Queen Mary University of London
Centre for Commercial Law Studies

UNIVERSITY OF CAMBRIDGE

Microsoft Cloud Computing Research Centre

5th Annual Symposium, 17-18 September, 2018

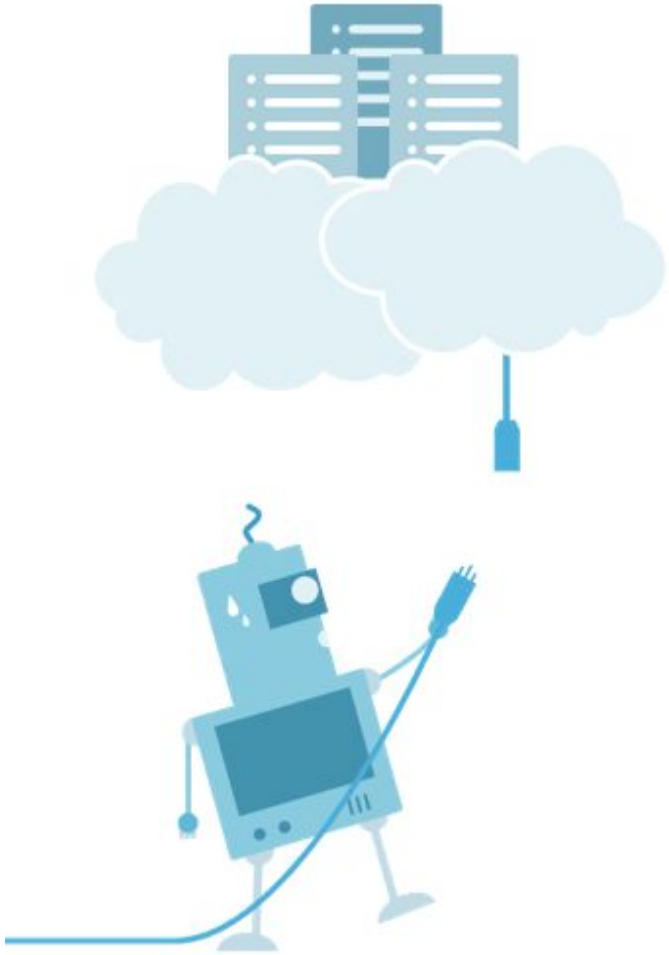
Cloud Robotics Law and Regulation

Dr. Eduard Fosch-Villaronga
e.foschvillaronga@qmul.ac.uk

Prof. Christopher Millard
c.millard@qmul.ac.uk

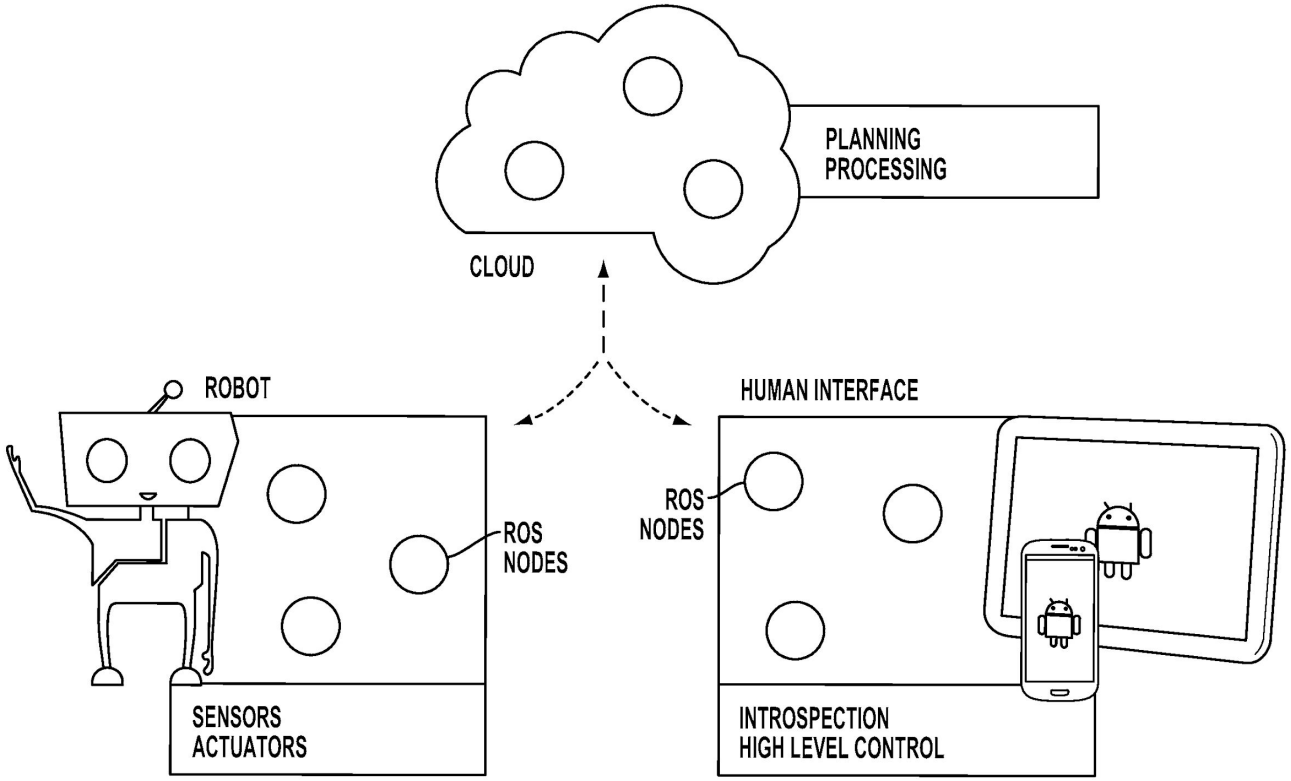
Outline

- What is cloud robotics?
- Legal and regulatory issues
- Addressing the issues
- Conclusions



What is *Cloud Robotics*?

Cloud services providing computation, data and/or storage to support the operation of a robot



