

International Workshop

Responsible Research and Innovation in Robotics

Thursday, 12th of July, 2018

[Book of abstracts and presentations]

Organizers:

Inclusive Robotics for a better Society

The City Law School

Universidad Complutense Madrid

Instituto Cajal-CSIC



With the support of:

Santiago Mediano Abogados

CertificaRSE

Neural Rehabilitation Group (NRG)



E-print Complutense:

Responsible Research and Innovation in Robotics

International Workshop.



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Foreword

The INBOTS International Workshop on “Responsible Research and Innovation in Robotics” was held at UCM on the 12th of July, 2018. This workshop was jointly organized by the H2020 INBOTS Project on Inclusive Robotics for a better Society (G.A. No. 780073), The City Law School, Universidad Complutense Madrid and Instituto Cajal, with the support of: Santiago Mediano Abogados, CertificaRSE Project DER 2015-653704-R MINECO-FEDER on Legal-Financial Effects And Control Of The Social Impact For Sustainable Development: The Role Of Labels In The Investment And In The Public Contracts, led by Professor María Amparo Grau Ruiz from the Complutense University of Madrid, and the Neural Rehabilitation Group (NRG).

The **welcome speech** to the Faculty of Law was given by **Faustino J. Martínez Martínez**, Associate Dean for Research and Scientific Policy, Faculty of Law, UCM. **Ignacio Lizasoain Hernández**, Associate Rector for Science Policy, Research and Doctorate Degrees was in charge of the **opening ceremony**.

The **first panel** dealt with Regulation and Robotics. The speakers were **Santiago Mediano**, President of the Section on Robotics, Artificial Intelligence, Virtual and Augmented Reality of the Madrid Bar, Santiago Mediano Abogados and **Enrico Bonadio**, The City School of Law, CITY, University of London. The Chairman was **Juan Pavón Mestras**, Director of the UCM GRASIA Research Group on Agent Based Social and Interdisciplinary Applications, Faculty of Computer Science & Engineering, UCM.

The **second panel** was devoted to Responsible Innovation in Robotics. The speakers were **Luke McDonagh** and **Enrico Bonadio**, The City School of Law, CITY, University of London. The Chairman was **Jose Luis Pons Rovira**, Principal Investigator of INBOTS CSA and Director of the Neural Rehabilitation Group, Instituto Cajal, Consejo Superior de Investigaciones Científicas (CSIC).

For the **closing remarks** **María Amparo Grau Ruiz**, INBOTS WP2 Leader - PI UCM team, Director of UCM IUS-SustentaRSE Research Group, Faculty of Law, UCM, addressed some of the Ethical, Legal And Socio-Economic Issues affecting robotic companies and the potential of taxation to promote their Responsible Research and Innovation.

As directors of this academic activity, we thank all the speakers and attendants for their elevated interdisciplinary dialogue, and Álvaro Falcón for his help with the edition of this Eprint UCM for a broader dissemination of the outcome.

Professor María Amparo Grau Ruiz, Professor Yolanda Sánchez-Urán Azaña

Further information on these research projects can be found on the following institutional websites:

<http://inbots.eu/>

<https://www.ucm.es/proyecto-certificarse/>

Program

18:00 Welcome and Opening

FAUSTINO J. MARTÍNEZ MARTÍNEZ, Associate Dean for Research and Scientific Policy, Faculty of Law, UCM

IGNACIO LIZASOAIN HERNÁNDEZ, Associate Rector for Science Policy, Research and Doctorate Degrees, UCM

18:20 h First Panel: Regulation and Robotics

Chairman: JUAN PAVÓN MESTRAS, Director of the UCM GRASIA Research Group on Agent Based Social and Interdisciplinary Applications, Faculty of Computer Science & Engineering, UCM

Speakers:

Law and Robotics

SANTIAGO MEDIANO, President of the Section on Robotics, Artificial Intelligence, Virtual and Augmented Reality of the Madrid Bar, Santiago Mediano Abogados

Intellectual Property Aspects of Robotics

ENRICO BONADIO, The City School of Law, CITY, University of London

19:20 h Break

19:30 h Second Panel: Responsible Innovation in Robotics

Chairman: JOSE LUIS PONS ROVIRA, PI, INBOTS CSA, Director of the Neural Rehabilitation Group, Instituto Cajal, CSIC

Speakers:

University innovation: strategies for patenting and spin-outs in the field of robotics

LUKE MCDONAGH, , The City School of Law, CITY, University of London

Open discussion with robotic companies: focus on IP issues

LUKE MCDONAGH & ENRICO BONADIO, The City School of Law, CITY, University of London

20:30 h Closing remarks

Ethical, Legal and Socio-Economic Issues affecting robotic companies: towards Responsible Research and Innovation through taxation?

MARÍA AMPARO GRAU RUIZ, INBOTS WP2 Leader - PI UCM team, Director of UCM IUS-SustentaRSE Research Group, Faculty of Law, UCM

Abstracts

First Panel: Regulation and Robotics

SANTIAGO MEDIANO

President of the Section on Robotics, Artificial Intelligence, Virtual and Augmented Reality of the Madrid Bar, Santiago Mediano Abogados

(Slides of the presentation on page 19)

Law and Robotics

AI, Robots & IPRs – An Approach to Ownership

Nowadays, Artificial Intelligence (AI) is tangible and not just the imaginings of a Sci-fi novelist. Concepts such as AI and Robotics are known - or at least familiar - to the public¹, and not merely the preserve of a few individuals (experts). It is now common to hear speak of machine learning (deep learning), word embedding, Natural Language Processing (NLP), Profiling [1] etc.

Unquestionably, some of the many applications of AI and robotics can make our life a lot easier, and, moreover, some AI has already entered our lives [2]. However, AI also presents significant problems in the realms of human safety, health issues, the widely disputed labor challenges, IP protection and liabilities issues [...] all of which must be addressed from a legal standpoint². As already widely experienced, many legal issues arise out of innovation³.

Debate has opened for some time now on issues such as: whether we should include or not Asimov's rules into AI systems' coding; or which restrictions and limitations must apply to determine liabilities; or what kind of intellectual property rights (IPRs) protection rules should we apply to AI created content (and other issues, such as licensing issues), and so on.

Looking closer into IPRs, answers to different problems might be already within the laws of some Member States, although harmonization has not yet been achieved. One of the most important issues, when it comes to the protection of AI systems, is to

¹ Either because they have been highly covered by pop-culture or media.

² Together with, and without prejudicing, the ethical debate.

