(D) Impact of Artificial Intelligence approaches on patent strategy in the healthcare area

Bal Matharu & Matt Cassie

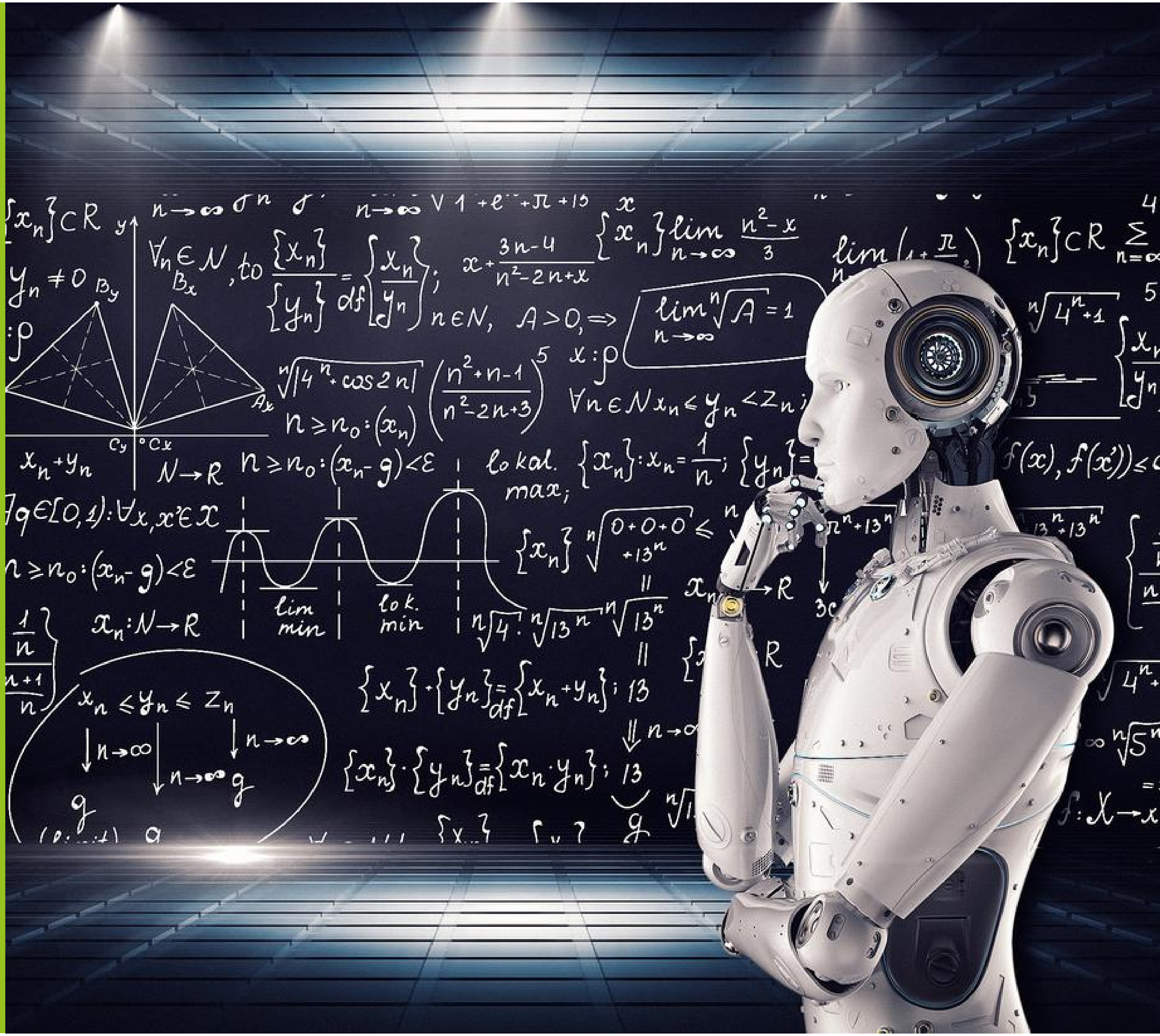
#healthcare #intellectualproperty

Outline

An introduction to AI

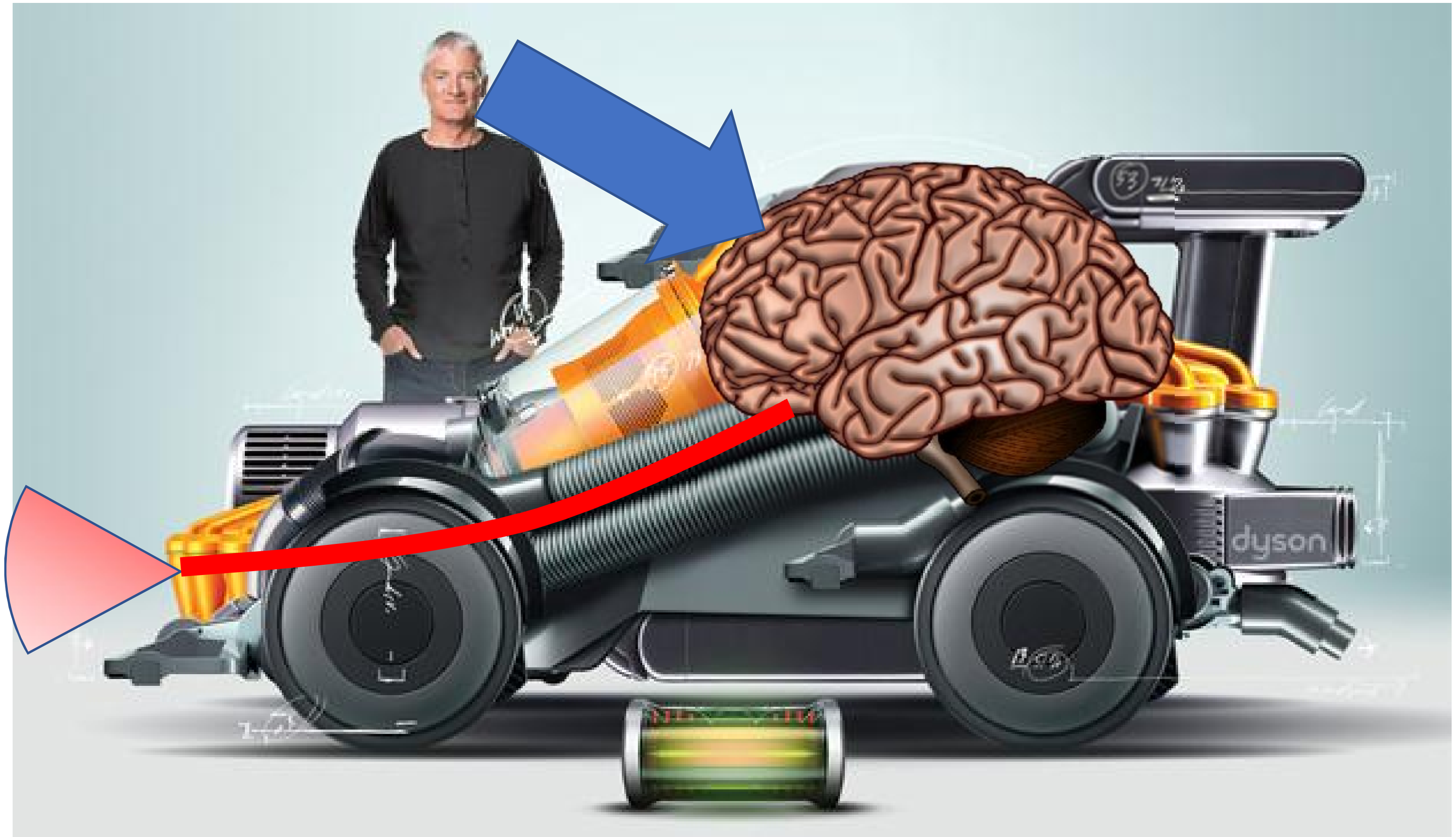
AI as an enabling tool

Patenting AI

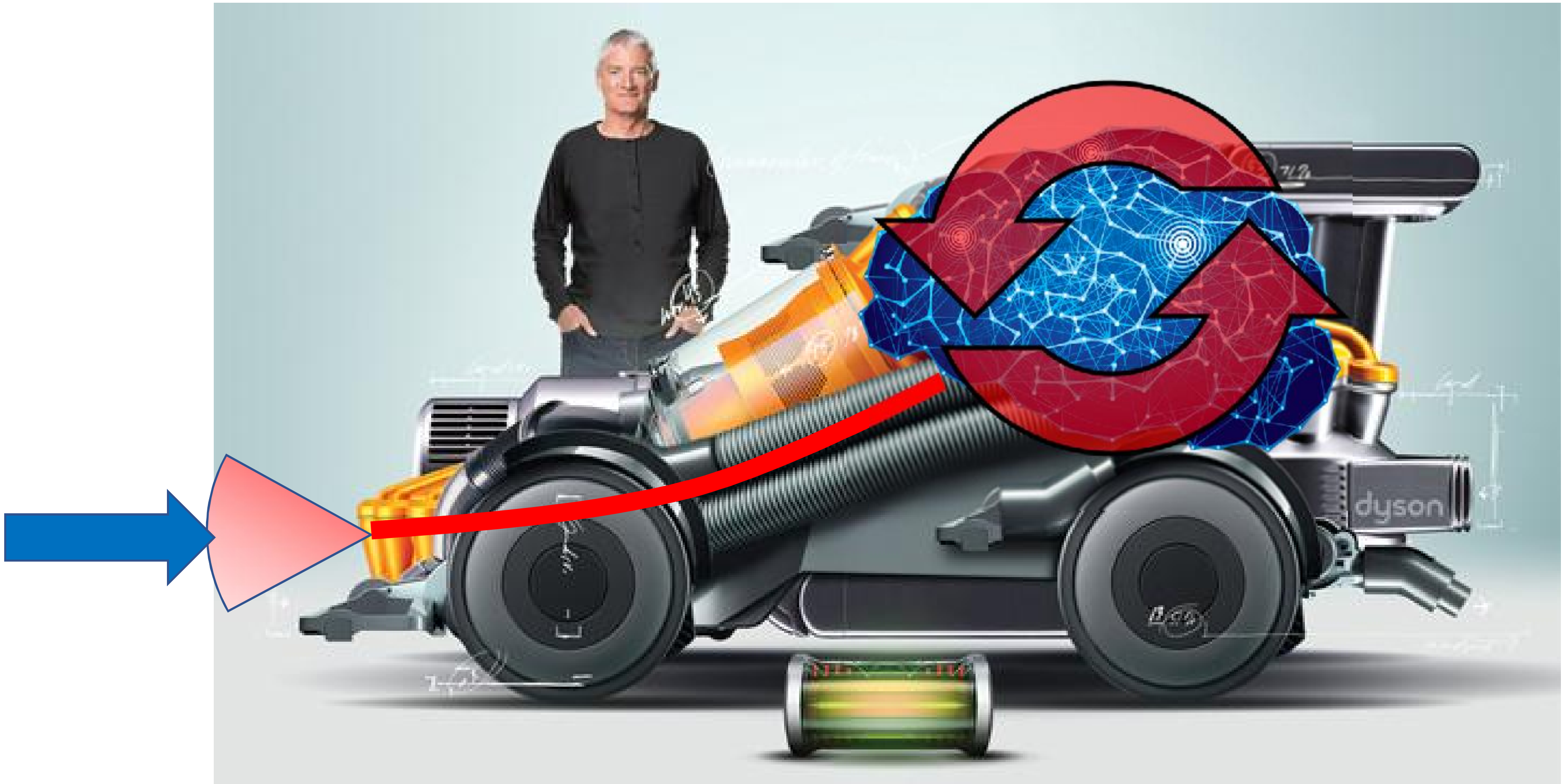


What is AI?

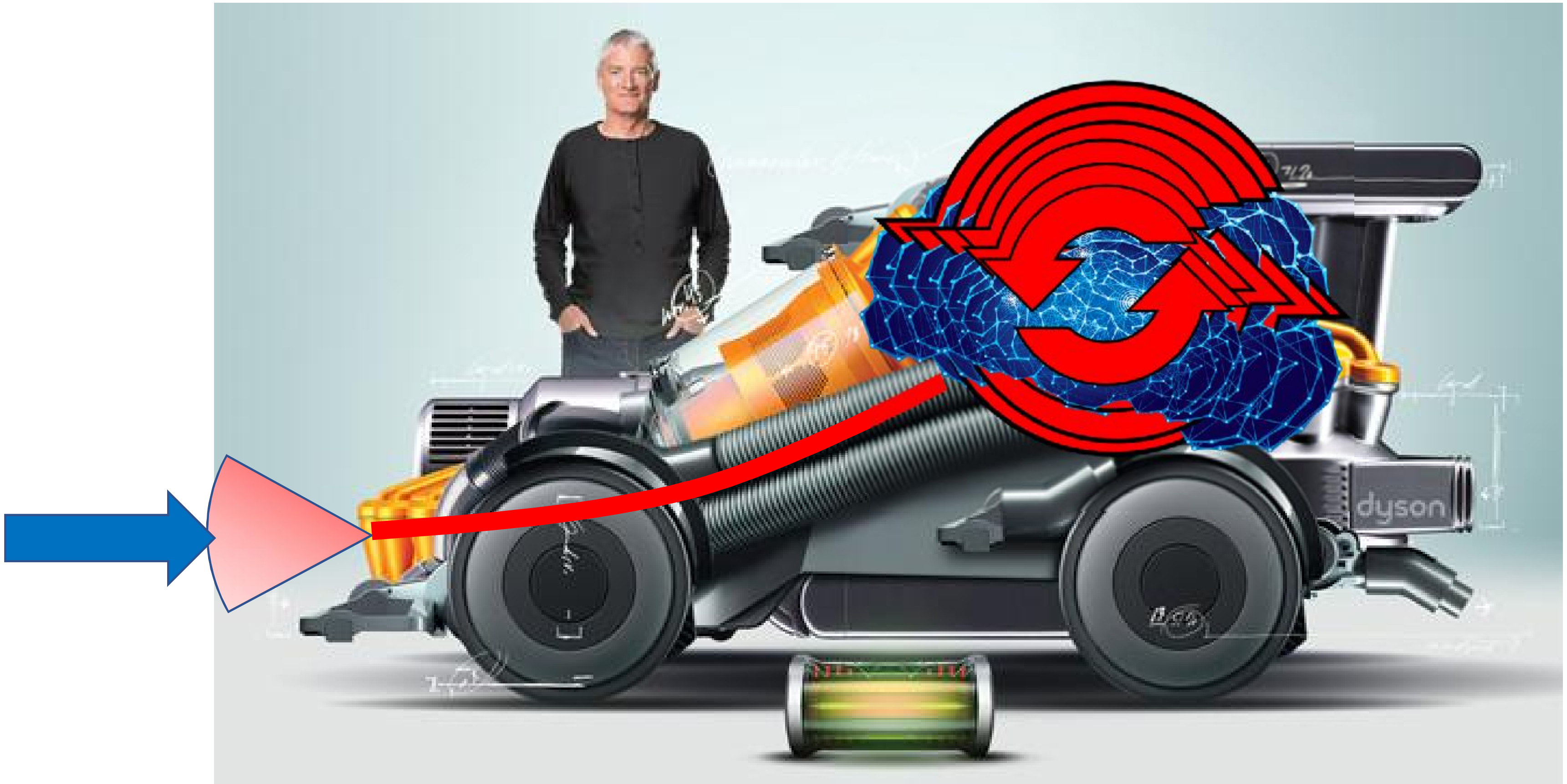
Artificial Intelligence



Machine Learning



Deep Learning



Benefits of AI – Delivers value

HGF

AI in healthcare

Google's DeepMind predicts 3D shapes of proteins

AI program's understanding of proteins could usher in new era of medical progress

▲ Google's DeepMind artificial intelligence program, AlphaGo, plays South Korean professional Go player, Lee Sedol. Photograph: Ahn Young-joon/AP

The Guardian

AI in healthcare

AtomNet: A Deep Convolutional Neural Network for Bioactivity Prediction in Structure-based Drug Discovery

Izhar Wallach
Atomwise, Inc.
izhar@atomwise.com

Michael Dzamba
Atomwise, Inc.
misko@atomwise.com

Abraham Heifets
Atomwise, Inc.
abe@atomwise.com

Our EchoMD AutoEF software receives FDA clearance for fully automated AI echocardiogram analysis
June 2018

AI May Be Better at Detecting Skin Cancer Than Your Derm

How new tech could replace your physician.