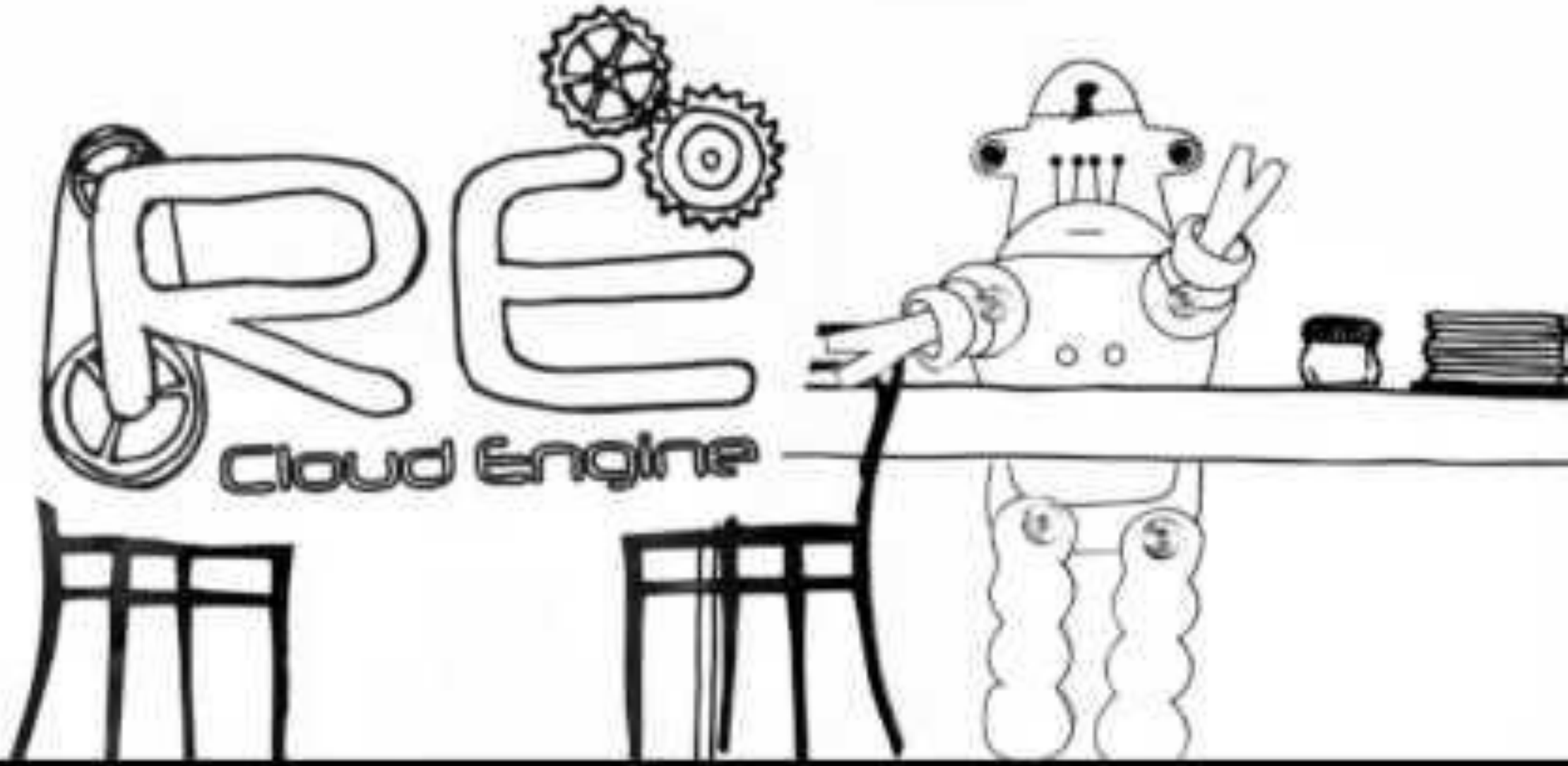
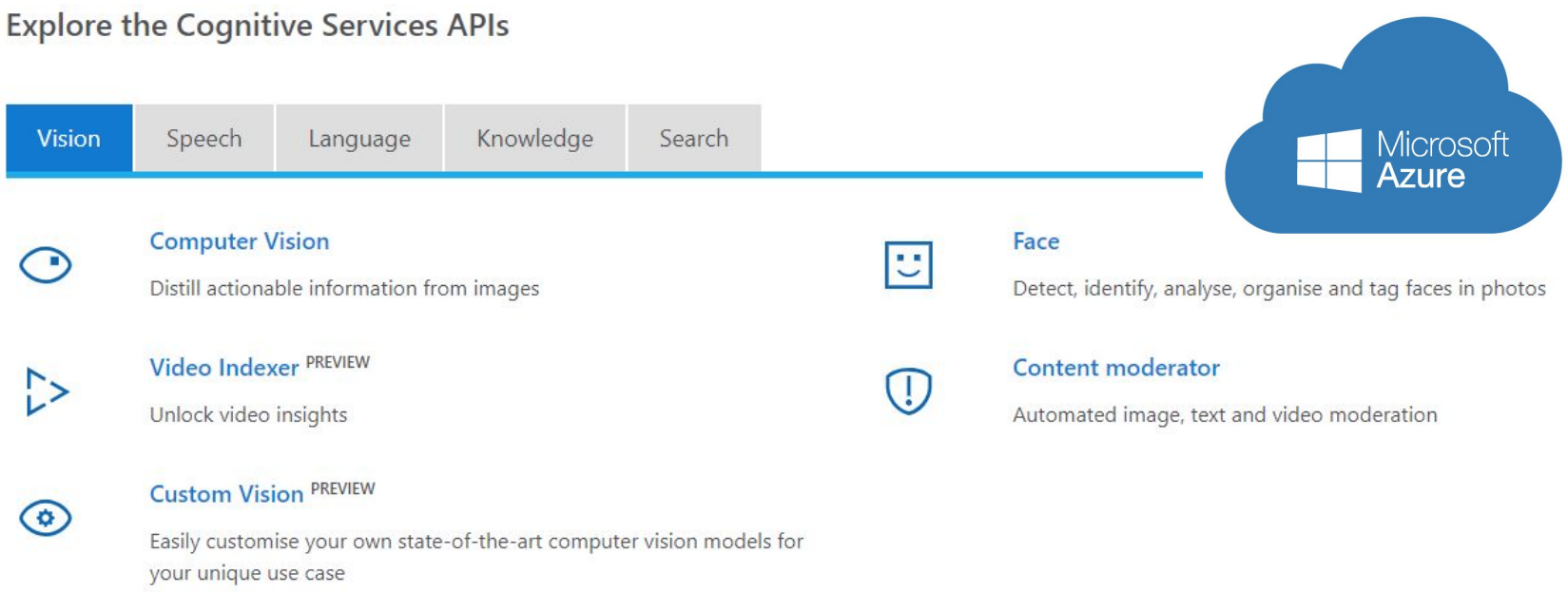
