



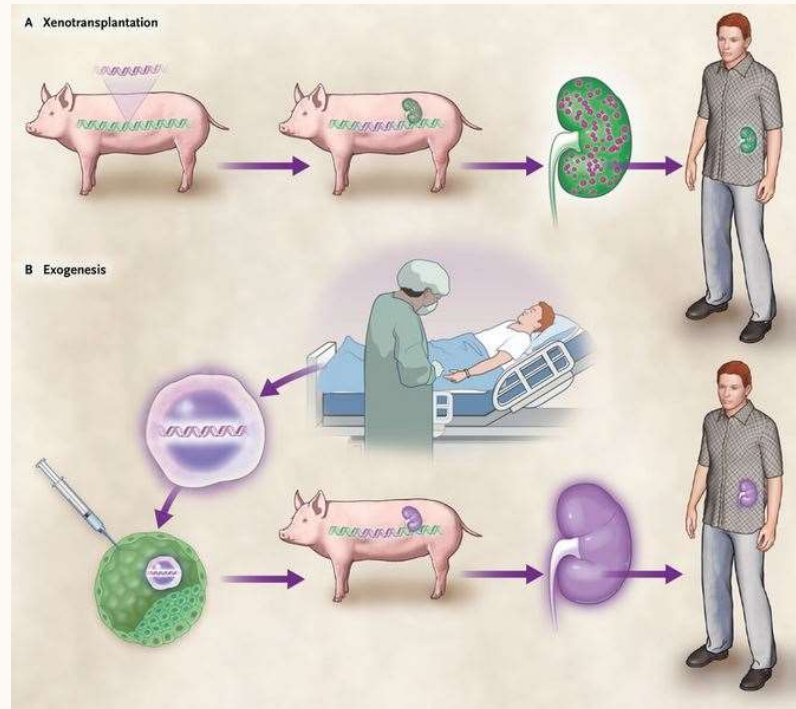
Smart Transplants: Ethical Considerations of AI in Organ and Tissue Donation'

An Ravelingien, PhD

Beleidscoördinator Ethiek en Persoonsgerichtheid, AZ Delta

* Disclaimer: images in this presentation were generated by ChatGTP

THE WORLD OF TRANSPLANTS HAS ALWAYS BEEN ONE OF GREAT INNOVATION (AND CONTROVERSY)







Kidney International Reports

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Research Letter

Relevance of the Banff Human Organ Transplant Consensus Gene Panel for Detecting Antibody and T-Cell-Mediated Rejection of Kidney Allografts

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C. Nau *et al.*, "An Exploration of Optimizing Kidney Exchanges with Graph Machine Learning," *2024 IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA)*, Montreal, QC, Canada, 2024, pp. 114-119, doi: 10.1109/CogSIMA61085.2024.10553716.

Abstract:

The Kidney Exchange Problem (KEP) determines organ exchange chains and cycles amongst a pool of patient-donor pairs (PDP) and non-directed donors (NDD) allowing for the maximum number of kidney transplants. The problem is complicated by optimization occurring over a sparsely connected, directed graph. The presence of an edge in this graph suggests a feasible transplant from a NDD or PDP to another PDP. Many traditional approaches treat the presence of edges in the exchange pool as known and certain. However, the certainty of edges in the exchange is unknown until optimization has been completed and transplants are offered. Edges that are thought to be present may fail because of physician preference, patient behavior, or previously unknown biological incompatibility. As a result, a disparity exists between the number of exchanges planned in optimal solutions and the number of exchanges that take place in the real world. Therefore, this work proposes an integrated KEP optimization methodology that learns a representation of features that affect the realization of optimized solutions. This methodology uses graph machine learning and allows for the integration of additional patient-donor attributes and collaboration between the optimization process and physician behavior. To evaluate this solution method an approach for simulating the implementation of KEP solutions is developed. An analysis of the required data inputs for both the solving and assessment methodology is noted and the potential benefits of the framework are described. A discussion of the limitations of the work is presented and directions for future works are proposed.

