CAREBOTS FOR ELDERCARE*

Workshop On Ethics & Regulation of Emerging Technologies

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*From NS Jecker, *Ending Midlife Bias: New Values for Old Age* (Oxford Univ. Press)

1

Do we need carebots for eldercare?

2

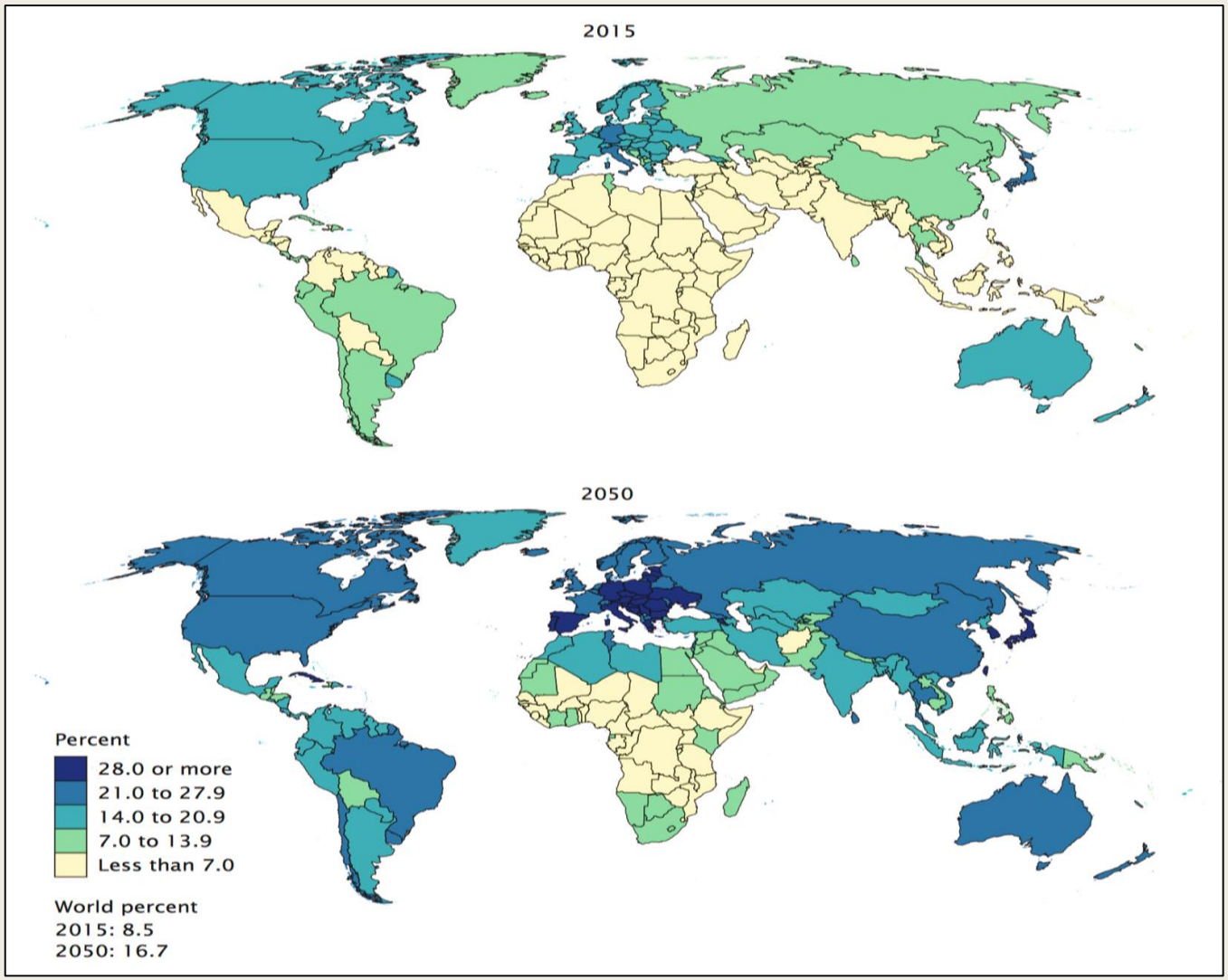
Can carebots do the right thing?

3

Can carebots show care?