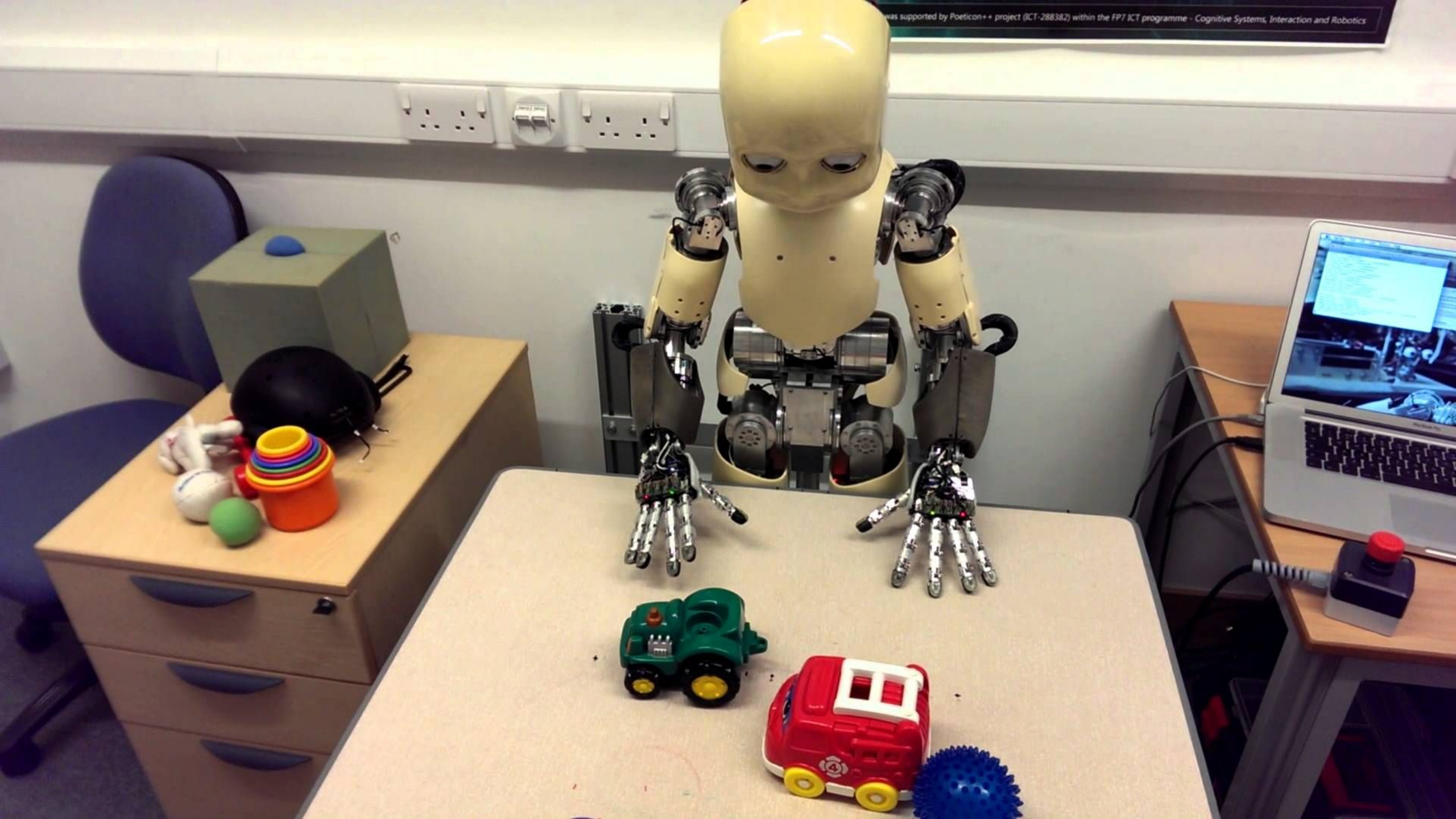