The use of Artificial Intelligence and 3D bio-printing for organ transplants



126-133

06/02/2024

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✉ D'Alessandro AAB; ✉ D'Alessandro WB; ✉ Herrera SDSC; ✉ Mendes SUR; ✉ Paiva MJM;
✉ Junior OGB; ✉ Holanda FS; ✉ Pedreira LE; ✉ Lima MG; ✉ Santos IA

Abstract

Technological evolution is driving revolutionary changes in the healthcare sector, especially in the field of organ transplants. Crucial innovations in this field include Artificial Intelligence (AI) and 3D printing, which, when combined, are paving the way for remarkable advancements in the creation of organs for transplants. This evolution has the potential to radically transform regenerative medicine and the treatment of chronic diseases. AI plays a fundamental role in processing and analyzing large amounts of data to optimize the design and functionality of artificial organs. It assists in modeling complex organic structures, predicts organ reactions in various environments, and facilitates the customization of organs according to the specific needs of patients. Furthermore, AI contributes to improving manufacturing processes and reducing costs, making the technology more accessible and effective. On the other hand, 3D printing, also known as bio-printing, enables the construction of three-dimensional structures using successive layers. In regenerative medicine, it is used to manufacture artificial organs and tissues from living cells. This technique has **the potential to alleviate the shortage of donated organs**, reducing dependence on human donors and the risk of transplant rejection, as organs can be created from the patient's own cells. The fusion of AI with 3D printing in organ transplant production is a promising field with enormous potential to save lives and improve the quality of life for patients. **This interdisciplinary approach is redefining the boundaries of tissue and organ engineering**, opening new horizons in the customization of medicine, research, and medical ethics. With the continuous advancement of these technologies, more significant progress is expected in the coming years.