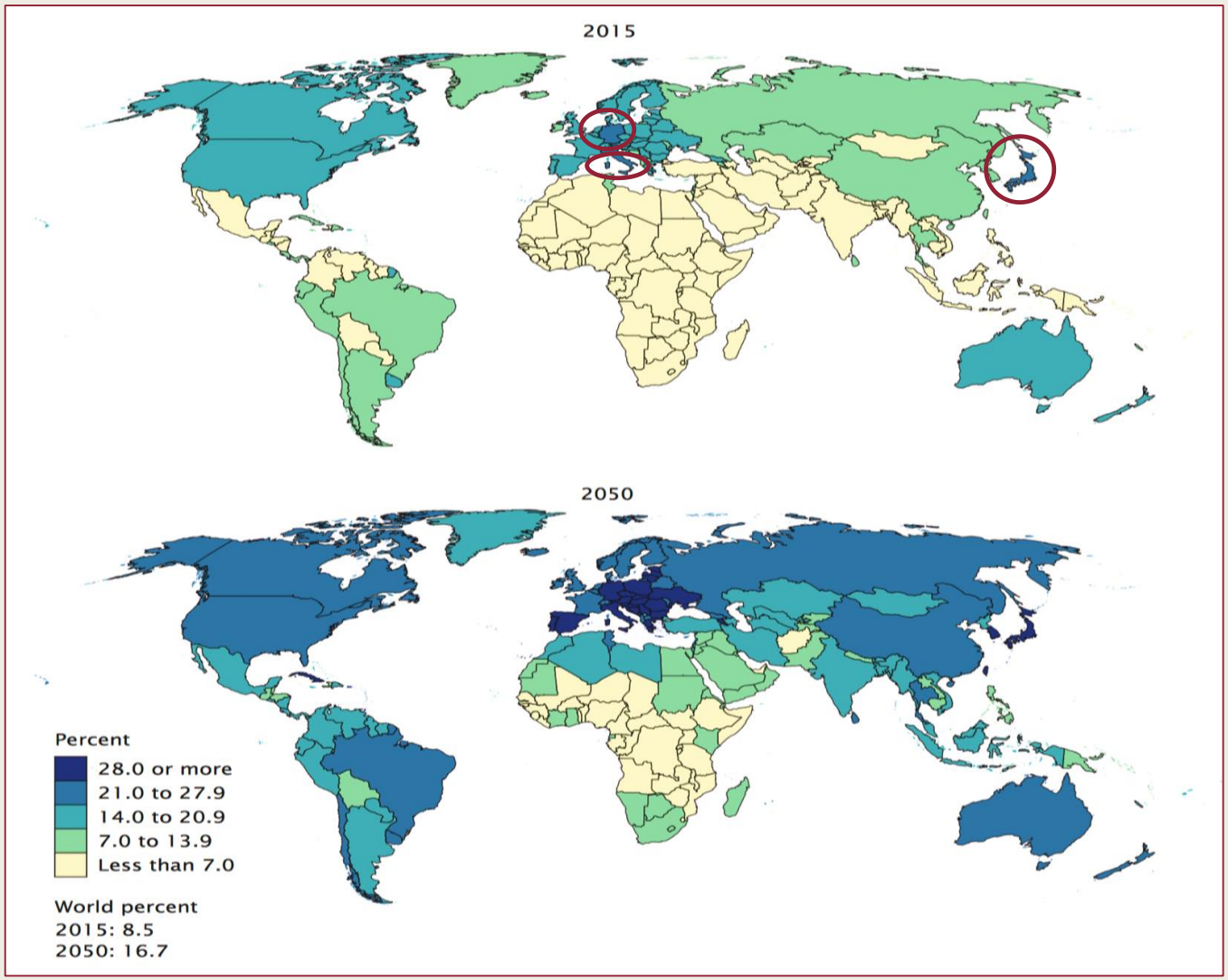
DO WE NEED CAREBOTS?

World Population 65+



UN, World Ageing Report, 2017

World Population 65+



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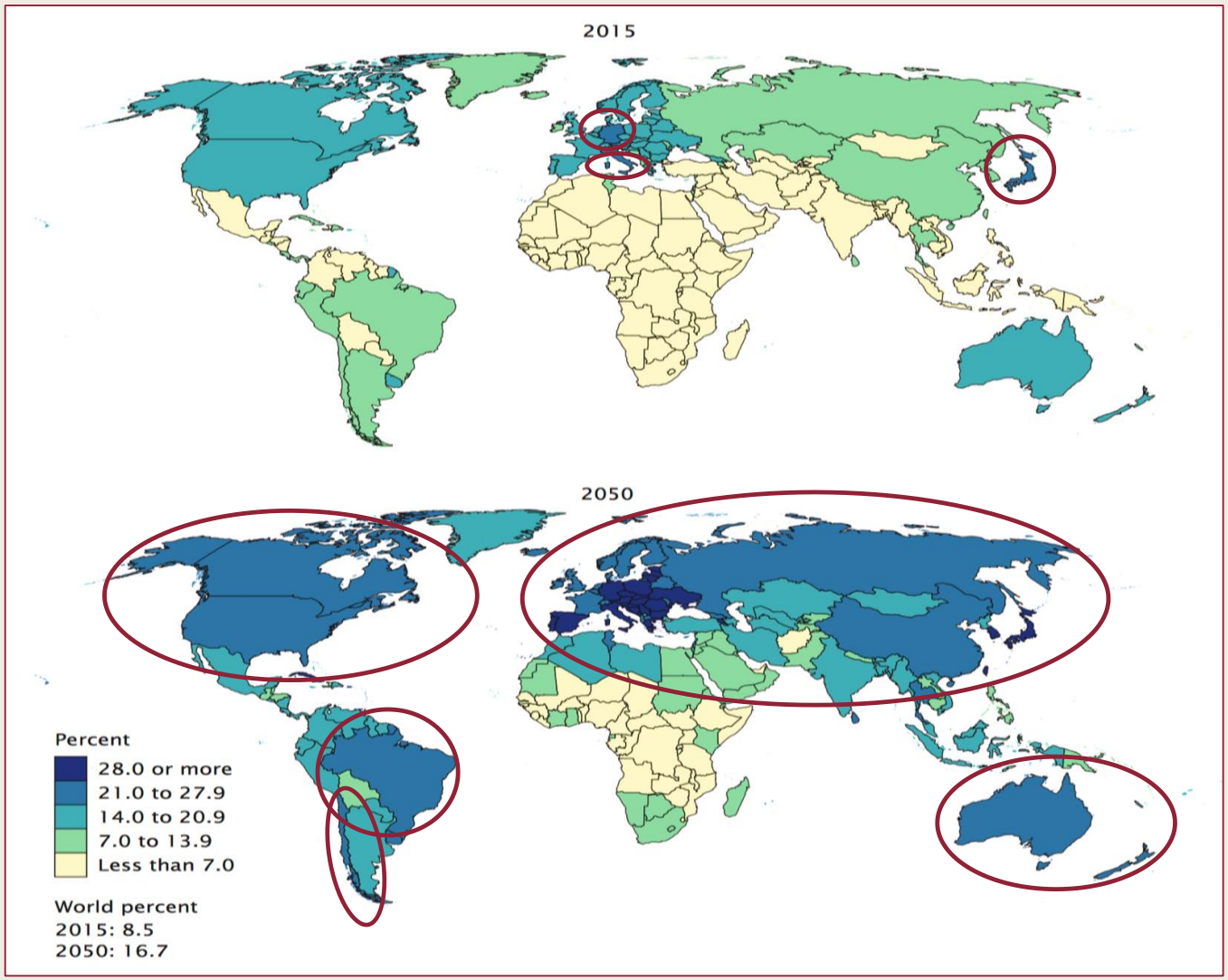