RE
Cloud Engine

Image recognition

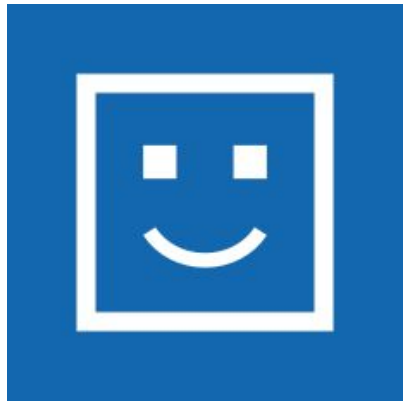



was supported by Poeticon++ project (ICT-288382) within the FP7 ICT programme - Cognitive Systems, Interaction and Robotics

Navigation

Speech

Face



Neutral:
Happiness:
Surprise:
Sadness:

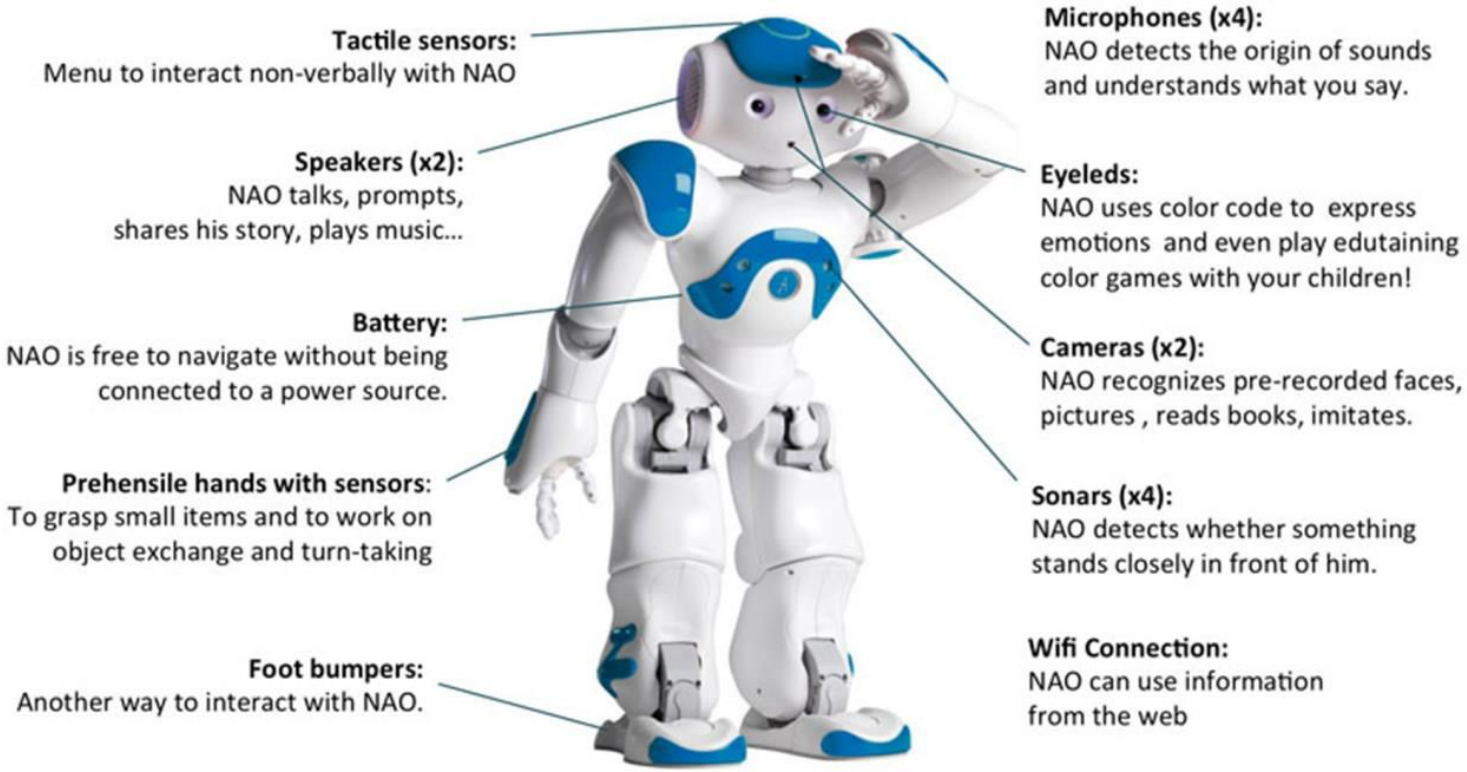
Anger:
Disgust:
Fear:
Contempt:

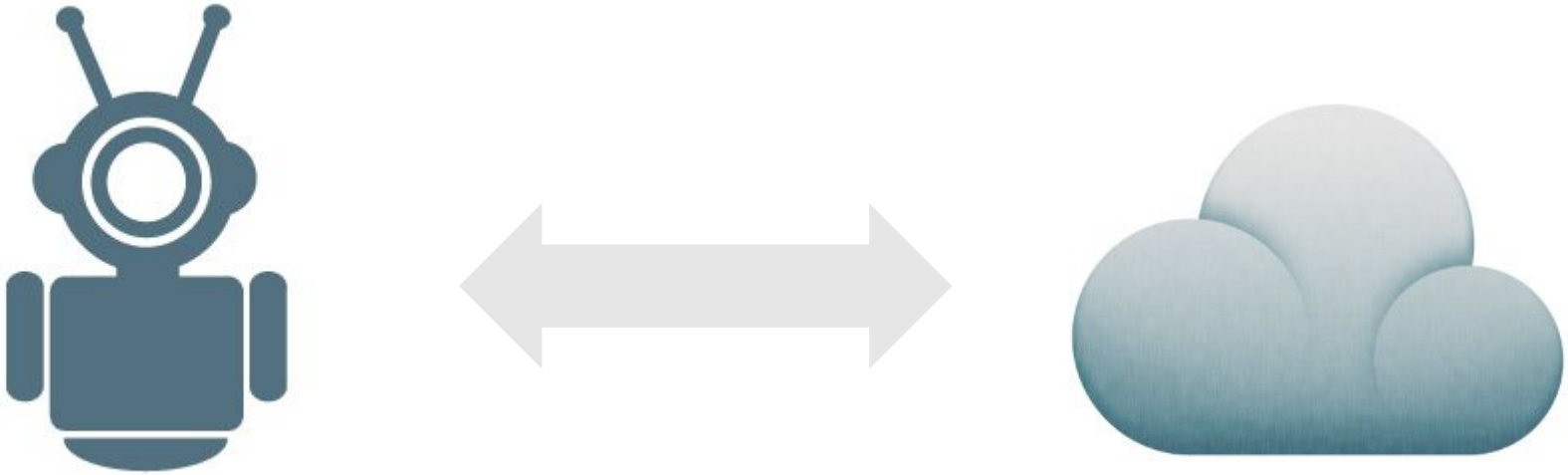
Microsoft

Get started for free at projectoxford.ai

What is a *robot*?

Movable machine that performs tasks either automatically or with a degree of autonomy





Queen Mary
University of London
Centre for Commercial Law Studies

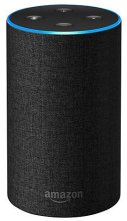
Cloud Robotics Law and Regulation
MCCRC 5th Annual Symposium - Sept 2018

UNIVERSITY OF CAMBRIDGE

Virtual AI

Physical Robot

Virtual AI



Physical Robot

Queen Mary University of London
Centre for Commercial Law Studies

Cloud Robotics Law and Regulation
MCCRC 5th Annual Symposium - Sept 2018

UNIVERSITY OF CAMBRIDGE

What are the main legal and regulatory issues in relation to *Cloud Robotics*?

- Regulatory framework for cloud robotics is fragmented and uncertain
- Cloud robotics ecosystem is complex and opaque, and it challenges the allocation of responsibilities between the parties
- There is literature supporting the idea of holding the autonomous robots liable
- Cloud robotics raises data protection considerations in relation to transparency, data controller/processor identification and data portability

The regulatory framework for cloud robotics is fragmented and uncertain

What is regulated in *Cloud Robotics*?

- No regulatory framework developed specifically for cloud robotics
- As emerging technology
  - Products
    - Directive 2001/95/EC on general product safety
    - Directive 85/374/EEC on liability for defective products
  - Context of use
    - Machinery Directive 2006/42/EC may regulate industrial robots
    - Regulation 2017/745 on medical devices may apply to robots with an intended medical purposes
    - Directive 2009/48/EC on the safety on toys may be relevant for robot toys
  - Parts
    - Low Voltage Directive 2014/35/EU might apply to some service robots
    - Electromagnetic Compatibility Directive 2014/30/EU
    - Radio Equipment Directive 2014/53/EU may apply to robots incorporating a GPS
  - Personal Data: GDPR

What is regulated in *Cloud Robotics*?

"complex and sophisticated interdependencies both within products (based on hardware and software) and across interconnected services" challenge the legal certainty regarding the applicable legal framework

(EC Building a European Data Economy COM(2017) 9 final)

This challenges the concepts of:

- Product
- Producer
- Defect

- No regulatory framework developed specifically for cloud robotics
- As emerging technology
  - Products
    - Directive 2001/95/EC on general product safety
    - Directive 85/374/EEC on liability for defective products
  - Context of use
    - Machinery Directive 2006/42/EC may regulate industrial robots
    - Regulation 2017/745 on medical devices may apply to robots with an intended medical purposes
    - Directive 2009/48/EC on the safety on toys may be relevant for robot toys
  - Parts
    - Low Voltage Directive 2014/35/EU might apply to some service robots
    - Electromagnetic Compatibility Directive 2014/30/EU
    - Radio Equipment Directive 2014/53/EU may apply to robots incorporating a GPS
  - Personal Data: GDPR

What is regulated in *Cloud Robotics*?