Charles River offering AI-enabled drug discovery services via Atomwise tie-up

By Melissa Fassbender
14-Jan-2019 - Last updated on 14-Jan-2019 at 16:05 GMT

PROCESS AUTOMATION | HEALTHCARE | RESEARCH AND DEVELOPMENT

AI and Machine Learning for Clinical Trials – Examining 3 Current Applications

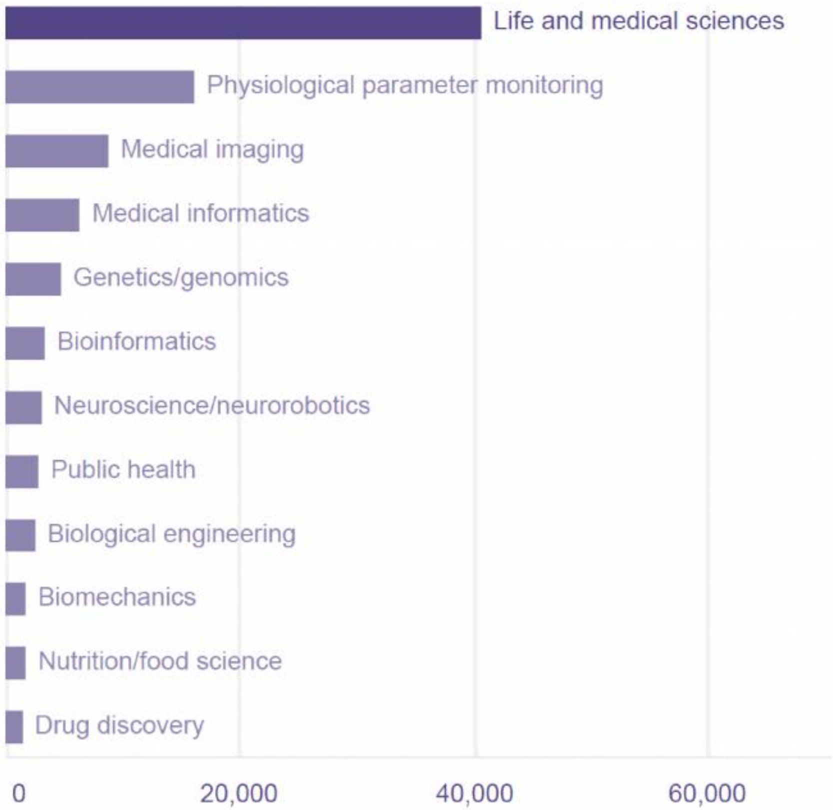
Last updated on January 28, 2019, published by Kumba Sennaar
Kumba covers emerging technology research breakthroughs and news at TechEmergence. She has performed research through the National Institutes of Health (NIH). Is an honors graduate of Rensselaer Polytechnic Institute and a Master's candidate in Biotechnology at Johns Hopkins University.

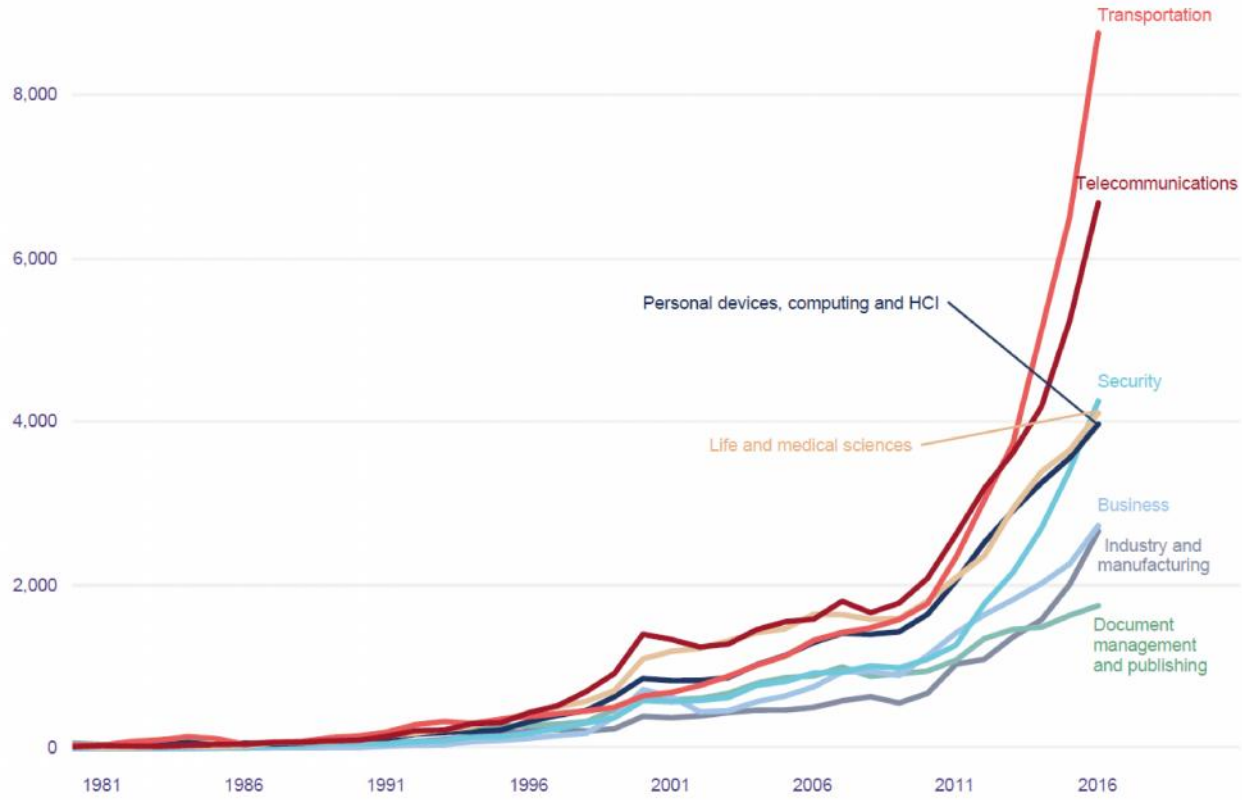
Reimagining Novartis as a 'medicines and data science' company