³ Technology is evolving so rapidly that determining whether we are downhill incline from the peak of inflated expectations or climbing up to the slope of enlightenment, is not an easy task.

determine ownership of IPRs, and, furthermore, when such AI systems are significantly complex, to determine whether the content they create might be propitious to IP protection.

This debate is only beginning, and a unanimous approach should be taken towards determining not only authorship, but also, and most importantly, how AI systems should be considered. Technology is evolving and diffusing so rapidly that our major challenge should be to make sure that we all benefit from these technologies without losing ourselves.

ENRICO BONADIO

THE CITY School of Law, CITY, University of London

(Slides of the presentation on page 27)

Intellectual Property Aspects of Robotics

Robots and Intellectual Property

Robotics innovation often require years of intensive research and financial investments. The lengthy and expensive process of delivering profitable products highlights the importance of, and need to protect, IP rights (including patents, trade secrets, copyright, trademarks and designs) to recoup investments and fend off competitors seeking to capitalise on others' research and development. Robotic entrepreneurs indeed often face competition for investment and end users: which means that having a strategic comprehensive IP plan can benefit such entrepreneurs and help reaching commercial success.

While there are phases within the life of robotic firms where a cooperative and non IP-focused policy (especially at a pre-commercialisation stage) is better suited to support growth, IP strategies are certainly key in shaping and strengthening this industry.

Patents protect innovation and give their owners a monopolistic right to prevent others from exploiting the patented technology. It is a legal monopoly which gives innovators a tool to maximise profits out of the developed technology. Not only big companies in the robotics field do seek patents. Smaller robotic entities also rely on patents to attract investors and protect their investments in technology against larger players. Robotic companies may also rely on the law of trade secrets, especially where the technical solutions they develop cannot be easily reverse-engineered by competitors. This tool could actually prove to be a better option than seeking patents as the legal protection could potentially last indefinitely, as opposed to the limited patent term (20 years).

Moreover, some elements of a robotic device can be copyright protected. Particularly relevant here is the protection of software code embedded in robots.

As the field of interactive robots is gradually expanding, and gets even more consumer-facing in business-to-consumer scenarios, the IP strategies should also focus on the external dimension of such robotic companies and products. This means that firms and entrepreneurs in this field should take into account the opportunity to protect extensively commercial brands and the aesthetic characteristics of the robots. The way this is done is via registering their trademarks and designs with the relevant intellectual property offices. What about trademark registration? How can this IP right add value to robotic companies and their interactive products? In general, registering trademarks is crucial to protect products' goodwill and reputation, especially in business-to-consumer industries. The commercial success of products also depends on a reliable brand that consumers know, trust, appreciate and remember. For this reason, robotics companies with a strong brand name and solid reputation are indeed investing on and registering trademarks, worldwide. Several European robotic companies, for example, have already registered their brands with both national trademark offices and the European Union Intellectual Property Office (EUIPO). It is expected that the number of trademark registrations for both the company names and the specific robotic products will grow further in the coming years, as the industry keeps building up and strengthening a pan-European customer base.

As mentioned, today's interactive robots are becoming much more consumer facing, which means that a robot's physical appearance and its 'look and feel' plays a role in influencing consumers' choice. Robot designs that meet certain requirements, including novelty and individual character, can be registered with the EUIPO, such registrations protecting the ornamental features of the machines. Some interactive robotics companies in Europe have indeed taken advantage of this chance and obtained EU design registrations protecting the ornamental features of products such as vacuum cleaners and grass-trimmers. Also, designs rights may soon be regularly sought by companies active in the field of wearable robots, ie devices that are used to enhance people's motion and physical abilities. Despite having functional elements,

these products may be devised in a way that makes them more appealing to final consumers – and design rights could exactly be the appropriate legal tool in the hands of such firms to protect the eye-catching elements of their products. In other words, these rights may help these companies to keep pace with the likely “fashionalisation” of this area of robotic industry.

Second Panel: Responsible Innovation in Robotics

LUKE MCDONAGH

THE CITY School of Law, CITY, University of London

(Slides of the presentation on page 50)

University Innovation: Strategies for patenting and spin-outs in the field of robotics - Analysing the University Incubator Model in the EU and Mexico

IP protection – via patents, copyrights, designs, trade secrets, trade marks, etc. - is key to the field of interactive robotics.⁴ The lengthy and expensive process of designing, developing, producing and delivering interactive robotic products relies on IP protection to recoup up-front investments and to fend off competitors seeking to capitalize on the R&D investments of their rivals. IP is also important for investment and raising finance: a company subject to due diligence, because of - for instance - a strategic investment plan, acquisition or initial public offering (IPO), will likely have its IP portfolio reviewed as part of this process, with potential investors likely to view robotics firms without a strong IP portfolio as less attractive.⁵ Investors tend to not only want proof of a company's potential for developing promising robotic applications but also a policy on IP protection - i.e. positive indicator of the company's scientific inventiveness and its strategic economic planning.⁶ What is often under appreciated is that universities are some of the most significant innovators in the area of robotics. Does the current EU IP system adequately facilitate innovation in the field of robotics? What are the most important differences between the systems for protecting patents, copyright, trade marks and trade secrets? What are the most prevalent forms of IP protection in Robotics innovation? What is the appropriate role for intellectual property (IP) rights – copyright, trade marks, and especially, patents – in promoting open innovation and social enterprise in the context of university research? How can universities in the EU make the best use of their intellectual and financial resources in

⁴ See for example C. Andrew Keisner, Consultant, Julio Raffo and Sacha Wunsch-Vincent, Breakthrough Technologies – Robotics and IP, December 2016, Economics and Statistics Division, WIPO 2016, available at http://www.wipo.int/wipo_magazine/en/2016/06/article_0002.html.

⁵ See the article "Making Your Robotics Company a More Attractive Investment", in Robotic Business Review of 21 October 2012, at https://www.roboticsbusinessreview.com/unmanned/making_your_robotics_company_a_more_attractive_investment.

⁶ Ibid.

order to encourage social innovation via IP rights? What about strategies at the University level? Can the 'incubator' model provide useful guidance? What can we draw out from successful university spin outs in the EU in the field of robotics?

In this paper I examine insights from the incubator model at European, UK and Mexican Universities.

MARÍA AMPARO GRAU RUIZ

Universidad Complutense de Madrid

(Slides of the presentation on page 59)

Ethical, Legal and Socio-Economic Issues affecting robotic companies: towards Responsible Research and Innovation through taxation?

Taxation can play an important role in promoting Responsible Research and Innovation by robotics companies. In a context of technological change, at different speeds in each sector and with applicable standards varying geographically, the use of a smart mix of voluntary measures and mandatory regulation by public authorities is necessary.