- No regulatory framework developed specifically for cloud robotics
- As emerging technology
  - Products
    - Directive 2001/95/EC on general product safety
    - Directive 85/374/EEC on liability for defective products
  - Context of use
    - Machinery Directive 2006/42/EC may regulate industrial robots
    - Regulation 2017/745 on medical devices may apply to robots with an intended medical purposes
    - Directive 2009/48/EC on the safety on toys may be relevant for robot toys
  - Parts
    - Low Voltage Directive 2014/35/EU might apply to some service robots
    - Electromagnetic Compatibility Directive 2014/30/EU
    - Radio Equipment Directive 2014/53/EU may apply to robots incorporating a GPS
  - Personal Data: GDPR

Robots outside the industrial environment and collaborative robotic systems are excluded from current harmonized standards.

(EC Evaluation of the Machinery Directive, May 13, 2016)

What is regulated in *Cloud Robotics*?

- No regulatory framework developed specifically for cloud robotics
- As emerging technology
  - Products
    - Directive 2001/95/EC on general product safety
    - Directive 85/374/EEC on liability for defective products
  - Context of use
    - Machinery Directive 2006/42/EC may regulate industrial robots
    - Regulation 2017/745 on medical devices may apply to robots with an intended medical purposes
    - Directive 2009/48/EC on the safety on toys may be relevant for robot toys
  - Parts
    - Low Voltage Directive 2014/35/EU might apply to some service robots
    - Electromagnetic Compatibility Directive 2014/30/EU
    - Radio Equipment Directive 2014/53/EU may apply to robots incorporating a GPS
  - Personal Data: GDPR

- Technology-neutral regulation
- Translational problem between general principles and concrete actions

Cloud robotics ecosystem is complex and opaque, and it challenges the allocation of responsibilities between the parties