Published on January 12, 2018

Vas Narasimhan Influencer + Follow
Reimagining medicine as CEO of Novartis
12 articles
1,225 47 253

AI Patenting in Life Sciences

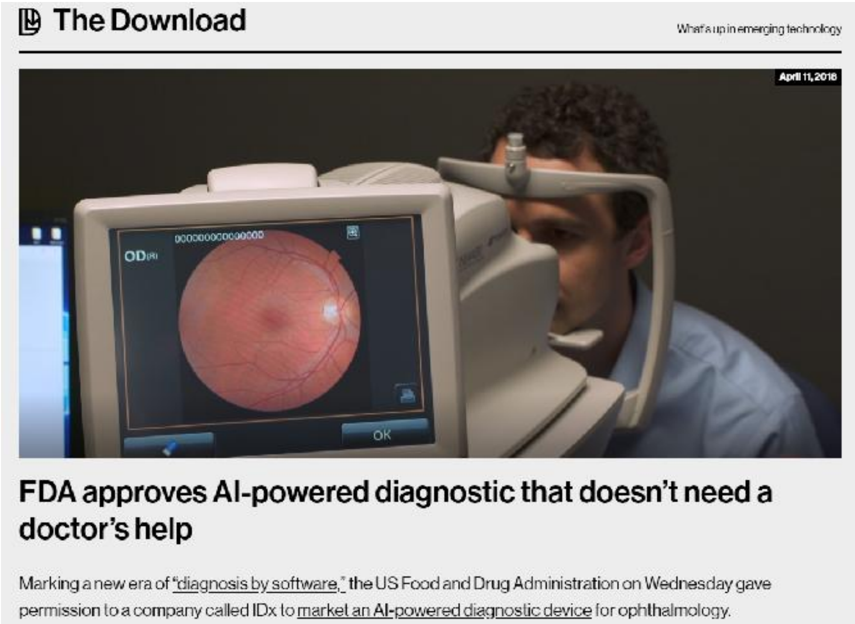




HGF

Inventions created by using AI

Case Study – Medical Diagnosis



The Download

What's up in emerging technology

April 11, 2018

FDA approves AI-powered diagnostic that doesn't need a doctor's help

Marking a new era of "diagnosis by software," the US Food and Drug Administration on Wednesday gave permission to a company called IDx to market an AI-powered diagnostic device for ophthalmology.

- Deep learning algorithm trained on extensive set of images annotated by experts
- Conventional approach limited by user's ability to identify features deemed important
- New system allows recognition of features, which may not be intuitive even to expert!

Patent Filing Strategy

Should claims to new diagnostic methods be pursued?

Patentable?

Value?

Alternatives?

Case Study – Process Chemistry

NEWS
28 MARCH 2018

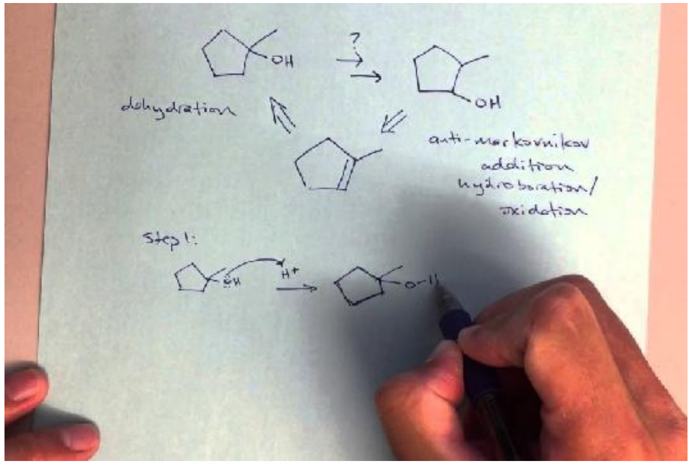
Need to make a molecule? Ask this AI for instructions

Artificial intelligence tool that has digested nearly every reaction ever performed could transform chemistry.

Holly Else

An artificial-intelligence tool could help scientists plan multi-step chemical reactions. Credit: Roger Mayne Archive/Mary Evans Picture Library

doi: 10.1038/d41586-018-03977-w



Inventorship…

"….is one of the muddiest concepts in the muddy metaphysics of the patent law"

Mueller Brass Co v. Reading Industrial Company (1972)

Inventorship errors, i.e. naming the wrong inventor either by inclusion or omission, can render a patent **invalid**

Assessment should be made using established legal principals

- Inventorship ≠ Authorship

Inventorship determination

Inventor is the person who "conceived" the invention

"Formation **in the mind** of the inventor, of a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice"

"Reduction to practice" does not equate to conception

Inventorship if AI involved in creation

Patent Laws do not (presently) recognise machines as inventors

Parallels to selfie-taking monkey copyright case?

