" will become a part of history, as have longer work weeks of the past. Currently, many of us identify closely with our employment. With more wealth and leisure time, society will face the monumental challenge of changing our purpose and role in life.

Do you think that there will be sufficient redistribution to remove poverty?

There is an opportunity and challenge that come with the advance of technology. Currently, the wealth created by brilliant machines and increasingly sophisticated software is becoming increasingly concentrated. An innovative software company can be created by a dozen people and in a short time, generate a net worth of a hundred million dollars or greater. I live at ground zero where technology is causing an explosion of wealth - Silicon Valley.

The challenge is to reward the innovators and still redistribute wealth and there are many ways to do that. I am not necessarily suggesting a transfer of wealth through government, although that is one avenue. The progressive income tax and an economic safety net, while in need of repair, already exist. Another avenue is philanthropy. One example is the creation of Singularity University by two wealthy visionaries. They identify individuals who will shape the future and encourage the development of business plans, provided the plan will impact a billion people. Often the business plans that are funded use technology to cost-effectively provide tools and learning focused on underdeveloped nations. For example, Warren Buffett and Bill and Melinda Gates are asking hundreds of rich Americans to pledge at least 50 percent of their wealth to charity. Buffett himself has pledged that 99 percent of his wealth will go to philanthropy during his lifetime or at death. In 2007 alone, nearly a quarter million dollars of U.S. private philanthropy was given to the developing world, ten times the amount of governmental assistance. The challenge of redistribution is daunting and we are going to struggle with it - through government, philanthropy, innovation, and technologies themselves as they bring education, communications, and even food and drinking water to billions.

Are companies preparing for these changes?

There are companies that are anticipating these changes - but there are more that have underestimated the exponential growth of technology and the effect it will have on business. They are less prepared than they should be for the changes that are coming.

One of the missions we have in the Robotics, AI and Automation Industry Group at Littler is to help users of technology anticipate and prepare for

the kind of changes that will happen and the dislocation of the workforce. Companies need to reexamine how they will secure needed skilled labor and remain flexible as business needs change and disruptive technology arrives.

A typical 30-year old in Silicon Valley will already have had nine jobs by the time they've reached that age. The contingent workforce, including independent contractors, has already reached 30 percent of the entire U.S. workforce. About 70 percent of new graduates in the U.S. now anticipate that they will be self-employed at some stage. A fundamental change is happening in which organisations increasingly approach new projects much like the way movies are made. Capital is invested together with management, labor, consultants, and experts for short durations. The project is accomplished and the workforce is disassembled, moving back into the economy ready for the next assignment, most likely with an entirely different organization. Robotics, AI, and other disruptive technologies create an urgent need for these projects and then in an increasingly short time, make the projects obsolete in favor of a newer set of projects or even a new industry.

Staffing Industry Analysts surveys job satisfaction of contingent workers including independent contractors. Attitudes toward temporary employment have shifted dramatically over the last decade. More than five years ago, contingent employment was viewed as lower paid positions, less satisfying than regular employment. Since then, attitudes have shifted. Increasingly, such positions are seen as higher paid opportunities and contingent workers report greater job satisfaction than regular employees. This development mirrors the impact of technology and its exponential growth.

How important is it for employers to start planning ahead? Some employers will think they will not be affected.

It's time for a wake-up call. Disruptive technology is touching a larger number of areas than before - not just manufacturing, but also services. Technology impacts almost every industry and the vast majority of employers. For instance, a hotel has opened in Japan where robots perform 80 percent of the tasks traditionally requiring employees. This maybe an extreme example, but it is also a view of the future. Employers who

believe they will not be affected are destined for disappointment and often extinction. Incorporating a survey of potentially disruptive technologies into long-term planning is not something to consider in the future, it is mandatory now! Assisting employers in both short and long-term planning for the workforce is a mandate of our Practice Group. The employment and labor law issues and solutions are many ranging, from health and safety requirements and the effects of human displacement to privacy, discrimination, and new regulations and legislation.

Disruptive technologies are like a tsunami; they are unstoppable, they will arrive, and they are global. If governments erect barriers, new factories and jobs will move to more welcoming countries. Companies that prepare and anticipate change will weather the transition far better than their unprepared competitors.

What should be the role of government?