GETUIGENIS ORGAANDONATIE

Orgaandonatie vraagt om een hart, niet om artificiële intelligentie



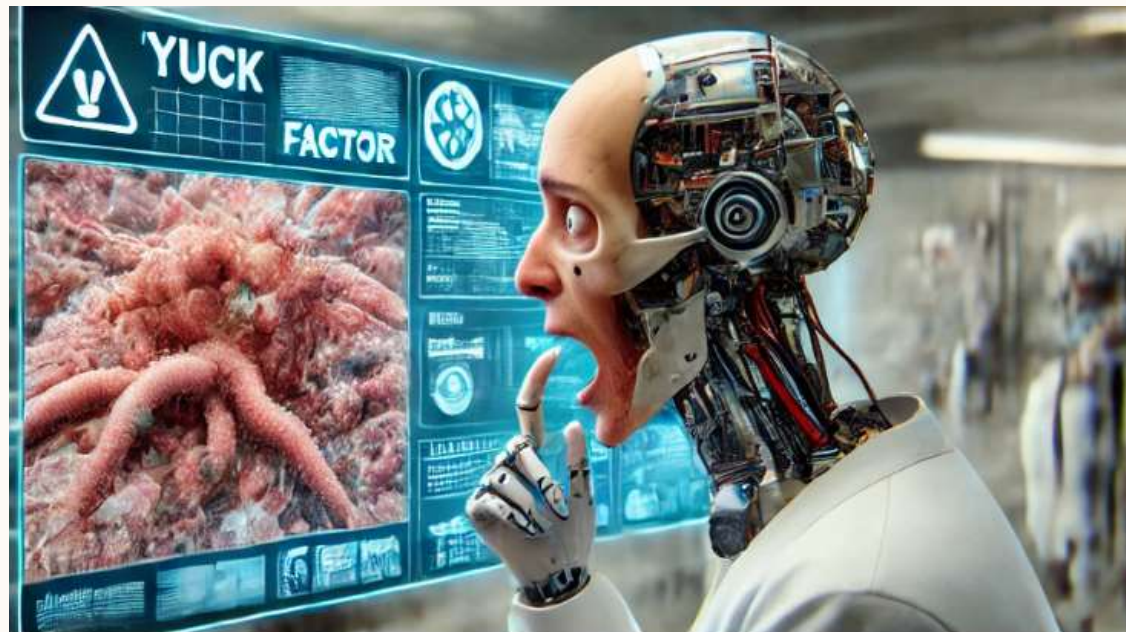
© getty

Terwijl anesthesist Ronald W. Dworkin een hersendode patiënte klaarmaakte voor orgaandonatie beseftte hij hoe belangrijk menselijke zorg en compassie is. Als AI artsen vervangt, wordt orgaandonatie een nachtmerrie.

Ronald W. Dworkin

Zaterdag 15 juni 2024 om 03:00

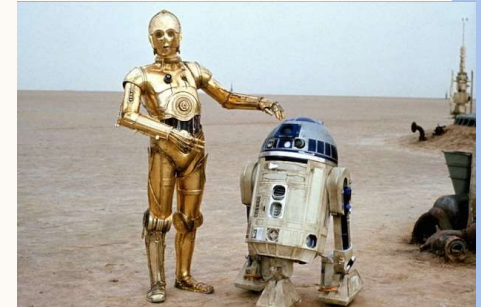
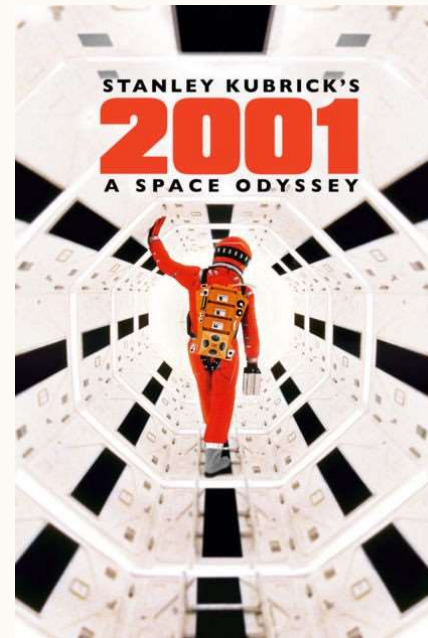
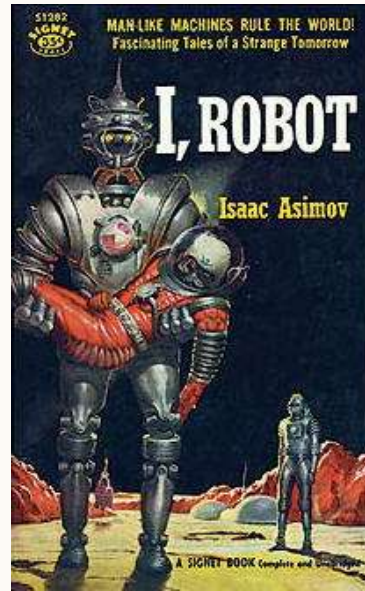






Metropolis (1927)

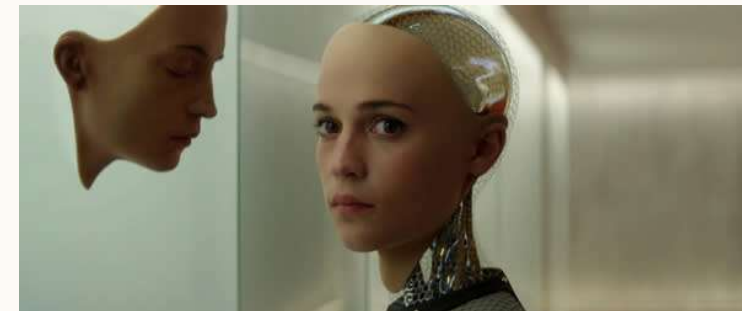
The Terminator (1984)



Star Wars (1977)