UN, World Ageing Report, 2017

Assistance With Daily Living

ADLs

- *Toileting*
- *Eating*
- *Dressing*
- *Bating*
- *Grooming*
- *Getting out of bed*
- *Getting out of chair*
- *Walking*

IADLs

- *Shopping*
- *Meals*
- *Housekeeping*
- *Laundry*
- *Medications*
- *Phone calls*
- *Traveling*
- *Finances*

Who Cares: Family Members

- *Unpaid female family members currently provide most of the daily support for elderly family members*
- *As nations develop, women gain opportunities outside the home*
- *As families age, the ratio of working age to older age members is shrinking*

By 2050, global demand for <u>paid</u> caregivers will more than double

UN, 2017, Living arrangements of older persons; WHO, 2015, World Report on Ageing

Who Cares: Migrant Workers

1 in 5 paid domestic workers is a migrant

- *Low wages*
- *Living & working conditions fail to protect human dignity*
- *Migration will increasingly create care gaps for sending nations*

Jecker, Chin, 2018, Justice & Global Care Chains, Dev World Bioethics; ILO at: https://www.ilo.org/global/topics/labour-migration/policy-areas/migrant-domestic-workers/lang--en/index.htm

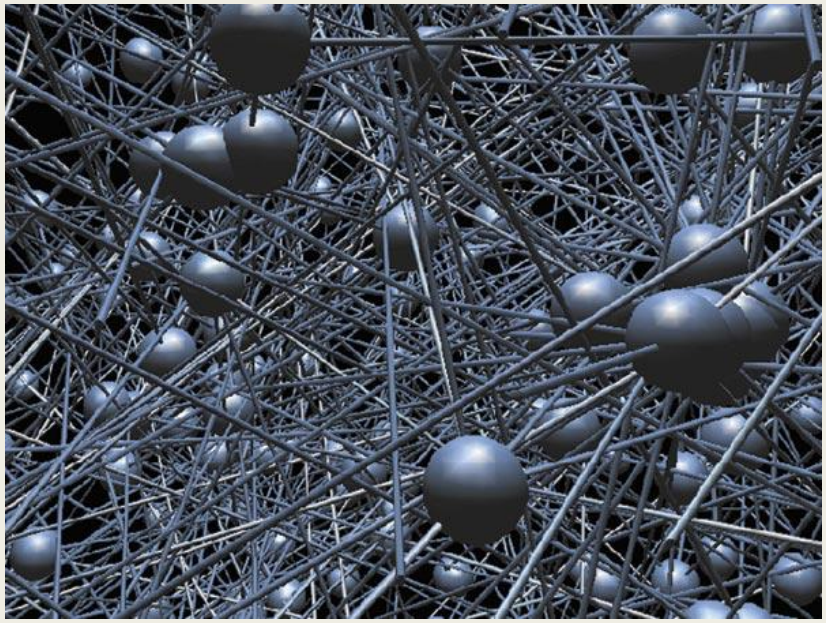
- *Can emerging technologies help solve the shortage of human caregivers?*
- *Can Carebots provide <u>quality</u> care?*


THE ETHICS OF ROBOTS
IN THE FUTURE, WILL THIS GUY MAKE
DECISIONS BEHIND THE WHEEL FOR US??

WILL CAREBOTS DO THE RIGHT THING?