Socially responsible enterprises care for their impact on the environment, the workers and local population, and the governance itself. They can do so in all stages, even when carrying out research and innovation. Adopting this type of commitments may be costly in a competition context. Therefore, there is room to better adjust their tax treatment when they meet the stakeholders' needs. An attempt could, at least, be made in this sense at an European level to define controllable tax incentives with clear requirements on this matter.

Materials

First Panel: Regulation and Robotics

SANTIAGO MEDIANO

President of the Section on Robotics, Artificial Intelligence, Virtual and Augmented Reality of the Madrid Bar, Santiago Mediano Abogados

CONFERENCE

SESSION 2: PROMOTING DEBATE ON LEGAL, ETHICS & SOCIO-ECONOMICAL ASPECTS

“AI, Robots & IPRS - An Approach To Ownership”



3/3/2019

CONFERENCE - AI, ROBOTS & IPRS: AN APPROACH TO OWNERSHIP

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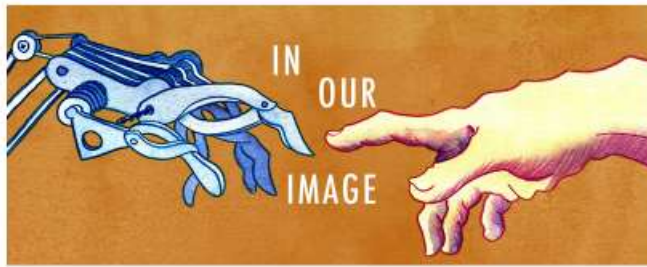
- **Robotics & AI systems**
 - Strong AI tangible: AI machine creating works
- **AI & IPRs: ownership dilemma**
 - IPRs issues: determining ownership
 - Different approaches towards authorship
 - *AI creations belongs to the public domain*
 - *Programmer and/or user as owners*
 - *Machines as authors: is it possible?*

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3/3/2019

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ARTIFICIAL INTELLIGENCE (AI) MACHINES

Can machines create?

Artistic Works?

"AI systems have been used to create works of art since late 60's, however never have technology been so evolved as now"

Industry 4.0

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AI MACHINES CREATING WORKS

more than mere tools



The Next Rembrandt



Angelina



Amper Music

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3/3/2017

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AI & IPRS: OWNERSHIP DILEMMA

DIFFERENT APPROACHES

- CAN A CREATION MADE BY AI SYSTEM BE PROTECTED BY IPRS?
- TO WHOM WILL THE OWNERSHIP BELONG?
- WOULD WE BE OPEN TO CONSIDERING MACHINES AS AUTHORS? GRANTING THEM LEGAL PERSONALITY?
- DOES SUCH CONTENT QUALIFY AS A WORK?

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MAIN APPROACHES TO SOLVING THIS DILEMMA

Computer-generated content belongs to the public domain

- AI systems can't ever be considered as authors, since authorship is only attributed to humans;
- Content created by AI systems are not protectable, thus belongs to the public domain

Programmer (or user) is the author

- This approach follows the predominant concept of anthropocentric IPRs;
- More thoughtful IPRs aims;
- More practical solution;
- Already included in several jurisdictions, such as Spain, UK, USA, New Zealand (amongst others)

Machines as owners

- AI systems as capable of owning IPRs, by being considered as authors;
- IPRs will be allocated to a legal entity, that would be governed by the AI machine;
- Ultimately, providing AI systems with rights?

1ST APPROACH: AI SYSTEMS GENERATED CONTENT NOT COPYRIGHTABLE

In theory:

- This first approach is based on the generalized concept that artistic works can only be created by human intellect;
- Intellectual property strives to protect the results of intelligence;
- As a consequence, AI generated content does not comply with the basic requirement;
- Thus, shall fall directly into public domain.

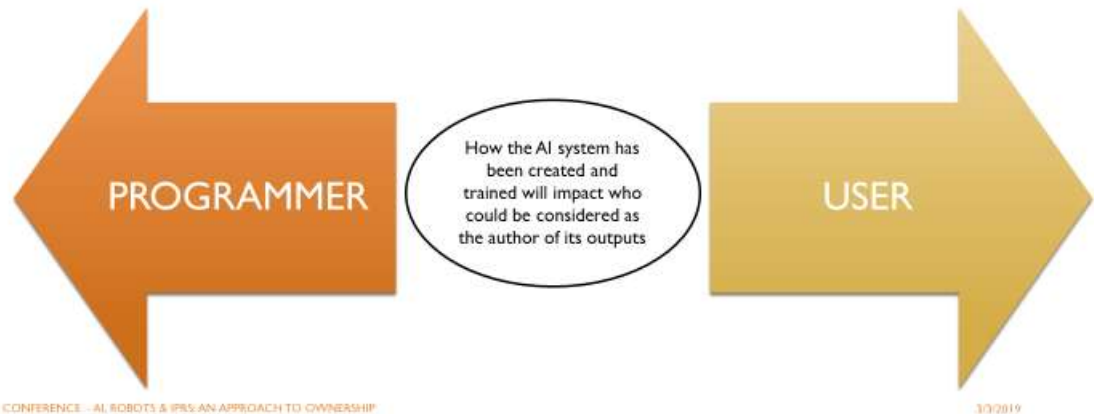
Cons:

- If implemented, could stop innovation altogether. For example, imagine investing millions in a system that generates music, to find that such content is not protected by law and can be used by anyone FREELY.
- AI development and investments would be in jeopardy;
- Computer programs protections rules within the EU already are in contradiction with this (section 178 of the UK Copyright Act and *Urantia vs Maherra* case);

2ND APPROACH: PROGRAMMER OR USER, WHO IS THE AUTHOR?

- Authorship must pertain to a human being: in this case, most scholars mention that the programmer (s) of the AI system should be the author, and in some cases the user (s) can also hold that position.
- According to ANDRES GUADAMUZ (Wipo Magazine), several countries, such as Ireland, New Zealand, Hong Kong and the UK, directly attribute authorship to the programmer(s) over computer-generated (or AI systems generated) content, even though such decision making did not involve a human.

2ND APPROACH: PROGRAMMER OR USER, WHO IS THE AUTHOR?



2ND APPROACH: PROGRAMMER OR USER, WHO IS THE AUTHOR?