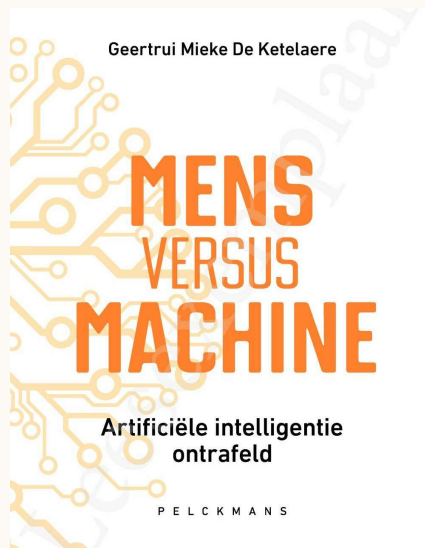


Her (2013)



Ex machina (2015)

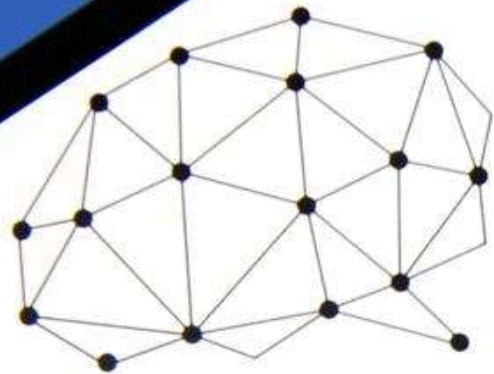
ETHICS OF TECHNOLOGY



“A.I. is geen religie. We moeten er niet in geloven. We moeten gewoon zorgen dat het werkt zoals we willen dat het werkt, net zoals elk ander gereedschap.”



“Techniekontwikkelaars, ingenieurs, computerwetenschappers en programmeurs zien zichzelf vaak als neutrale, uitvoerende spelers, werkzaam binnen de exacte wetenschappen, maar wie ontwerpt, maakt voortdurend keuzes, zowel functionele als morele. Moraliteit en technologie zijn dus geenszins afgescheiden domeinen, maar lopen sterk door elkaar. (...) elk product dat door mensen gemaakt is, is *made with morality*”



Cambridge
Analytica



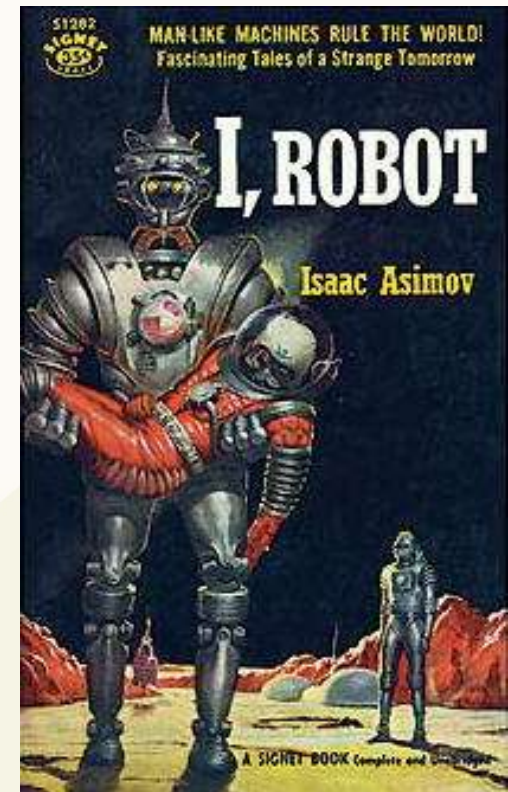
Asimov's laws of robotics (1942):

FIRST LAW: A robot may not injure a human being or, through inaction, allow a human being to come to harm.