The Values Alignment Problem

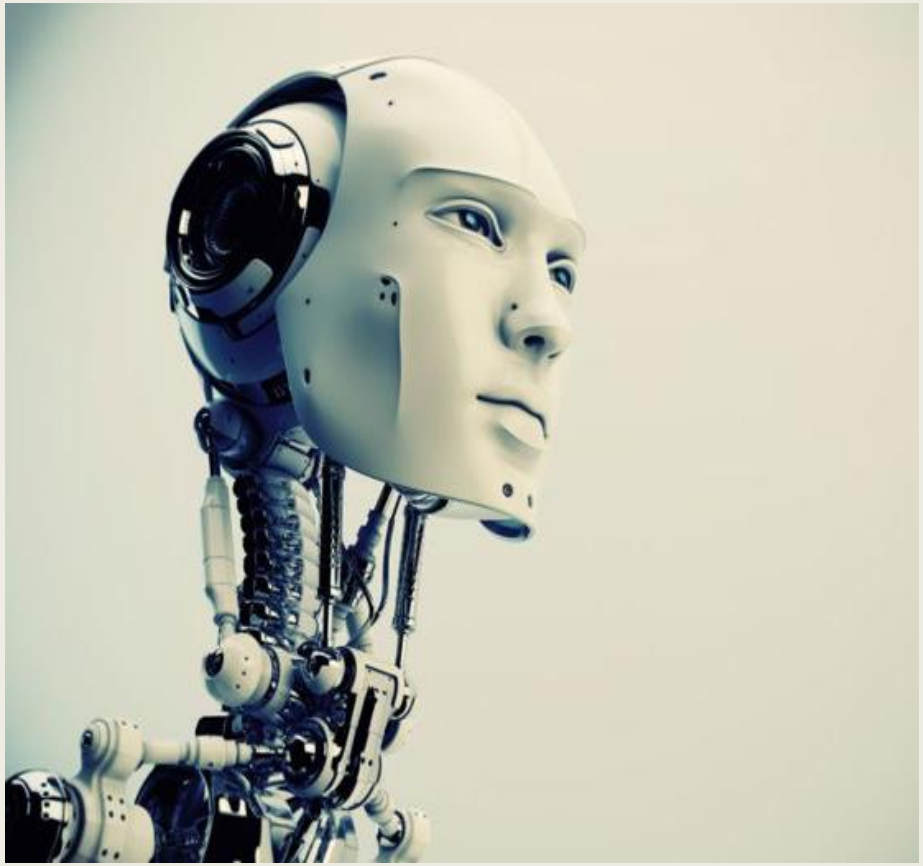
- *How can we align machine behavior with human values?*



Russell, 2015, World Economic Forum, 24 February, at: https://www.youtube.com/watch?v=WvmeTaFc_Qw

1G Carebots

- *Top-down*
- *Programmed with moral principles*
- *Made up of collections of if-then statements*



3G Carebots

- *Bottom-up*
- *Learn from external data*
- *Find patterns & use algorithms to decide what to do in novel situations*

AI/Bottom Up

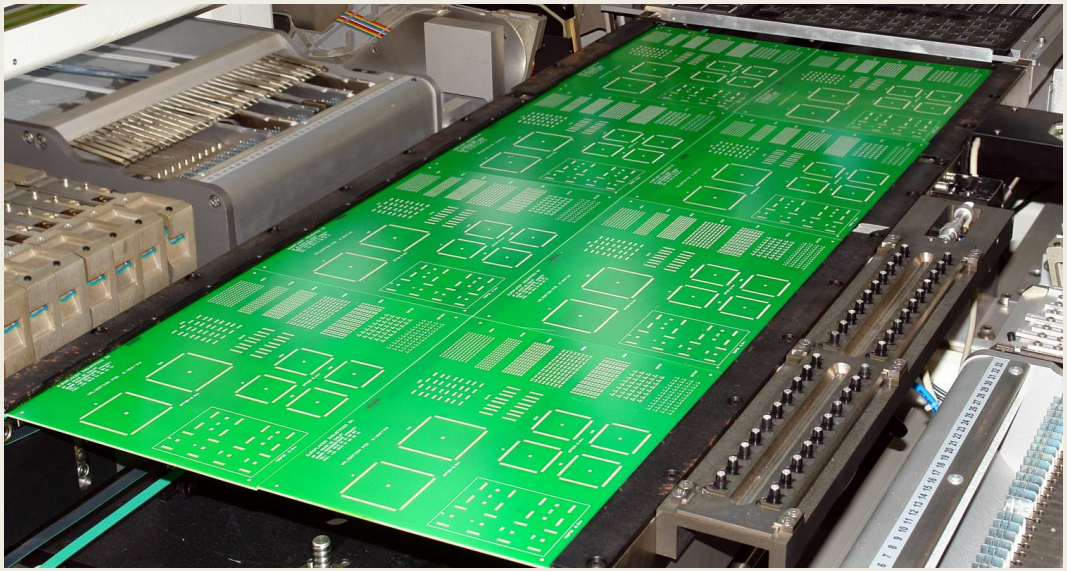
- *A child learns to recognize a face not by applying rules formalized by parents, but by seeing hundreds of thousands of faces*

Kaplan, Haenlein , 2019. Siri, Siri, in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence." Business Horizons 62

2G/Dual Mode

- *Dual mode*
- *Combines 1G & 3G*

Machine Learning: 1G



- *Program moral rules*
- *Test by having it "guess" what a human expert would do*
- *Tweak the rules & retest*

Machine Learning: 3G

- *Select data reflecting what we want to teach*
- *Feed data into AI system*
- *Test by having it "guess" what human experts would do*
- *Perform multiple iterations*