Cloud Service Providers

Hardware Manufacturer

Users

Customers

Robot Service Providers

Cloud Service Providers

Sub-Providers

Users

Hardware Manufacturer

Sub-Providers

Customers

Robot Service Providers

Sub-Providers

Cloud Service Providers

Sub-Providers

Hardware Manufacturer

Sub-Providers

Users

Primary

Secondary

Third users

Customers

Robot Service Providers

Sub-Providers

There is literature supporting the idea of holding the autonomous robots liable

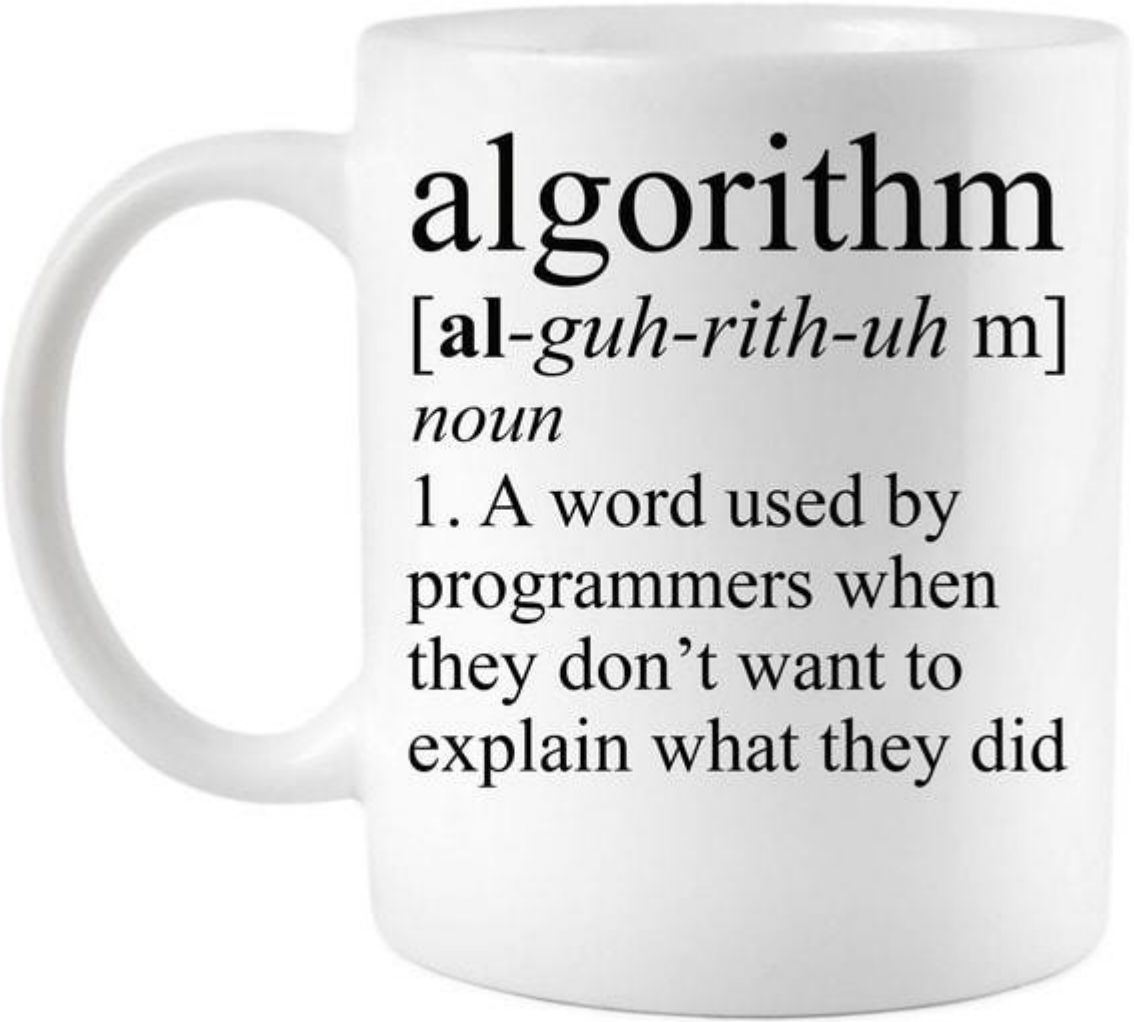
- **Responsibility gap:** if a robot learns as it operates, and the robot itself can, in the course of its operation, change the rules by which it acts, then there is no reason why humans should be held responsible for the autonomous behaviours of such a robot.
    - EP persuaded by this analysis: specific legal status for robots in the form of electronic persons, and to hold them responsible when causing damage
    - Divided expert opinion

- Robots using cloud services operate as a part of a complex system comprising various components that may entail multiple processes over which different persons, natural or legal, exercise control and, therefore, **might be held responsible**.

Technological complexity should not, in itself, be a reason for removing liability which might otherwise arise

Cloud robotics raises data protection considerations in relation to transparency, data controller/processor identification and data portability

- Ensuring transparency in cloud robotics may be challenging
  - Users do not identify robots as data processing devices
  - Contested ‘right to explanation’
    - EP: “it should always be possible to supply the rationale behind any decision taken with the aid of AI that can have a substantive impact on one or more persons’ lives; (...) it must always be possible to reduce the AI system´s computations to a form comprehensible by humans; (...)”.