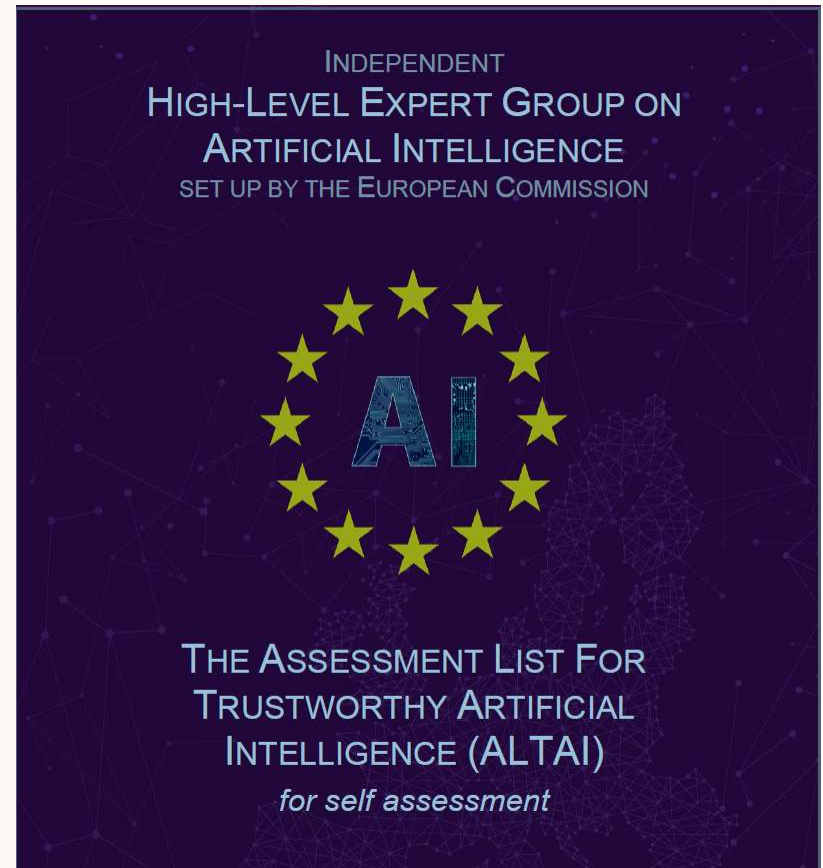
SECOND LAW: A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.

THIRD LAW: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

ZEROth LAW: A robot may not harm humanity, or, by inaction, allow humanity to come to harm.