Top-Down

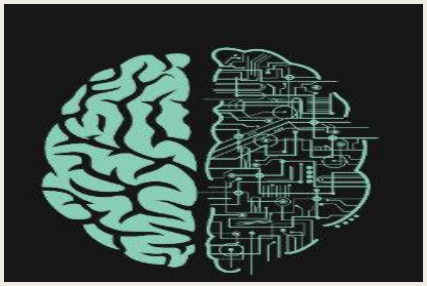
Pros

- *Easy to comprehend*
- *Easy to debug*
- *Easy to enhance*

Cons

- *Heuristic*
- *Manual labor*

Bottom-Up



Pros

- *Trainable*
- *Adapts automatically*
- *Reduces manual labor*

Cons

- *Retraining for each domain*
- *Needs ML expertise*
- *Opaque*

Chitcariu L, Li Y, Reiss F, 2015. Transparent Machine Learning for Information Extraction

Case 1: Marsha & her 1G Carebot

79 yo Marsha discharged home after treatment for pneumonia. Unable to self-care due to delirium, incontinence & gait instability. A 1G carebot, Casey, is assigned to Marsha & programmed for utility & safety.

1 wk post-discharge, delirium resolves; yet, Casey cannot detect this.

Marsha refuses diaper change & wants to use the toilet.

Case 1: Marsha & the 1G Carebot

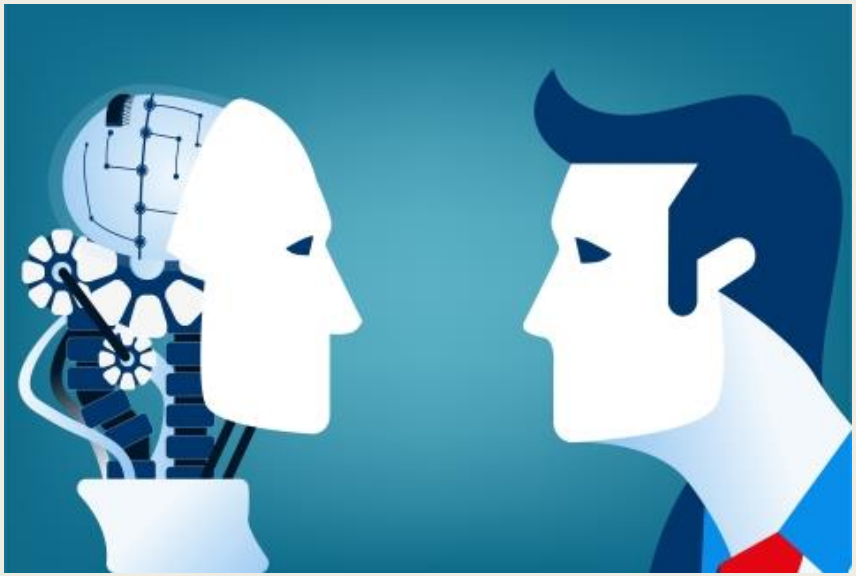
Programmed for utility & safety, Casey could not let Marsha ambulate independently. Preventing this required physical restraints.

Marsha became agitated. Programmed to minimize distress, Casey switches to chemical restraints.

Benzodiazepine has amnestic effects, which further mitigates Marsha's distress by eliminating recall.

1G Carebots : Values Alignment

- *Debug*
- *Tweak the rules*
- *Add a deontological constraint that requires respecting dignity*

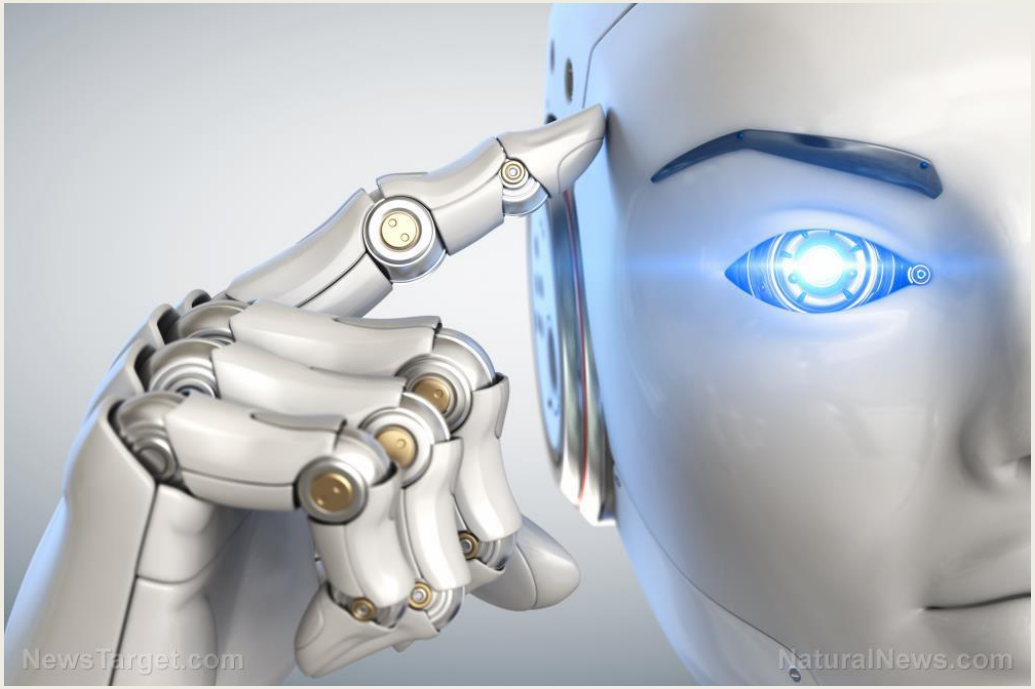


Principles for 1G Carebots

Principle	Definition	Example
Precautionary	Maximize utility but assign more weight to avoiding harm	Restraints to reduce fall risk
Utilitarian	Maximize utility	Benzodiazepine to eliminate recall