- This approach could also be tackled by way of applying legal rules on contracts, by letting both parties agree on who is the author and owner of the copyrights.
 - Some jurisdictions, such as Spain, already contemplate this possibility. For example, Sections 96 and 97 of the Copyright Act allows legal entities to be consider as author of computer program. The SCA specifically refers to the “*legal entity that coordinates and publish the program under its name, unless otherwise agreed.*”

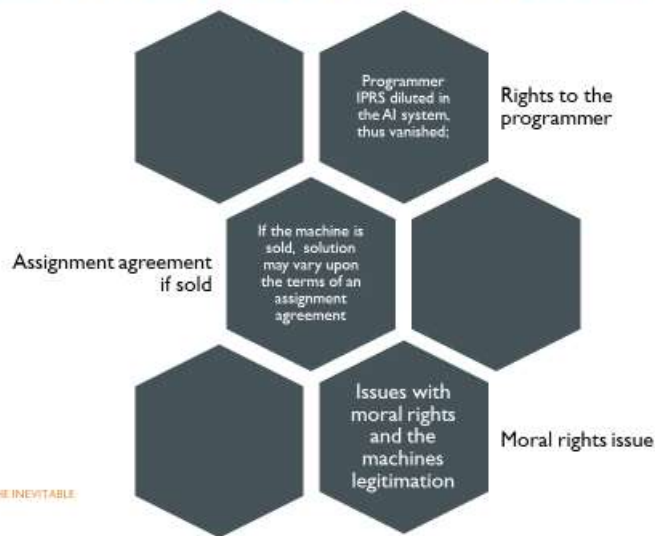
3RD APPROACH: MACHINES AS AUTHORS, IS IT POSSIBLE?

- The idea generated from the analysis of the following:
 - ✓ Profound evaluation of the concept of “intelligence”, and whether humans are the only beings endowed with intelligence;
 - ✓ Can AI systems hold legal personality?
 - ✓ Some laws, for example in UK and USA (and also Spain), already bestow IPRs upon legal entities, as authors, when they are unable to think or be creative in any way;
 - ✓ Thus, there should be no impediment to consider AI systems/machines as authors, and, therefore, allocate intellectual property rights to a new form of “person”.

3RD APPROACH: MACHINES AS AUTHORS, IS IT POSSIBLE?

- This approach could generate practical conflicts, such as:
 1. What happens to the rights of the original programmer (s) that created the AI system? Would they even receive any revenues and/or rights over its creation? should we consider then applying a work made for hire doctrine as solution?
 2. What would happen if the AI system is sold or licensed to many users, would the terms governing the relationship of the AI’s content and the new owner be those of the sale?

IMPLICATIONS OF PROVIDING AI SYSTEMS WITH LEGAL PERSONALITY



WORKSHOP - LAW AND ROBOTICS: FACING THE INEVITABLE

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THE HYBRID APPROACH: TOTAL DISSOCIATION BETWEEN AUTHORSHIP AND OWNERSHIP

- ✓ If authorship and ownership are totally dissociated they can be attributed to different entities
- ✓ The system could be the author of the work irrespective of being capable of holding rights, and the ownership could be left to be agreed upon between the AI system generator and its legitimate user (when they are different entities)
- ✓ To allocate the authorship to the system without it being a right could benefit its creator and serve the purposes of consumer protection, while allocating the ownership of the rights somewhere else

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CONTACT



SANTIAGO MEDIANO

PRESIDENT OF SANTIAGO MEDIANO ABOGADOS, S.L.P., OF THE SECTION ON ROBOTICS, ARTIFICIAL INTELLIGENCE, VIRTUAL AND AUGMENTED REALITY OF THE MADRID BAR ASSOCIATION, AND OF THE ASSOCIATION OF LAWBOTICS



ENRICO BONADIO

THE CITY School of Law, CITY, University of London

12 July 2018 – Universidad Complutense Madrid

***Intellectual Property
Aspects of Robotics***

Dr. Enrico Bonadio
City, University of London



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outline

- Intellectual Property (IP) strategy in robotics
 - disputes (both in US and Europe)
- open source approaches

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robotic industry

- robotic innovation ecosystem is
 - highly dynamic
 - research intensive (research can take years to give fruits, also thanks to university spin-outs)
 - collaborative
 - often companies do not have all the required expertise in-house and need to get it outside through joint development agreements with specialised robotic companies

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robotic industry and IP

- it involves wide networks of specialists, research institutions and technology-intensive firms (big and small) that invest massively money and resources
- IP protection needed to recoup investments (**offensive**) and try to fence off competitors' aggressive strategies and trigger cross-licences with them (**defensive**)



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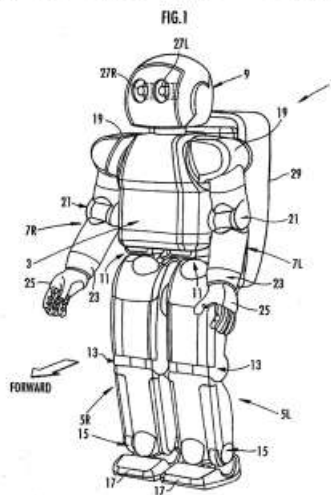
robotic industry and IP

- patents
- know how / industrial secret
- copyright
- brands
- designs



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U.S. Patent Sep. 13, 2011 Sheet 1 of 9 US 8,019,145 B2



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robotic industry and patents

- recouping investments, generating new revenue streams
- useful to protect **inventions that can be easily reverse-engineered**
- a solid patent portfolio makes it possible to license technologies and get stream of royalties
- patenting is capable of **supporting specialisation** of companies, which drives further evolution – **spiral of innovation**



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robotic industry and patents

- many robotic companies are using patent documents
 - to find out about latest technological developments relevant to their business
 - to gain insight about competitors' strategies, to either improve an existing product, or create a new one
 - ... and possibly challenging their patents for lack of novelty/inv. step
- massive patenting in **automotive** / **electronics** sectors
- **US, Germany, UK, Japan, South Korea**

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robotic industry and patents

- crucial robotic inventions are often developed by the original inventor (eg an academic)
- ... who then start his/her own company, or transfer the IP to an existing manufacturing company
- no reported standard essential patents (SEPs), for the moment
- a few disputes occurred, especially in the US

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iRobot v Urus (2005) Massachusetts – vacuum robots

- **patents**, **copyright** and **trade dress** infringement
- settlement: patents valid, Urus agreed not to sell in the US, and not to advertise in a way which jeopardised iRobot reputation/products



iRobot v Solac GmbH et al (2013) – Court of Dusseldorf

- alleged infringement of iRobot's 5 patents
- settlement



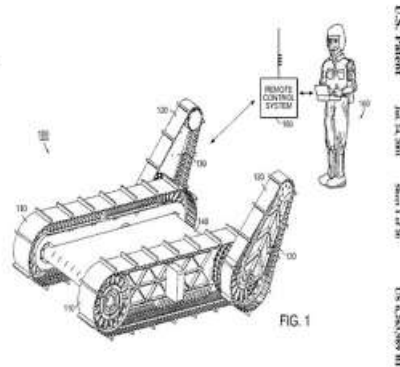
iRobot v Shenzhen (2013)