GDPR
Medical Device Regulation

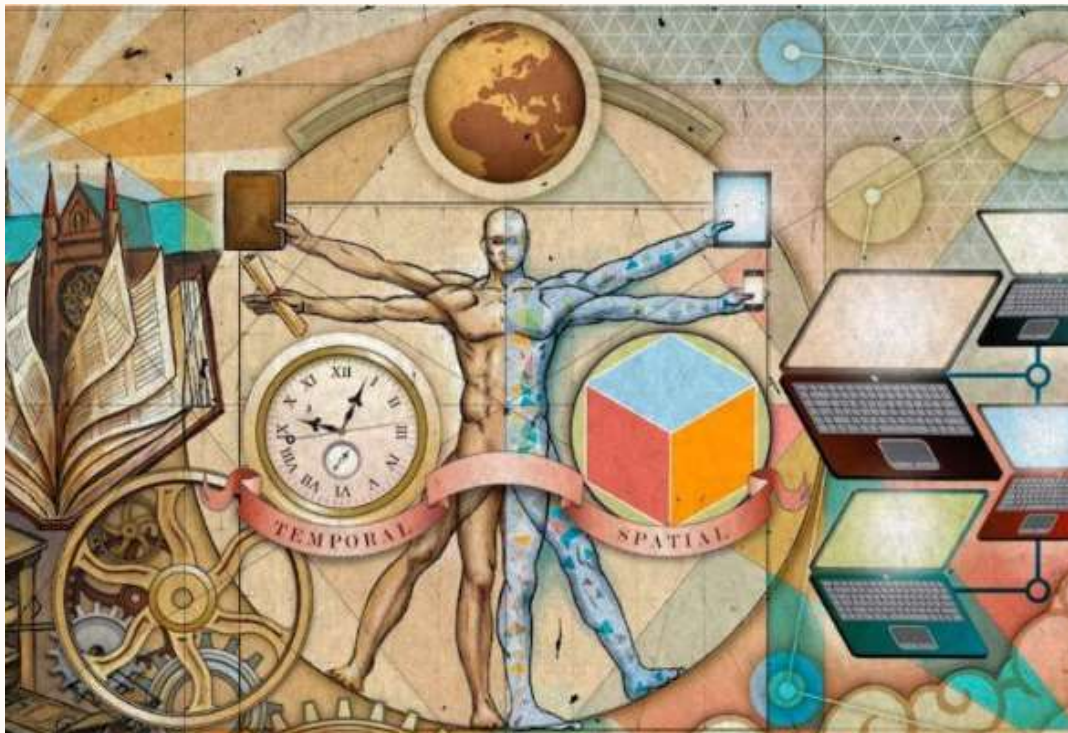




ETHICAL ISSUES

1° Does it serve a worthy goal?

THE GOOD LIFE



Technology developed to
accord with important
human values and goals
-- “ethical by design” --

...gieren
 die. Hannah Arendt
 le grootste risico's voor
 t dan verliezen mensen
 kaar, in instellingen,
 ia die belangrijk zijn
 rantwoording te laten

plekken of manieren
 ie op een verantwoor-
 maatschappij kunnen
 in de technologie zelf.
 sen dat het algoritme,
 n met je overleden
 besef je wel dat ik er
 t een herinnering is?
 p een gegeven mo-

de omgeving van de
 ng, misschien onder-
 e. De derde is de ge-
 t opvoeden of bij-
 in de technologie.
 aact kunnen hebben
 zondheid, reguleer
 die recreatief wordt

if de wet nog niet
 echnologie, maar
 ia. "Je stem is een
 t toelaat om je te
 vingerafdruk of je
 iDPR, in het Ne-
 rordering Gege-
 die waardoor je
 even voor cookies
 ische gegevens te
 ridische basis
 emming. Ac-
 ten voortaan
 voegen die de
 stem later te
 ming niet wei-

t overleden
 we binnen-
 eren om ook
 n je erfgena-

Elon Musk deed op X, waarin ze dingen
 zei die ze nooit heeft gezegd: op basis van
 de AI Act moet zo'n video binnenkort een
 duidelijk logo hebben die hem identifi-
 ceert als deepfake."

Eternal sunshine

Hoe ziet de toekomst van AI eruit? Smuha
 is kritisch. "Het beeld rond nieuwe technolo-
 gie is dat van altruïstische vernieuwers.
 Maar heel vaak is het businessmodel ach-
 ter AI er gewoon op gericht om ons er af-
 hankelijk van te maken, zodat we er geld
 aan blijven besteden. Of is er amper nage-
 dacht over de maatschappelijke gevolgen."

"Makers steken met opzet
 emotie in AI-stemmen,
 zodat we ze meer
 vertrouwen"

Nathalie Smuha
 AI-onderzoeker KU Leuven en
 New York University

"Ik denk ook dat het maatschappelijke
 belang van die technologie soms gehypet
 wordt. Er zijn positieve toepassingen, zoals
 de AI-systemen die dokters helpen om ro-
 buustere diagnoses te stellen. Maar bij veel
 toepassingen moet ik nog overtuigd wor-
 den van de wenselijkheid."

"Ik vind het interessant dat technologie
 onze ethische kaders opschuift", zegt Ver-
 beek. "Ik bedoel niet dat het allemaal oké
 is en we er niet kritisch naar moeten kij-
 ken. Maar ooit is AI zo normaal als een fo-
 tootje van een overledene op de schouw
 nu. We kunnen nu mee bepalen hoe die



ETHICAL ISSUES

- 1° Does it serve a worthy goal?
- 2° Does it work? And is it safe?