Who should be named on the patent application?

- Data set providers
- AI software and hardware developers
- Individuals that decided to apply AI to data set
- Individuals that configured/trained/implemented AI
- Individuals that recognised invention

Beware of multi-party contributions and impact on IP ownership!

Longer term impact on patentability?

Article 56 EPC

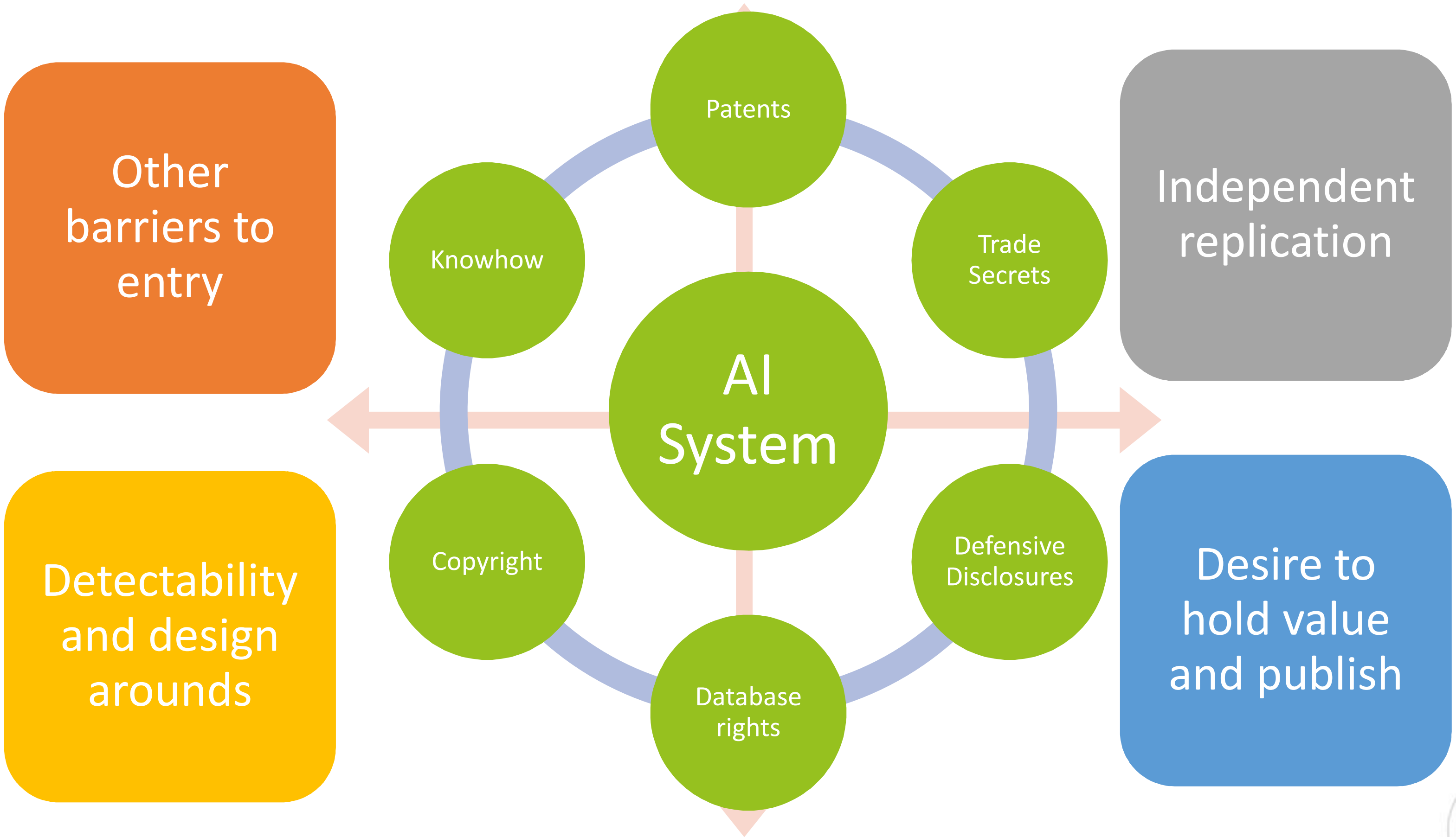
> “An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to **a person skilled in the art**”

Article 83 EPC

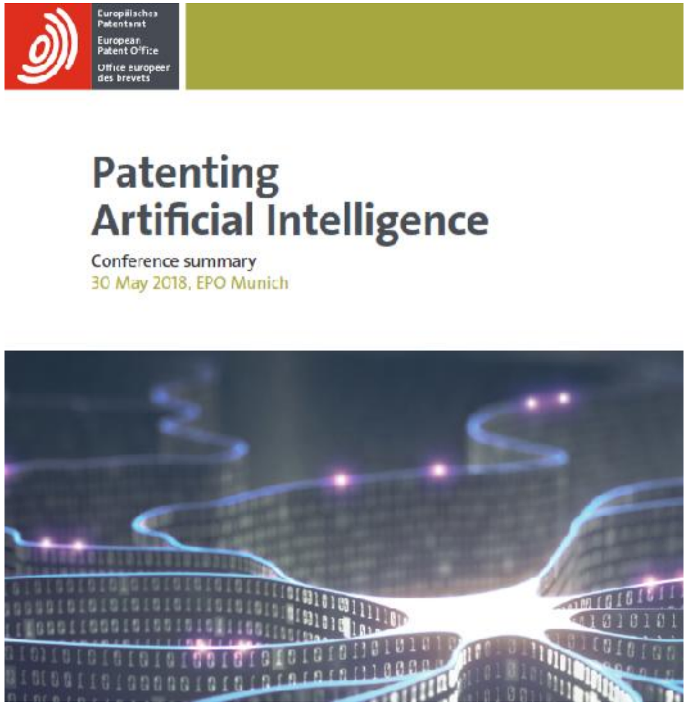
> “The European patent application shall disclose the invention in a manner sufficiently clear and complete for it to be carried out by **a person skilled in the art**”