- infringement of iRobot's German portions of 4 European Patents
- iRobot obtained preliminary injunction in Court of Dusseldorf
- German authorities seized Shenzhen products at a trade fair in Berlin



iRobot v Robotix FX (2007) – robots for military mine detection

- iRobot former employee founded Robotix
- ... developed same mine detection – with Robotix winning a lucrative govt contract
- 2 lawsuits – **patent/secret appropriation.** (Massach./Alabama)
- patents covered tread wheels in the front that swiveled
- painful settlement for Robotix: (i) **liquidation** (ii) founder **agreeing not to work** in the industry for 5 years, (iii) **govt contract to iRobot**



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InTouch Technologies v VGo Communications (US Fed. Court of Appeal – 2014)

- telepresence robots in health sector
- audio-video communications combined with remote controlled mobility ...
- ... enabling nurses, doctors and social workers to check on patients without having to be physically present



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InTouch Technologies v VGo Communications (US Fed. Court of Appeal – 2014)

- VGo's product - cheaper
- Appeal Court found **no infringement**, but patents were valid
- InTouch has a reputation of aggressively asserting its patents, asking first for royalties and then starting litigation
- ... patents that many consider too broad



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Computer Motion v Intuitive Surgical – early 2000s (surgical systems)



Da Vinci
INTUITIVE SURGICAL



Zeus
COMPUTER MOTION

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Intuitive Surgical v Computer Motion **ZEUS**

- **ZEUS Robotic Surgical System (ZRSS)**
- medical robot designed to assist in surgery, produced by **Computer Motion (CM)** (before Da Vinci)
- ZEUS had three robotic arms, remotely controlled by the surgeon
- first arm, AESOP (Automated Endoscopic System for Optimal Positioning) was a voice-activated endoscope, allowing the surgeon to see inside the patient's body
- other two robotic arms mimicked the surgeon's movements to make precise incisions and extractions

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Intuitive Surgical v Computer Motion **DA VINCI**

- surgical system controlled by a surgeon from a console
- commonly used for prostatectomies and for cardiac valve repair repair and gynecologic surgical procedures
- also designed to improve upon conventional laparoscopy, where the surgeon operates while standing, using hand-held, long-shafted instruments, which have no wrists



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Intuitive Surgical v Computer Motion RECIPROCAL DISPUTES – early 2000s

- CM filed 8 lawsuits against Intuitive Surgical
- ... for alleged patent infringement on CM's patents relating to ZEUS
- ... in addition to proceedings at USPTO/patent offices in Europe
- May 2002: Delaware federal court granted summary judgment that CM's ZEUS literally infringed Intuitive Surgical's US patent on **voice-controlled surgical robots**
- ... and in August 2002 a Delaware jury found that CM had failed to prove that the patent was invalid and awarded Intuitive Surgical **\$4.4 million** for damage caused

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Intuitive Surgical v Computer Motion DISPUTES and SETTLEMENT

- March 2003 - **MERGER**
- ... also to end litigations between the companies
- ... but also to combine efforts in developing robotic surgical systems to increase the effectiveness of such technology
- ZEUS was finally phased out in favor of Intuitive Surgical's Da Vinci system
- after the merger, Yulan Wang (founder of CM) moved to found inTouch

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'TRADE SECRET'

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robotic industry and trade secret

- useful for inventions that are not apparent, easy discoverable and **cannot be easily reverse-engineered**
- ... especially for **standard, mechanical, hardware-related technologies** ... and for certain aspects of **software source code**



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robotic industry and trade secret

- for technologies that last longer, it offers a more valuable option as the protection is **potentially perpetual**
- ... so trade secret may be useful for inventions that **may not get market acceptance and success for a long time**
- in the past (80s), companies seeking patents spent lots of money on patenting but reaped little reward
- ... because by the time they were finally commercialised, many of these patents had expired
- also, many small companies may want to save costs related to patent prosecution and litigations, in multiple countries

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robotic industry and trade secret

- difficulty of patenting software, in US (after *Alice v CLS Bank*) and elsewhere
- ... could increase the incentive to protect sw related inventions via secrecy



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trade secret - weaknesses

- employee mobility is high (use of NDAs is recommended)
- for newly created companies, patents (or at least, applications) may be necessary to prove and provide value to investors ...
- ... who might not like the idea of committing to non-disclosure agreements
- ... and may find difficult to quantifying the value of a trade secret

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robotic industry and trade secret

- *ISR Group v Manhattan Partners (2013)*
- after talks for a potential acquisition collapsed, two ISR employees left to join Manhattan Partners
- lawsuit in Tennessee for misappropriation of secret
- then, settlement

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MAKO Surgical v Blue Belt Technologies (2013 and 2014)

- in 2013 MAKO started action in Florida against former sales manager who had joined BBT for a position working on the **Navio surgical system**
- ... for trade secret misappropriation and for former employees' violation of non-compete obligation to his former employer
- MAKO obtain an order preventing that employee from working for BBT for a certain period, in any position
- ... and BBT from using conf. info
- ... then **settlement**



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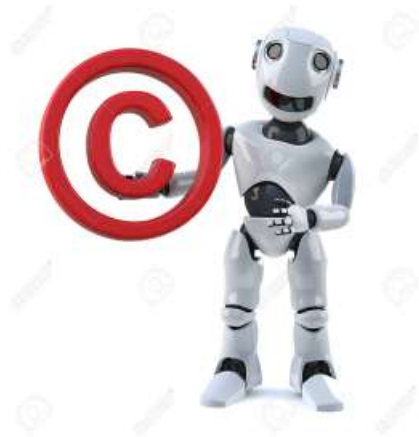
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MAKO Surgical v Blue Belt Technologies (2013 and 2014)

- but MAKO sued again BBT in June 2014 for patent infringement, with BBT counterclaiming that
 - the patent was invalid
 - MAKO infringed BBT patents
 - MAKO engaged in a systematic campaign of tortious interference
 - MAKO's patent license was acquired expressly to generate litigation against Blue Belt
- also, in 2016 USPTO held BBT's patent no. 6,757,582 covering "Methods and systems to control a shaping tool" invalid for lack of novelty / obviousness

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Robotic companies can use © to prevent others from copying and even accessing their computer code

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circumventing protecting measures to access the code