The technological revolution is global and happening now. The legislative, regulatory, and administrative arms of government have critical roles as robotics and increasingly sophisticated software enter the workplace, create new industries, and disrupt others. First, governments have historically and continue to promote the development of pure and applied science. In the U.S., many of the advances in robotics started with grants and financial incentives from the Defense Advanced Research Projects Agency (DARPA). For instance, the development of the self-driving car came from a DARPA-financed challenge. Governments also play an essential role, balancing competing interests when, for example, technology threatens worker safety or compromises individual privacy. However, legislation and regulations should be promulgated with extreme care as unintended consequences often occur. Recently the U.S. Federal Aviation Administration issued proposed regulations for drones. Clearly government is needed as air safety and drones (flying robots) can pose a serious threat. However, the draft regulations attempting to ensure safety threaten to destroy or severely curtail the industry by prohibiting drones from flying over people or at night. On construction sites and in making deliveries, it

Throughout this technological transformation of the workplace, there will be substantial displacement of workers.

would be nearly impossible to avoid flying over people. Also night flights over roofs are necessary for thermal imaging identifying leaks. The FAA is understandably concerned about collisions yet in 2015, multiple collision avoidance technologies became available. As a consequence of the FAA's limitations and delays, Canada has become a world leader in drone technology. This was demonstrated with the Nepal earthquake when Canadian drones were used to guide first responders in finding survivors and mapping the destruction.

Another concern in defining the role of government is the potential for it to be used to preserve the status quo. In an effort to protect jobs, some nations have enacted limitations and barriers to technological displacement. In a global economy, such efforts are counterproductive as new factories and investment will quickly move to a country or state more accepting of robotics and other technology. The new plants built using advanced technologies may employ fewer workers than current plants, but they still employ people. Accordingly, the effort to keep the status quo and protect jobs merely causes the closure of older plants with the more efficient plants and their accompanying jobs to migrate to a jurisdiction more accepting of the new technologies.

The good news is that in the European Union, a thoughtful study was commissioned by Parliament to address the need for regulations in promoting robotics. The report recommended no new regulations in many areas, letting the marketplace and existing laws suffice. Limited suggestions were made for safety and to preserve privacy. In the U.S., the Congressional Robotics Caucus has been a forum for learning as opposed to reactionary legislation. Littler's Robotics, AI, and Automation group is committed to informing employers about new and proposed regulations and legislation, as well as the application of existing workplace laws. With this assistance, the inevitable march of technology into the workplace is enabled while meeting legal compliance requirements.

Littler Mendelson: Based in San Francisco, the firm specialises in employment issues and acts only for management. It has 60 offices in the US, Canada, and Latin America.

Next issue: View from Germany by Annabel Lehnen of Osborne Clarke

If governments erect barriers, new factories and jobs will move to more welcoming countries.

China prepares to become a world robotics power



Eddie Hsu

Eddie Hsu, Shanghai-based of counsel at Dentons, looks at China's plans to become a world manufacturing power in 'numerical control tools and robotics'. The State Council included this area as one of ten it will develop in this way as part of the 'Made in China 2025' plan announced in May

What new developments do you expect to see in the robotics sector under the "Made in China 2025" plan? Could it be transformative? And will it mean more East-West interaction?

The Chinese government recently announced a "Made in China 2025" plan which is aimed at shifting China's manufacturing industry from low-end and labor-intensive manufacturing to sophisticated and high-tech production. The policy will place specific emphasis on ten industrial sectors, including the robotics sector. This plan has paved the way for new tax refunds and subsidies for robotics companies, which are aimed at assisting Chinese companies to establish "manufacturing innovation centers" to foster the development of technologies related to robotics (and the other nine industrial sectors).

The developments in these sectors will likely be a catalyst for greater East-West interaction, given that as the domestic production market expands, western companies will increasingly look to China to purchase technology, including robots. The increase in domestic production could be further amplified through joint venture deals with foreign investors, as long as costs remain lower in China than in the West.

A growing number of companies manufacture industrial robots in China, and in southern China's Guangdong province in particular. According to the Shunde Economy, Science and Technology Bureau, located in China's manufacturing heartland of Guangdong, more than 20 companies in the area currently produce industrial robots. Many are joint ventures with international partners, including Comau, an Italian multinational which specializes in robot and other advanced technologies, and ABB, the Swiss engineering giant.

The 'Made of China 2025' group is to be located in the Ministry of Industry and Information Technology, led by vice premier Ma Kai. To what extent will new infrastructures, rules and standards be implemented?

The Chinese government has stated that it will introduce policies to deepen institutional reforms and strengthen financial support specifically for the robotics industry. No

specific information has been released at this time.

What should foreign partners expect - particularly from a legal point of view? What kind of terms should be incorporated in contracts? Would Chinese or foreign laws prevail?

If a foreign investor collaborates with a Chinese manufacturer, it is highly recommended that the parties execute a contract prior to the initiation of any production or payment under the transaction. The following are some steps that businesses can take to reduce risk when entering into contracts with Chinese parties:

- **Due diligence:** The foreign party would be well advised to perform a basic background check on the Chinese party prior to entering into the business relationship, including conducting basic inquiries and inspecting its business operations. The foreign investor also may request audited financial statements from the manufacturer and confirm its registration with the local Administration for Industry and Commerce.