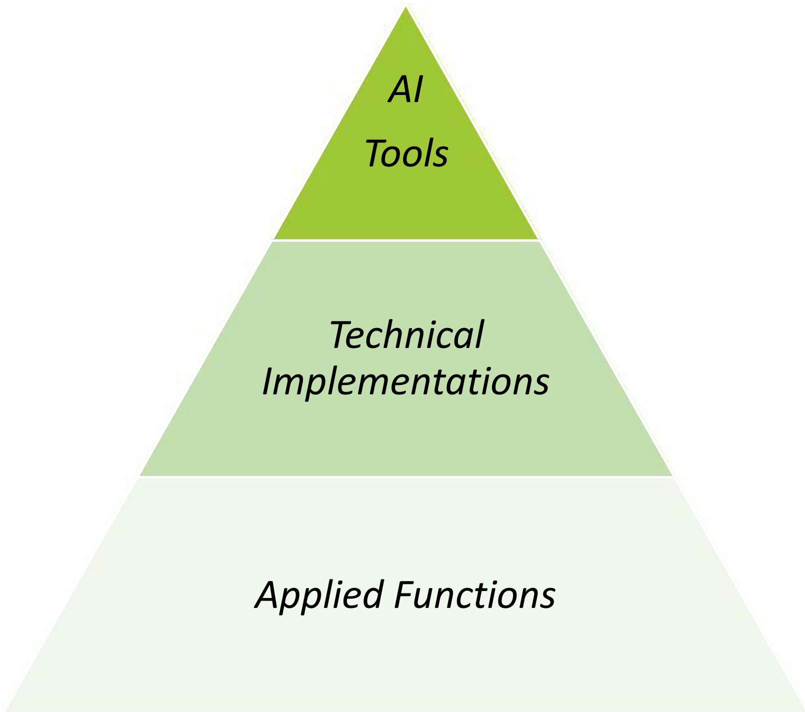
Inventions directed to AI

What forms of protection are appropriate?



Is it patentable and inventive?





/HGF

Is it patentable and inventive?

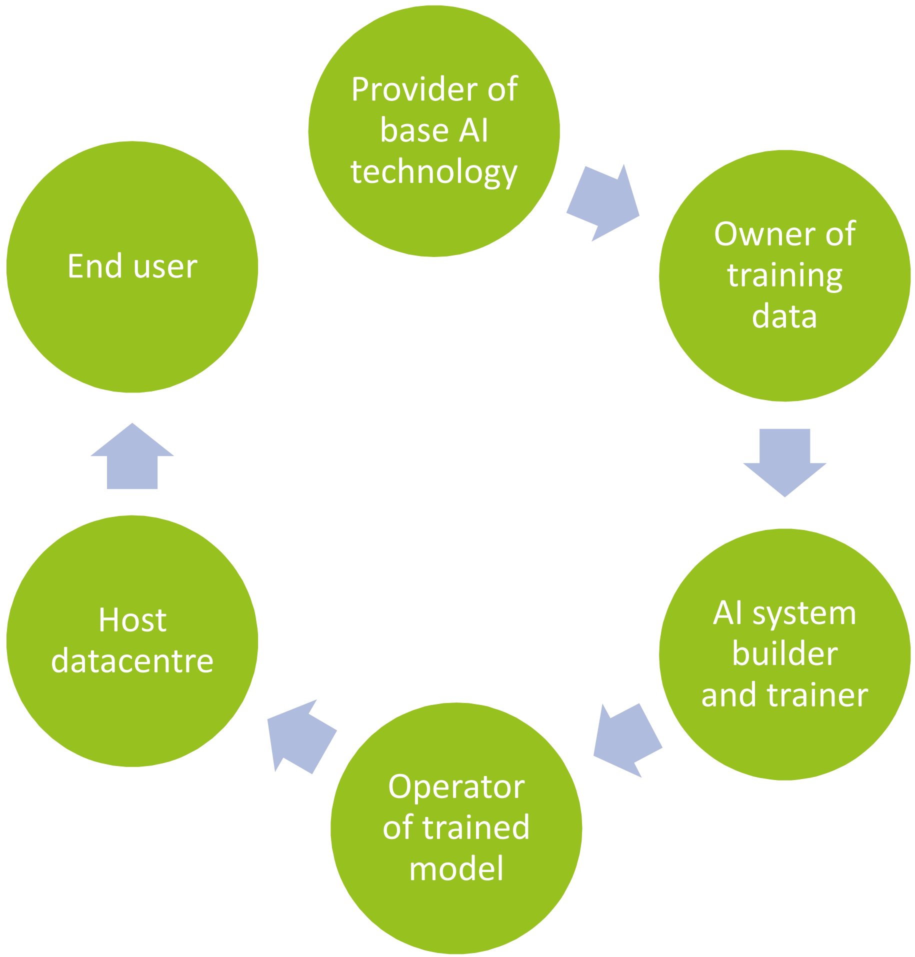
Alice decision creates tension with AI patents because the goal of AI is often to replicate human activity.