- anti-circumventions laws have been invoked by Sony
- ... when a consumer hobbyist decrypted the code defining its robotic dog Aibo's abilities
- ... and circulated new sw amongst consumers so that they could "teach" the dog to dance and speak
- Sony claimed it was a violation of DMCA, which prohibits circumvention of protective measures



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- build-up and maintain reputation amongst final consumers
- ... to distinguish business (company/trade names) and robots (trademarks)
- to boost after-sale services
- especially, in hospital, educational institutions

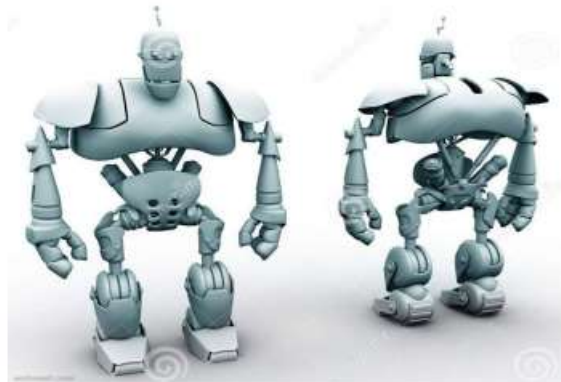


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industrial design

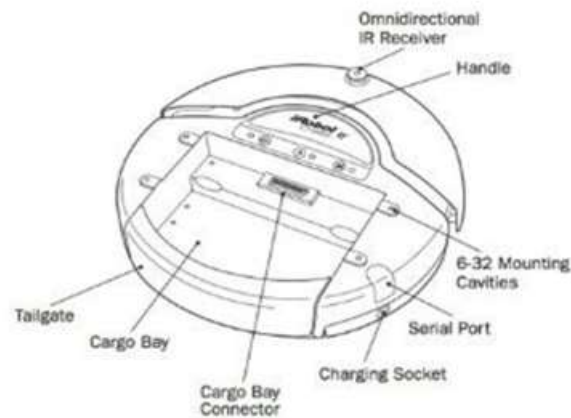
- robots today are much more consumer-facing
- need to protect the "look-and-feel", eg facial expressions, shape, colours
- ... and again build up and maintain reputation



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U.S. Design Patent No. D670877 - Roomba



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cooperative approach

- innovation processes often consist of a combination of open and competitive/proprietary approaches to IP management
- at pre-commercial stage, a lot of innovation is built to obtain collaborative, open platforms
- ... inviting third parties to use and improve existing content under open licensing arrangements (eg Creative commons, GNU licences)
- ... allowing quick prototyping and experimentation
- collaborative platforms allow users to share substantial up-front investment costs and avoid duplication of efforts

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cooperative approach

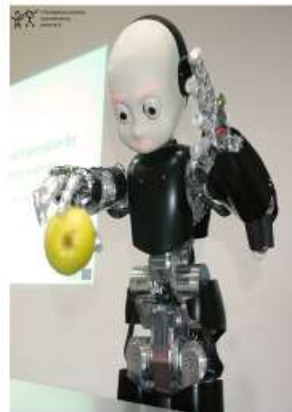
- open platform approach is not limited to software to be used in robotics research and product development
- ... but also blueprint, eg drawings and designs
- **Robotic Open Platform (ROP)** aims to make hardware designs of robots available under an Open Hardware license to the entire robotic community
- it provides CAD drawings, electric schemes and the required documentation to build their own robot

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cooperative approach

- iCub - humanoid robot developed at Istituto Italiano di Tecnologia as part of the EU project RobotCub
- it has 53 motors that move the head, arms & hands, waist, and legs
- it can see and hear, it has the sense of proprioception (body configuration) and movement (using accelerometers and gyroscopes)
- an **open source cognitive humanoid robotic platform**



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cooperative approach

- Poppy - an open-source 3D printed robotic platform designed by INRIA Bordeaux
- ... for the creation, use and sharing of interactive 3D printed robots
- initially built to study the impact of the body on sensorimotor development and cognition: it makes it possible to consider the body as an experimental variable



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then ... more proprietary

- but when innovative companies invest in their own R&D efforts
- ... they tend to protect their innovative technology more strongly, particularly when they need to differentiate their end-products



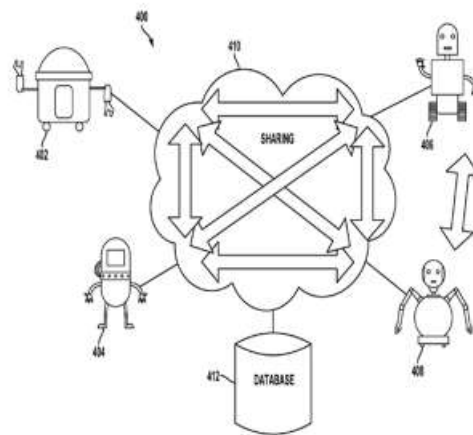
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risk of early proprietary approach

- Google – US patent US8996429B1
- granted March 2015
- Methods and systems for robot personality development



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risk of early proprietary approach

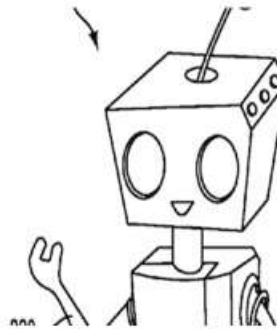
- robot can modify its personality by inferring the user's mood through methods like correlating the current weather to previous moods
- idea behind patent strongly relies on **cloud robotics**
- ... a field of robotics that attempts to invoke cloud technologies such as cloud computing, cloud storage, and other Internet technologies focused on the benefits of converged infrastructure and shared services for robotics

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risk of early proprietary approach

- risk of locking down a conceptual idea
- ... which happens to be at an early stage
- ... preventing others from working on the actual technical solutions
- ... at such stage we need more than one company innovating
- it's competition at this stage that drive better implementations of personalised robots



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robots and image rights

- humanoid robots resembling specific human beings, eg celebrities ?
- eg, in 1991 US actress Vanna White sued in Samsung for using a robot dressed in a wig gown, and jewelry meant to depict a futuristic vision of the Wheel of Fortune in a commercial for VCR - **failed**



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robots and image rights

- humanoid robots resembling specific human beings, eg celebrities ?
- eg, in 1993 US actors George Wendt and John Ratzenberger challenged use of animatronics based on their likenesses in airport bars modeled after the TV show set (settled in 2001)

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Thanks for your attention !