QUALITY OF CARE



RESPONSIBILITY AND ACCOUNTABILITY

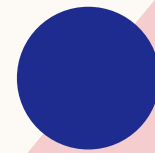




ETHICAL ISSUES

- 1° Does it serve a worthy goal?
- 2° Does it work? And is it safe?
- 3° Can it be understood?

TRANSPARANCY





ETHICAL ISSUES

- 1° Does it serve a worthy goal?
- 2° Does it work? And is it safe?
- 3° Can it be understood?
- 4° Will it be fair?

JUSTICE





**DIVERSITY, NON-
DISCRIMINATION**

PRIVACY

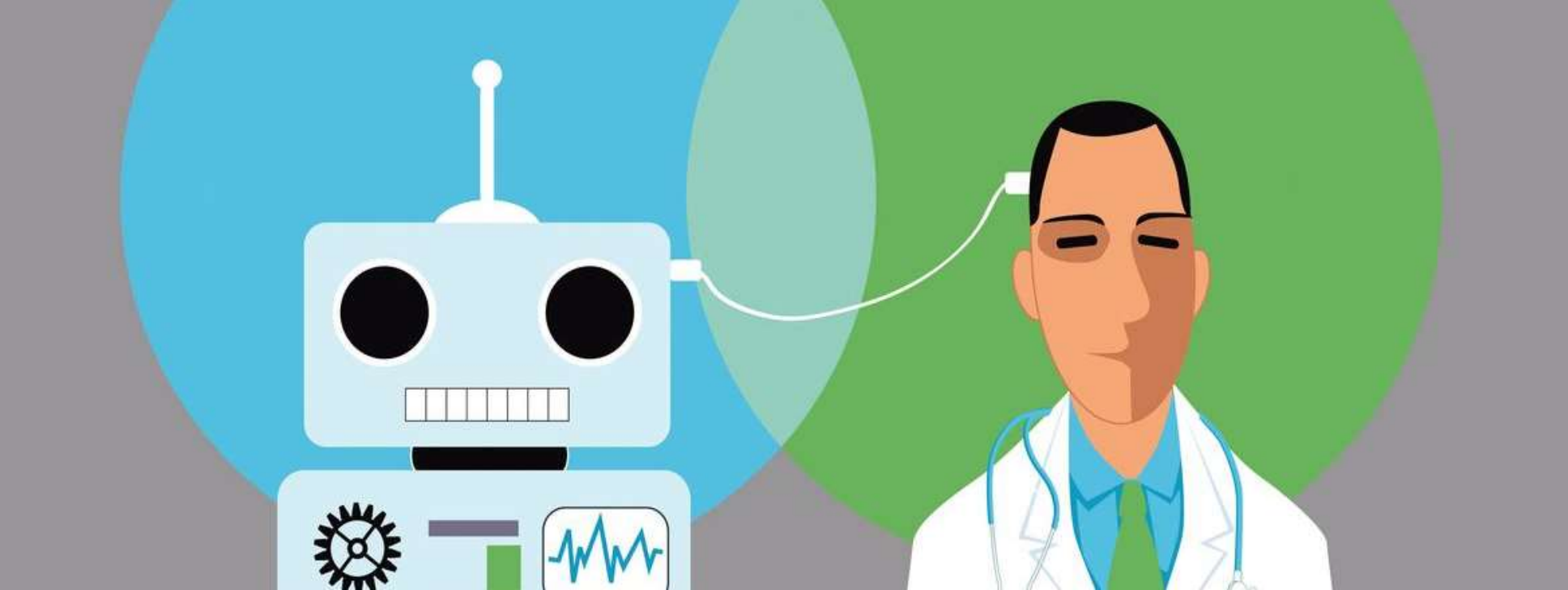




ETHICAL ISSUES

- 1° Does it serve a worthy goal?
- 2° Does it work? And is it safe?
- 3° Can it be understood?
- 4° Will it be fair?
- 5° Will we maintain autonomous choice?