Blue Spike, LLC v. Google Inc., applying the *Alice:*

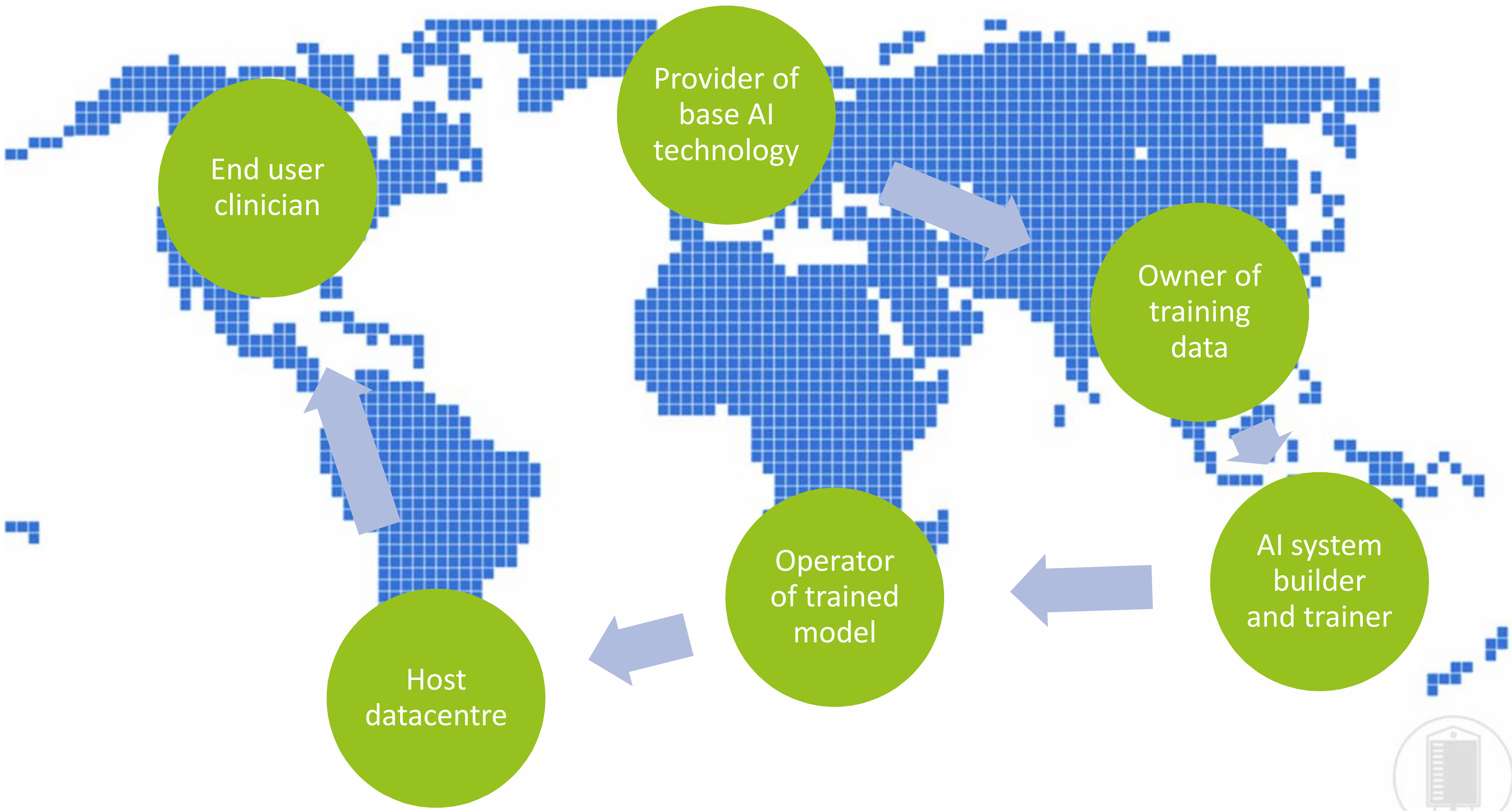
patent claims covered a general purpose computer implementation of "an abstract idea long undertaken within the human mind" because they sought to model "the highly effective ability of humans to identify and recognize a signal" on a computer.

- AI invention excluded under 35 USC 101

Who is the infringer?



Where is the infringer?



What to claim?

- Adapted AI algorithms and specific technical implementations
- AI system software configuration
- Implementation of AI system receiving inputs/controlling outputs
- AI system in combination with sensors and control apparatus
- Training dataset input
- Training process and apparatus
- Method and process for runtime operation of trained model
- Trained model in software and data outputs
- Server-side implementation
- End user-implementation
- Network of apparatus implementing AI system
- Specific outputs of trained AI systems

Proving infringement

Gathering evidence of infringement	In disclosure - Product and process description or source code	Limited seizure procedures	None	Limited seizure procedures
Experts	Essential	Of limited value	Of limited value	No cross examination
Extraterritorial protection	Recognised	No clear law	Recognised	Limited recognition

Summary

IP implications regardless of whether used as enabling tool or core technology

Important to understand role(s) AI may play in relation to IP generation

Cross-discipline approach will help develop comprehensive strategy

Rapidly developing area and patent systems expected to evolve…

Thank you

Bal Matharu – bmatharu@hgf.com

Matt Cassie – mcassie@hgf.com

#healthcare #intellectualproperty