Dr. Enrico Bonadio

City, University of London

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Second Panel: Responsible Innovation in Robotics

LUKE MCDONAGH

THE CITY School of Law, CITY, University of London

INBOTS EVENT – UCM 12/7/18

UNIVERSITY INNOVATION:
Strategies for patenting and spin-outs
in the field of robotics
- Analysing the University Incubator
Model in the EU and Mexico

Dr Luke McDonagh
Senior Lecturer
The City Law School
luke.mcdonagh@city.ac.uk



Primary Aims

- As part of INBOTS we are investigating the IP environment – patents, copyright, trade marks, trade secrets - in the EU with respect to encouraging innovation in robotic technologies
- The EU is keen to draw benefits from university innovation in the areas of science and engineering, e.g. in robotic science, by spinning out new inventions into private sector companies and social enterprises.
- Some of our INBOTS partners are leaders – SSSA (Pisa) and ETH (Zurich)
- Our aim is to investigate the 'best practice' experiences within the EU – including those of our partners – SSSA, ETH, UCM, CSIC
- We have already begun this with analysis of the London City Incubator at City, University of London
- We are now moving on to our partners and other EU based organisations
- We are also exploring links with Mexico and potentially Japan, as both are priority countries for the EU

Secondary Aims

- Although our INBOTS remit is EU-focused there are reasons to look outside the EU as well – the EU has deep trade links and burgeoning agreements with e.g. Mexico and Japan
- Mexico – especially UNAM and Tec de Monterrey- is a good case study for a state that produces a lot of innovative research in robotics but does not maximise this at the entrepreneurial level
- Although there are some notable positive exceptions – such as at Tecnológico de Monterrey from 2010-2015 - Mexican universities have yet to develop broad-scale, successful IP incubator models.
- Priority for 'Red de Innovación Social' (Mexican Social Innovation Network)
- This is of interest to the EU and may form a secondary part of INBOTS or a follow on project
- We also have some links with Japan at Keio University, Waseda University and Toyo University that we intend to explore

Questions

- Does the current EU IP system adequately facilitate innovation in the field of robotics? What are the most important differences between the systems for protecting patents, copyright, trade marks and trade secrets? What are the most prevalent forms of IP protection in Robotics innovation?
- What is the appropriate role for intellectual property (IP) rights – copyright, trade marks, and especially, patents – in promoting open innovation and social enterprise in the context of university research?
- How can universities in the EU make the best use of their intellectual and financial resources in order to encourage social innovation via IP rights?
- What about strategies at the University level? Can the 'incubator' model provide useful guidance? What can we draw out from successful university spin outs in the EU in the field of robotics?
- We intend to conduct empirical research to find out the answers to these questions – we now have ethics approval from our institution to do this

Framing our research

- Empirical research by Dahlborg et al. demonstrates that 'small and medium-sized companies are the largest absorbers of academic patents'. Is this true for the field of robotics?
- Universities play a role in creating and supporting such SMEs, particularly social enterprises
- Social enterprises are of key interest because, although IP rights are valuable assets for all companies, social enterprises – which can include university partnerships with local businesses and start-ups – differ from other types of businesses in their attitude to IP, because they are not entirely profit driven.
- At the same time, university IP commercialisation cannot be ignored as revenues gained from IP may be reinvested in the social enterprise, creating greater opportunities for public benefit.
- Can a holistic approach to licensing help to satisfy the needs of both EU universities and social enterprises, as well as the overall public good?

How patents are used by universities in the UK

- **Protecting products and processes**
 - Increasing turnover and profits; Attracting investors
- Licensing, Cross-licensing, Building reputation, Generate revenue
- UK university patenting: "There has been an increase in total income from IP of 13 per cent, from £155 million to £176 million in 2015-16. This includes a 37 per cent rise in IP income from licencing and other sources (but excluding sales of shares). This increase follows a rise of 25 per cent in 2014-15. There are noticeable differences in IP income by partner and type of licence. Large business spending on non-software licences showed another strong increase, growing by 48 per cent to £100 million. Income from non-software licencing to SMEs also increased strongly, up by 43 per cent on 2014-15, reaching £16 million."
- HEFCE Survey (2015-16) - http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/2017/201723/HEFCE2017_23.pdf

The London City Incubator as an example of UK university innovation & commercialisation

- In the UK, the classic university incubator model works on the following basis:
 - 1. Concept (what is new, or inventive, or useful about the idea/research?)
 - 2. Commercial Viability Assessment (Based on market analysis - Could be positive or negative – If negative, project ends; if positive, it proceeds to the next step)
 - 3. Clarification of type of commercial or social enterprise/spin-out or licensing (For profit, or non-profit? What share of equity will university have? How will revenue be shared?)
 - 4. Proposal at University Level (confirmation of approval/support)
 - 5. Raising/allocation of funding (how will the company be funded? University funds and private investment/private loans?)
 - 6. Incorporation/setting up of company
 - 7. Manufacture, marketing, distribution & sales

Spin Outs – The common challenge: investment

- One typical method of commercialising research is via licensing patents to existing businesses (relatively low risk; though comparatively low reward)
- The other usual method is spin out formation (higher risk; higher reward): first, an academic has an idea that is promising; second, the incubator staff will help find a team to run it; third, the inventors (and the university) will become shareholders of the new company (but will normally stay in their academic position); fourth, a managing director is recruited (externally).
- Once a managing director is in place, and a product prototype has been developed, external investors are approached for initial seed investment. Alternatively the university may put forward initial capital e.g. £10,000.
- Some promising spin-outs falter at the "valley of death" stage when they require an increase in the level of investment to become viable.

The London City Incubator as an example of UK university innovation & commercialisation

- The London City Incubator (LCI) is the innovation catalyst programme designed to commercialise technologies developed by City's academics, encouraging knowledge and tech transfer, IP protection and the formation of spin-off companies, including social enterprises.
- It involves scientists and engineers (who are conducting innovative research), technology transfer officers, managers and lawyers working together.
- We – as lawyers - are currently involved as IP advisers within the LCI.
- Our role is to advise City's scientists and engineers about how to protect their IP and unlock the commercial potential of their research. This necessarily involves explaining legal concepts and jargon for scientists/engineers, and giving them practical tips and advice, while for their part the scientists and engineers explain their concepts to us.
- By involving IP legal academics at City in the development of spin-out companies – i.e. the incubator model – City makes best use of its internal intellectual resources and minimises the need for external consultants and experts. We assist the tech transfer office to identify projects early on.