- **Terms specific to manufacturing contracts:** A foreign company should pay particular attention to the payment, delivery and liquidated damage clauses of the contract with the Chinese partner. Secured payment methods such as bank letters or credit or third-party escrow carry less risk than credit cards and wire transfers. Payment should be made only upon actual delivery of goods to the foreign party. Ideally, to ensure that the purchaser retains control in the overall production, the contract could split up the manufacturing process into phases, each with its own specific targets and monitoring procedures. The contract should establish clear liability for defective products. To minimize the risk of defects, the contracts should also prevent the Chinese manufacturer from subcontracting the production work to third parties.

- **Governing law and dispute resolution:** To ensure that a contract with a Chinese entity will be legally enforceable, it is necessary to identify which body of law, and which court or arbitration system, will govern its provisions. While foreign partners may prefer the law

and courts of their home country, non-Chinese governing law may make it difficult or impossible to enforce the terms of a contract. For these reasons, we often recommend foreign businesses to specify Chinese or Hong Kong law, with a dispute resolution at CIETAC (China) or HKIAC (Hong Kong). Despite China's status as a signatory to the New York Convention, which requires it to recognize and enforce arbitral awards of other signatory countries, including the U.S., Chinese courts will not enforce judgments issued by U.S. courts, making these judgments of little value unless the Chinese party has assets in the U.S. Moreover, some intellectual property ownership, labor law, land ownership and insolvency issues may be required to be governed by Chinese law.

- **Chops:** The official company chop, or seal, is necessary to bind the Chinese company to a contract. However, because chops carry legal authority, there is a risk that a document could be stamped with a fake chop, or with a legitimate chop used without authorization. To ward against the risk of a fraudulent chop, the foreign party could examine the chop for certain characteristics: chops should be round, no larger than 4.5 cm in diameter, with a five-point star at the center surrounded by the Chinese name of the company. The stamp must be made in red ink. The chop affixed to the contract may be compared with other documents previously sealed by the company, or with the company's business license. The foreign party may also send a Chinese attorney to the local government office to compare the chop with the official company seal on record.

Are there many manufacturing-specialist - and robotics-specialist - lawyers in China? Is this an area where a specialty practice will grow? What kind of lawyers might go into this area?

All of the top Chinese law firms have manufacturing sector expertise. In addition, most of the major international law firms present in China, including Dentons, also have substantial experience in the manufacturing sector.

Since robotics is an emerging field, there are no specialists in robotics law per se, but this will likely change as the industry develops.

The type of lawyers that go into this area of law will likely be IP lawyers and corporate lawyers with an expertise and/or interest in IP, technology and manufacturing.

Any final thoughts?

It is an exciting time for robotics in China. For decades, industrialized nations like the U.S., Germany and Japan have been at the forefront of robotic innovation but now China has the potential to lead the way. In the words of Premier Li Keqiang, the Made in China 2025 policy promises to "upgrade China from a manufacturer of quantity to one of quality." Robotics stands to play no small part in this endeavour. Indeed, for Chinese manufacturing, and the robotics industry in particular, this is just the beginning.

Robot hooker, robot wife, robot marriage law



Chrissie Lightfoot

As a lawyer and entrepreneur I am absolutely fascinated as to how the evolution of artificial intelligence (AI) and robotics is going to potentially disrupt companionship, relationships and marriage in both a negative and positive way. It is inevitable, in my opinion, that new law with regard to human-robot relationships will be required sooner rather than later.

For example, let's start with prostitution, 'the world's oldest profession'. In order to gain some insight as to why people will be willing to hire the services of robots for sex (malebots and fembots) and even contemplate marriage with one, I attended a futures conference in early 2014 at which I met David Levy, an AI researcher and the author of a thesis titled 'Robot Prostitutes as Alternatives to Human Sex Workers'.¹ David argues that the arrival of sexbots seems imminent when we consider recent trends in the development of humanoids, sex dolls, and sex machines of various types. I agree.

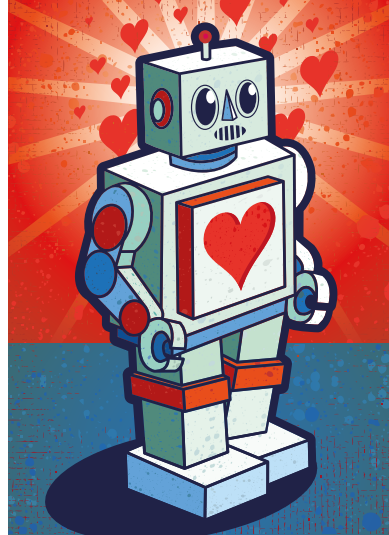
But where will all this sit with 'the law'?