Central Capabilities	
1. Life	✓
2. Health	
3. Bodily Integrity	✓
4. Senses, Imagination, Thought	✓
5. Emotions	
6. Practical Reason	✓
7. Affiliation	
8. Nature	
9. Play	
10. Environment	✓

RESPECT HUMAN DIGNITY



Case 2: Marsha & the 3G Carebot

- *Order a carebot to assist with ambulating & toileting*
- *Asks Marsha to agree to diapers at night*

Respecting Human Dignity

Central Capabilities	Reasonable Support
Life	Support authorship
Bodily Integrity	Ambulate during the day
Senses, Imagination, Thought	Keeps intact the ability to think & remember
Practical Reason	Negotiate & decide together
Environment	Order a 2nd carebot

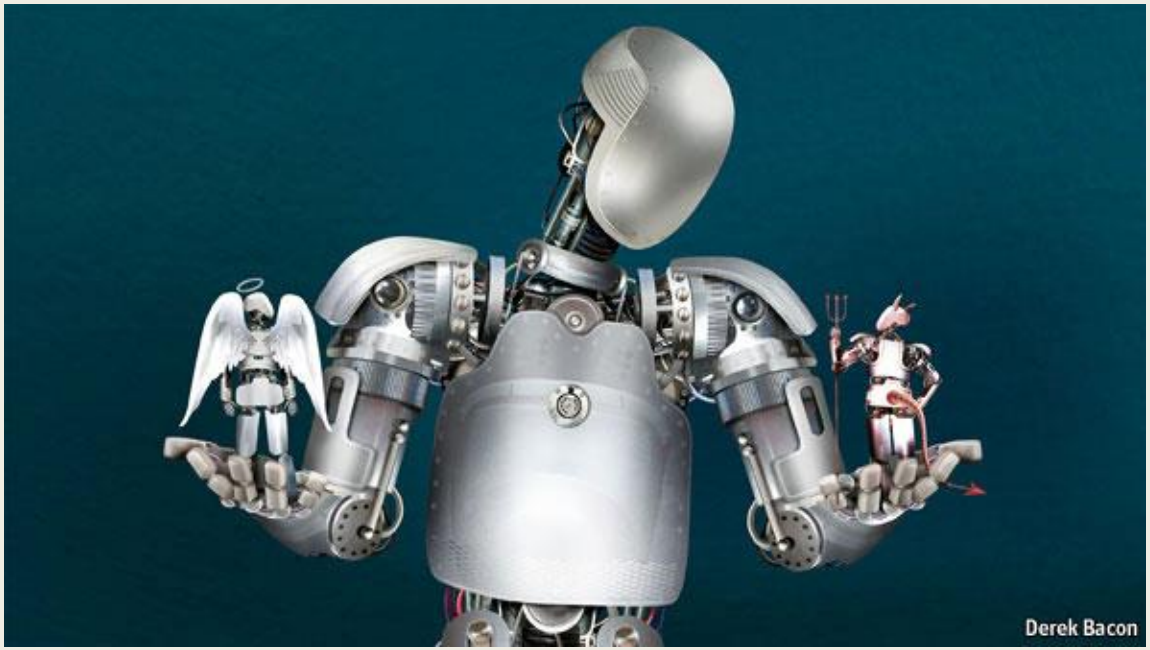
- *Marsha accepts Casey's proposal & posts a glowing review of the software update on social media*

Principles for 1G/2G Carebots

Principle	Definition	Example
Precautionary	Maximize utility but assign more weight to avoiding harm	Restraints to reduce fall risk
Utilitarian	Maximize utility	Benzodiazepine to eliminate recall
Dignity	Reasonable support for floor level capabilities	Negotiate & compromise

Is Values Alignment Sufficient?