algorithm
[al-guh-rith-uh m]
noun
1. A word used by programmers when they don’t want to explain what they did

- It may be difficult to identify controllers and processors of personal data
  - interactions and communications involving, robot2robot, robot2cloud, person2robot, sensors2cloud, sensors2robot, provider2processor, provider2subprovider, etc.
- The tangible aspect of cloud robotics challenges data portability

How to address the issues in relation to *Cloud Robotics*?

- Multi-impact assessment
- Multidisciplinary testing zones
- Uncertainty re the attribution of legal personality to autonomous robots
- Insurance schema could be considered + central fund to cover losses
  - For which type of robots
  - In which circumstances
  - Cyber-risk insurance for cloud robotics
- Alternatives models of liability: no-fault compensation model

Concluding remarks

- The growing interdependence between robots and cloud services raises a number of legal and regulatory challenges

- The dual cyber-physical nature of cloud robotics, the complexity of delivery ecosystems, and the number of actors with potential obligations and rights, give rise to some difficult challenges.

- Future regulatory initiatives addressing cloud robotics should take into account the complex and dynamic inter-dependence of the tangible and virtual elements of such systems

- Care should also be taken to avoid hasty and cumbersome interventions that might be a chilling factor at a time when the potential benefits of cloud robotics are just starting to emerge

Queen Mary University of London
Centre for Commercial Law Studies

UNIVERSITY OF CAMBRIDGE

Thank you for your attention

Dr. Eduard Fosch-Villaronga
e.foschvillaronga@qmul.ac.uk

Prof. Christopher Millard
c.millard@qmul.ac.uk