Robot hooker

With regard to sex dolls, Japan and Korea lead the way but the Americans are closing in. Upmarket sex dolls were immediately seen as a possible antidote to Korea's Special Law on Prostitution that had been placed on the statute books. Hotels in Korea were hiring out 'doll experience rooms'. These hotels assumed that there was no question of them breaking the law, since their dolls were not human. Since the sex acts are occurring with a doll and not a human being, the Special Law on Prostitution did not bite.

With sex dolls becoming increasingly 'human' in appearance, touch and relating (comprising AI, meaning the sex doll / robot converses and expresses emotion), it is highly likely that sex entrepreneurs will infiltrate the global 'sex for hire' community swiftly, for the robot sex for hire money-go-round will be too lucrative to pass up.

How will this affect the UK, USA, Japan, Korea and other countries? We will have to address our existing laws on prostitution (and porn), particularly when robots become so sophisticated that we will indeed be questioning what it means to be 'human' and the ethics and morals surrounding the same;



which is a debate that occurred at the University of Westminster, London, UK, 8 Oct this year.

Attitudes and behaviour with regard to relationships, love, sex, sexual exploits and sexual union have changed through the ages in relation to age, gender, ethnicity, and sexual orientation. For example, homosexuality, until very recently, was a taboo subject and societies throughout the world spurned gay men and women. But attitudes have changed. The law followed. Here in the UK, and in some other parts of the world, gay marriage is now lawful. I dare say that if you read in the 1980s / '90s (30/20 years ago) that the UK would grant the Civil Partnership Act 2004 and the USA a similar Act, you may have scoffed and mocked. But here we are in 2015 and so it is.

Robot marriage

We currently live in a world where:

- In divorce proceedings the parties are arguing over who gets full custody of the pet;
- A bridegroom chooses a dog as his best man;
- There are websites where you can 'marry' your dogs;
- Our children adore virtual pets, for example, the Tamagotchi;
- Sex-dolls are available for hire;
- A man says (in real life): 'I've tried having girlfriends but I prefer my relationship with my computer' (anon);
- Men marry their computer game characters/sex-dolls; and
- Gay marriage is lawful.

Human-robot relationships are surely indicative of the way human love / relationships/ sex / marriage are evolving.

Accordingly, I share more of my ideas and predictions that you are reading here in my latest book published last year – Tomorrow's Naked Lawyer: NewTech, NewHuman, NewLaw – How to be successful 2015 to 2045 along with my belief that it is likely that some societies will accept love, sex and even marriage with robots within 20 years. Matrimonial law and family law will need to evolve accordingly.

If you're thinking my ideas are outrageous, think again. Since writing the book in early 2014 and publication later that year, my predictions and insights have been picked up in the mainstream press, media and popular culture, and the topic has, thankfully, begun to be debated, at least in the public domain if not in the ivory tower law walls.

Robot wife

Albeit there have been fictional accounts of human-robot relationships, sex and love recently in popular culture, for example the drama series Humans, and the movies Her and Ex Machina, there have also been real-life accounts of the same, including marriage.

There are, for example, men who already claim to love and/or desire to be married to their robot; see synthetic love and technosexual. Back in November 2009, a Japanese man stood before a congregation to marry the 'woman' he loved, Nene Anegasaki; Nene is a computer game character, a 'virtual girlfriend' in the Nintendo DS game Love Plus, he 'brought to life' as a sex doll. In doing so, he, arguably, became the first man to marry his robot.

It is inevitable that with the rise of human-robot companionship, relationships, sex and love will come calls for the right to marry their robot, forcing law-makers to consider expanding marital rights and lawyers to deal with the disruption and problems that will inevitably ensue.

Is it too far removed that we cannot teleport ourselves into the future 20/30 years from now and imagine reading that the Robot Partnership Act 2035/45 is law?

Chrissie Lightfoot - The Entrepreneur Lawyer, CEO, Entrepreneur Limited, legal futurist, speaker, consultant and writer. Author of Tomorrow's Naked Lawyer: NewTech, NewHuman, NewLaw - How to be successful 2015 to 2045 (Dec 2014), and its prequel bestseller The Naked Lawyer: RIP to XXX - How to Market, Brand and Sell You! (Dec 2010).

Footnote

¹ Levy, D., 'Robot Prostitutes as Alternatives to Human Sex Workers' (white paper), London, 2006. Accompanying material includes: Levy, D., 'Marriage and Sex With Robots', EURON Workshop on Roboethics, Genoa, March 2006; Levy, D., 'Emotional Relationships With Robotic Companions', EURON Workshop on Roboethics, Genoa, March 2006; and Levy, D., 'A History of Machines With Sexual Functions: Past, Present and Robot', EURON Workshop on Roboethics, Genoa, March 2006; Levy, D., 'Love and Sex With Robots', Harper Collins, New York, 2007.

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