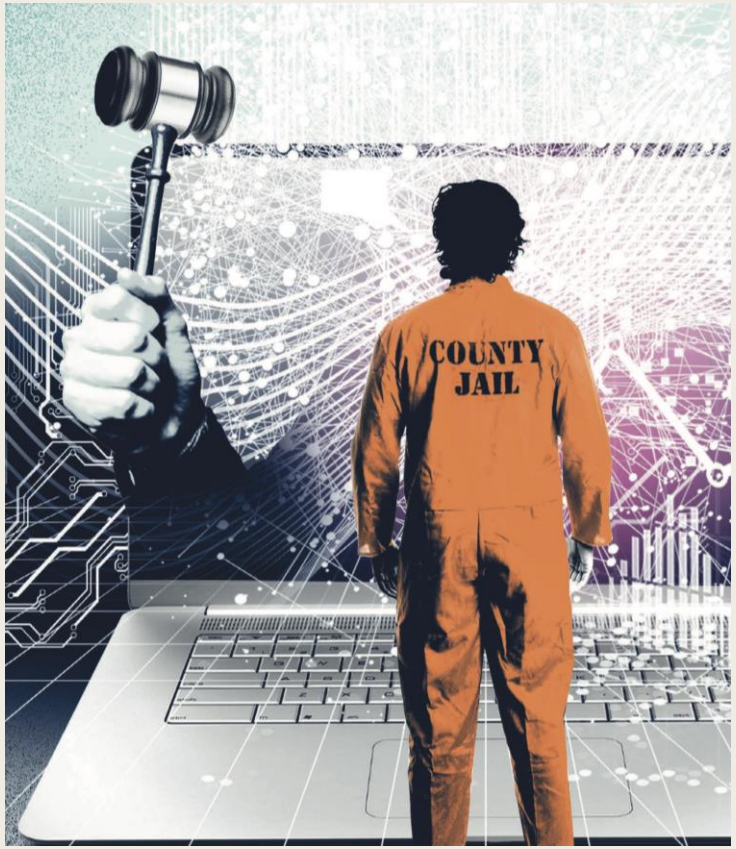
- *Google:* An African American couple identified as gorillas
- *Amazon:* Sales ranking removed for gay/lesbian books
- *Facebook:* Stereotypical portrayal of Muslims



Algorithmic Bias

Carebots reflect human biases:

- *Companies are profit-driven*
- *Carebots are deployed for populations different from those they trained on*
- *Data reflect human bias*
- *The "sea of dudes"*



Waajcman, 2010, Feminist Theories of Technology." Cambridge J Econ 34; Clark, 2016, What lessons will 'sea of dudes' teach? Vancouver Sun

Can machines make better (more ethical) machines?

- *Should we align human values with machine values?*
- *Will we understand machine values?*
- *Should we trust them?*

Case 3: Matt & Machine Diagnostics

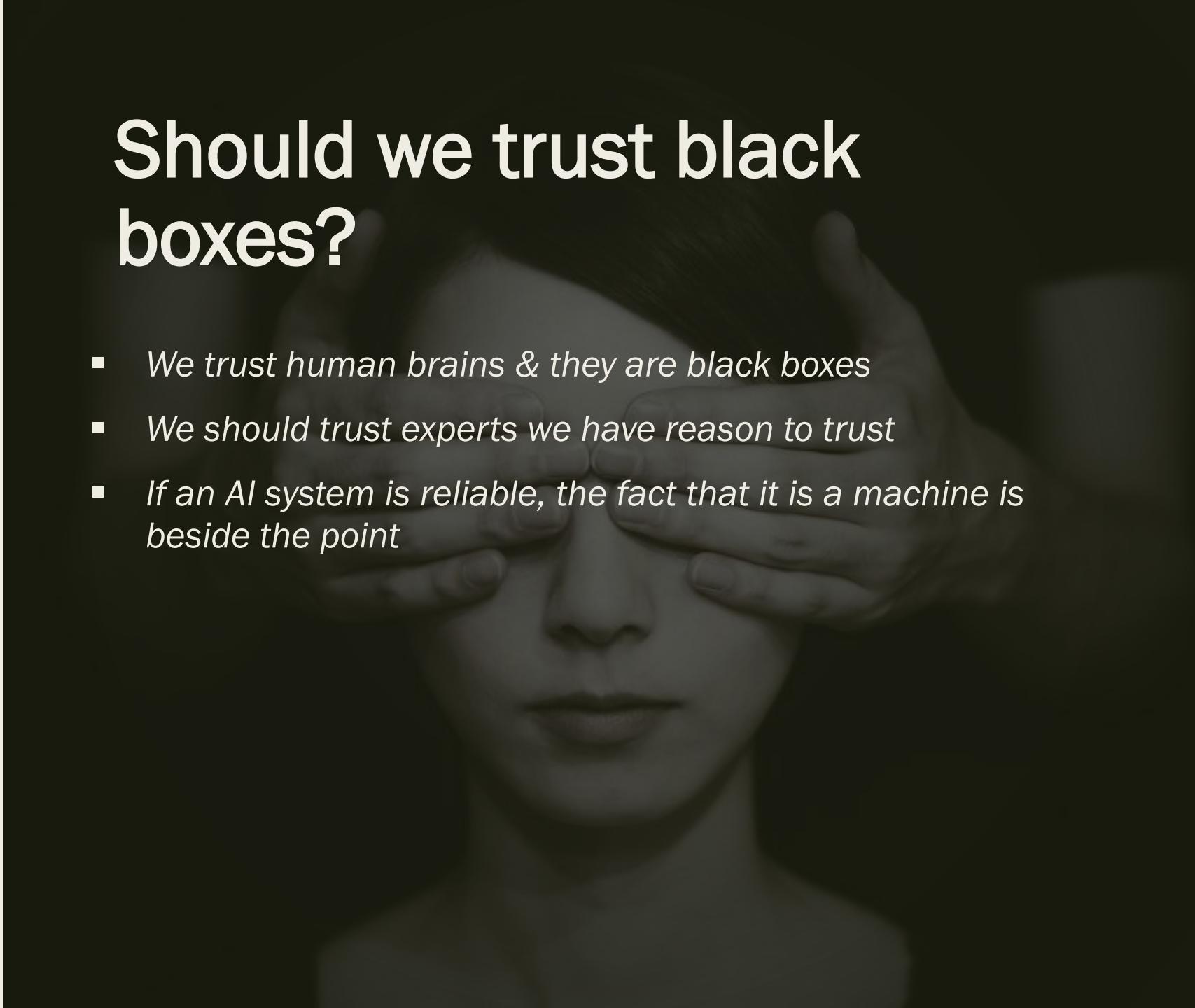
Matt is followed for worsening chronic back pain. Ordinarily, he would be referred for surgery; however, ABC Healthcare recently purchased the practice & requires providers use a new AI system.