AUTONOMY

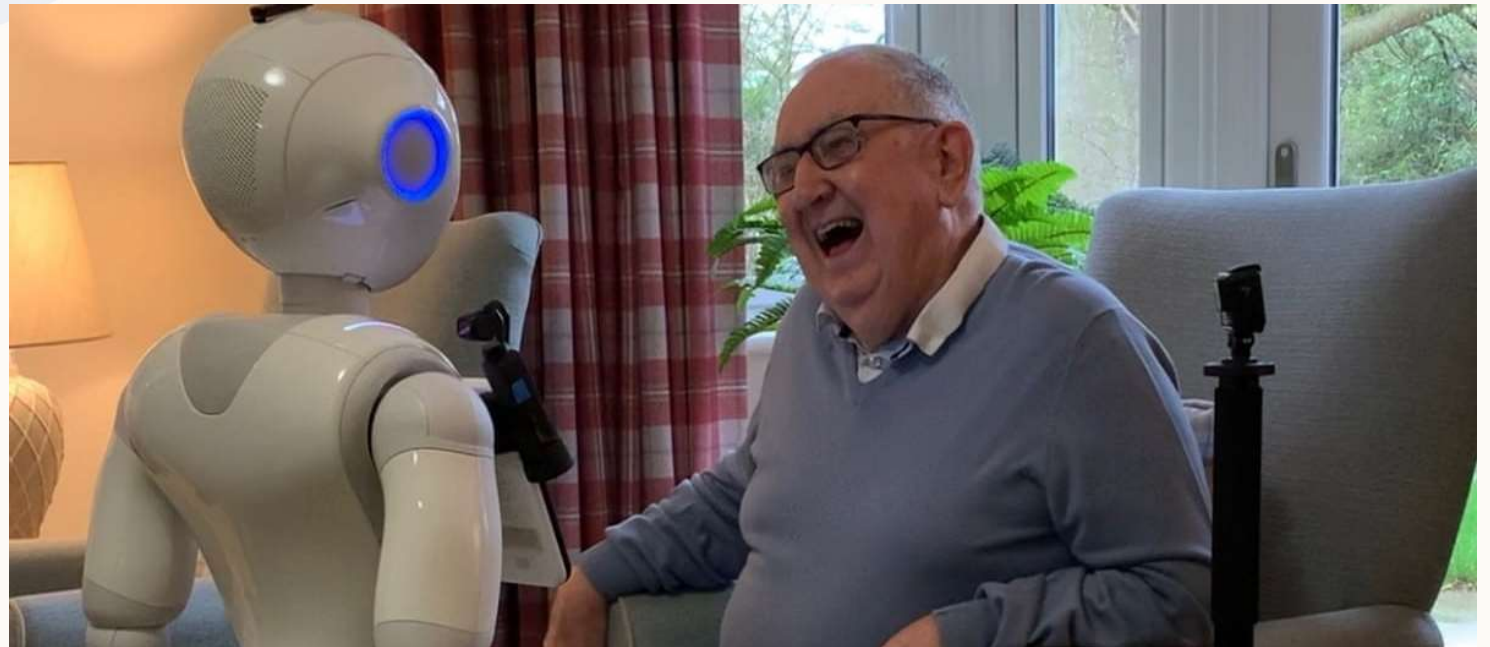




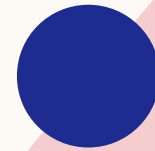
ETHICAL ISSUES

- 1° Does it serve a worthy goal?
- 2° Does it work? And is it safe?
- 3° Can it be understood?
- 4° Will it be fair?
- 5° Will we maintain autonomous choice?
- 6° What will it mean for humanity?

DIGNITY



MEANINGFUL INTERACTIONS



SO THE QUESTION REALLY IS... HOW CAN I (A.I.) HELP?





THANK YOU!

An Ravelingien

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