A sample of London City Incubator case studies:

- **1. Heliex**
- In 2009, Heliex Power Ltd formed as a spin-out from City's Centre for Positive Displacement Compressor Technology. Heliex developed patented technology that extracts energy from waste steam/heat, generated by industrial processes, and developed a unique screw-expander based machine. It made its first sales in December 2012. LCI supported Heliex from by conducting a feasibility study on the following key areas:
 - Prioritised market sectors and locations.
 - Advised on sales volume growth, pricing structure and sales growth curves.
 - Considered applications of steam classified by process, industry and geographical regions.
 - Advised on product range and development programme.
 - Evaluated costing including 'Make' versus 'Buy' decisions.
 - Provided production capital and manufacturing resources.
 - Advised on human resources requirements and management.
 - Provided financial modelling to include cash flow, P&L and balance sheet for first three years.
 - Advised on potential sources of funds, grants and assistance.

A sample of London City Incubator case studies

• 2. Start-ED Clinic

- Established in 2011, Start-Ed is a Law clinic for start up companies. It works as a free walk-in centre offering assistance for small businesses and technology start-ups. The service provides advice on a range of business and legal matters. It is run by law students of The City Law School and supervised by local professionals. No booking is required. It operates on a first come first serve basis.

- The centre provides assistance with advice on:

- Business structure and incorporation
- Contractual agreements - key issues in contracts
- Intellectual property issues - copyright/trademarks/patents
 - Preparation for an investment

The role of IP advisers within the Incubator

- Give advice to engineers/scientists on patent applications



- **No publication** prior to filing
e.g. no article, press release, conference presentation/poster/proceedings or blog entry



- **No sale** of products incorporating the invention prior to filing



- **No lecture or presentation** prior to filing
except under a **non-disclosure agreement (NDA)**



- Seek **professional advice** soon!
- **File before others do!**

INBOTS

- In addition to City, important university partners include **Scuola Superiore Sant'Anna, Italy (SSSA)** and the **Swiss Federal Institute of Technology (ETH)** in Zurich, Switzerland.
- Both of these companies are highly experienced in the field of social innovation and have created a number of key robotics spin out companies.

INBOTS: SSSA spin out - IUVO

- For SSSA, the key spin out company in the field of robotics is IUVO (<http://www.iuvo.com>).
- It is a spin-off company of The BioRobotics Institute, SSSA, and was founded on January 2015 by Prof. Nicola Vitiello and his colleagues of The Wearable Robotics Laboratory.
- Foundation of IUVO was authorized by the Academic Council and Board of Directors of SSSA on November 2014, in accordance with all Italian, local and SSSA laws and regulations.
- The mission of IUVO is to mature and bring on the market the wearable robots for movement assistance and rehabilitation invented and prototyped by the Wearable Robotics Laboratory of The BioRobotics Institute, SSSA.

INBOTS: SSSA spin out - IUVO

- On March 2015, IUVO signed an agreement with SSSA to gather the exclusive license to commercially exploit the two patent applications which protect the prototype of the Active Pelvis Orthosis (APO) wearable robot device and all the related know-how (i.e., all of the executable draws and source code).
- IUVO agreed with SSSA to be incubated within the building of The BioRobotics Institute, so IUVO team members can access all the facilities of The BioRobotics Institute, the latter being a relevant aspect to safely and smoothly carry out all of the research and innovation activities foreseen by this project.
- Currently, the business of IUVO consists of maturing wearable robotics technologies with the ultimate goal to market and sell the tech.
- All of this is underpinned by legal agreements negotiated and signed between SSSA and IUVO.
- The IP policy & follow-on agreements must be clear, precise and beneficial to all involved.
- Resources are shared efficiently and sustainably

INBOTS: ETH Zurich spin out: MyoSwiss

- ETH Zurich is a leading global natural science and engineering university. One of its primary goals is transferring its knowledge to the private sector and society at large. ETH plays an important role in the Swiss economy.
- More than 80 new patent applications and more than 20 spin-off companies are created out of ETH Zurich each year.
- A key ETH robotics spin out company with a social care vision is MyoSwiss. The 'Myosuit' is a state-of-the-art device created to assist people with mobility impairments. It works as an added layer of muscle that supports your movements as you do movements like getting up from a chair, go down a flight of stairs, or stand. The 'Myosuit' technology empowers people to be mobile and independent.
- In order to link science and business, ETH Zurich has a dedicated technology transfer office: which supports collaborations, licensing of ETH technologies, and start-up support programs.
- Again, everything is underpinned by a clear, precise IP policy and follow-on agreements.

Concluding points

- IP Policies and Innovation strategies for European Universities must be designed to encourage and incentivise commercially viable research (royalties) – it must benefit the university, the researchers and society at large (social innovation)
- The Incubator model can be adopted so that the university is making the best use of its scientific, human and legal resources
- The Incubator model begins with giving basic legal advice to scientists and engineers (e.g. what is a patent/trade secret; need to delay publication until patent filing etc.)
- Once a research concept/invention has been discovered/developed, the Incubator team must assess its commercial viability – looking at the prior art (patent search) and market research (commercial potential)
- Decision must be made about A) whether to license the technology or B) set up a type of spin out (commercial, non-profit or social enterprise)
- Investment (financial) is then required from university or external investors – this must be underpinned by clear, precise licensing agreements

Thank you for your attention!

- We welcome your comments!
- Contact us at
- luke.mcdonagh@city.ac.uk
- Enrico.bonadio.1@city.ac.uk

MARÍA AMPARO GRAU RUIZ

Universidad Complutense de Madrid



Ethical, Legal and Socio-Economic Issues affecting robotic companies: towards Responsible Research and Innovation through taxation?

*Prof. María Amparo GRAU RUIZ
Complutense University of Madrid*



EU Twin taxation priorities: **efficiency & fairness**

Taxation plays an important role in reducing inequalities and promoting social justice in line with the **UN 2030 Agenda**

Taxation & Corporate Social Responsibility policies can be mutually reinforcing (i.e. CSR can be used to spread good tax practices, while taxation can promote other areas of CSR)

Inject **more openness & TRUST into taxation**
(i.e. incentives only for responsible research and innovation?)

Public authorities can use a **smart mix** of **voluntary policy measures** and, where necessary, **complementary regulation**

Transparency in the **tax benefits** received and **contributions to public goals** made

RRI : align research process and outcomes with values, needs and expectations of society
CSR in robotics and AI - designed for and with the society, caring for impacts

The **tax treatment** should be better adjusted depending on CSR for Environmental, Social and Governance criteria

CONCLUSION

Regulation & CSR are necessary
to promote sustainable development with taxation

THANK YOU

- More information at <https://www.ucm.es/proyecto-certificarse/>
- And <https://inbots.eu>



CERTIFICARSE (DER2015-65374-R)
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PARA EL DESARROLLO SOSTENIBLE



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