After entering Matt's data, the physician is surprised that it recommends PT. The provider tells Matt she does not understand; yet, advises Matt to follow the AI recommendation since the AI system was validated in a recent study.

Black boxes

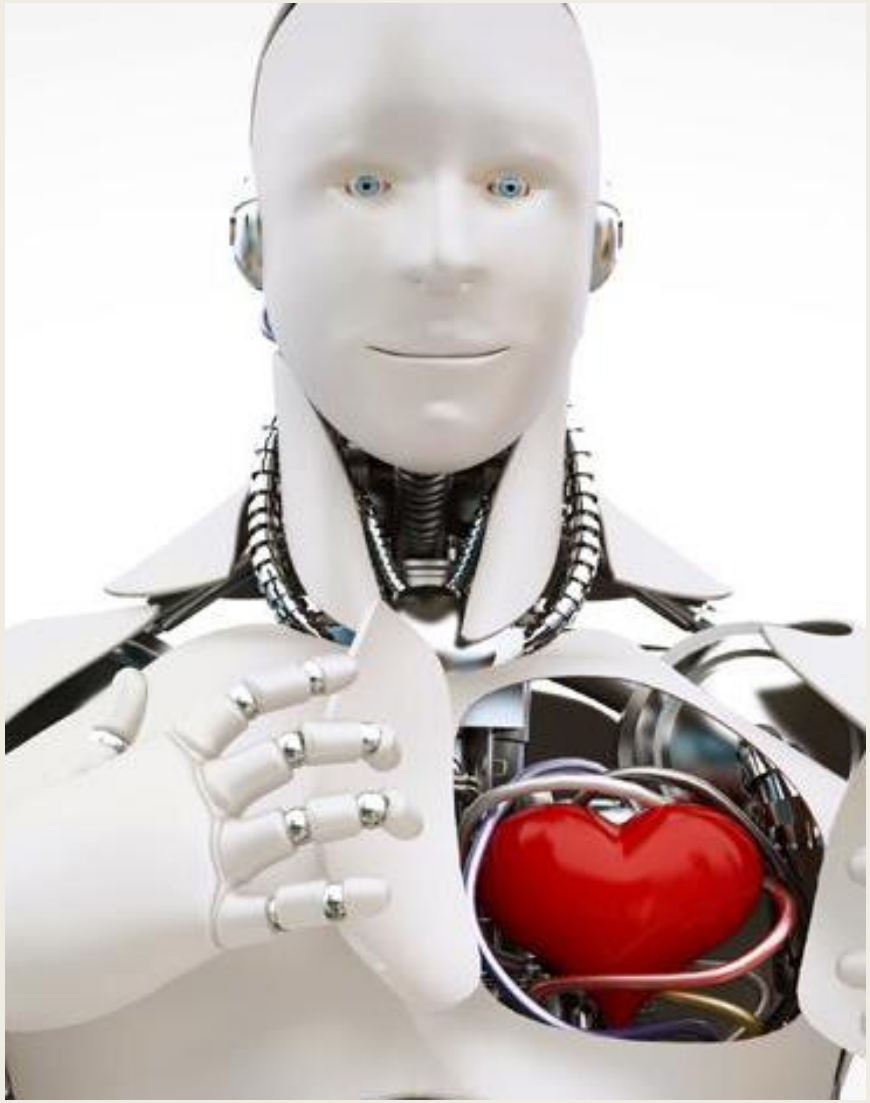
Devices that can be viewed in terms of inputs & outputs, without awareness of internal workings

Should we trust black boxes?



- *We trust human brains & they are black boxes*
- *We should trust experts we have reason to trust*
- *If an AI system is reliable, the fact that it is a machine is beside the point*

WILL THEY CARE?



Concerns

- *There are features of good caregiving robots lack*
- *Carebots do not care*

What's our Yardstick ?

- *Even if bidirectional attachment is desirable, it is neither necessary nor sufficient*
- *Carebots can establish good relationships (even if they cannot establish human relationships)*

Turkle, 2011. *Alone Together: Why we Expect More from Technology and Less From Each Other*. Basic Books.

MEET ZORA

"Patients have told the robot things they wouldn't share with doctors." (hospital staff)

Patients treat Zora like a baby, "holding and cooing, giving it kisses on the head" (hospital staff)

"It puts some cheerfulness in our lives here…We love her, and I miss her when I don't see her. I actually think about her quite often." (71 yo hospitalized pt)

Satariano A, Peltier E, Kostyukov D, 2018, Meet Zora, the Robot Caregiver, *New York Times* 23 November

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Demand for carebots will grow

2

Carebots can be taught to align their behavior with human values

3

Carebots can show care & humans can bond with them

ありがとうございました

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