ROBOTS IN HEALTHCARE

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WHAT IS A ROBOT?
WHAT IS A ROBOT?

IT WAS: ‘CAGED IN INDUSTRY’

The International Organization for Standardization ISO 8373 definition: "An automatically controlled, reprogrammable, multipurpose, manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications."

IT IS: UNCAGED IN HOMES AND HOSPITALS

1. A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer.
2. (Especially in science fiction) A machine resembling a human being and able to replicate certain human movements and functions automatically.

WHY ROBOTS IN HEALTH CARE?

The Onset of Global Aging
Percent of Population Over 65

- France
- Germany
- Japan
- Russia
- United States
- World

Japan is on the front line of aging.
With over 7 percent of their populations above 65, Western societies begin to age.

Source: United Nations
Robots have the potential to be a game changer in healthcare: improving health and well-being, filling care gaps, supporting care givers, and aiding health care workers. However, before robots are able to be widely deployed, it is crucial that both the research and industrial communities work together to establish a strong evidence base for healthcare robotics, and surmount likely adoption barriers.
ROBOTS IN HOMES, HOSPITALS, REHABILITATION CENTRES, NURSING HOMES
TYPES OF ROBOTS AND HUMAN PROXIMITY

1. Nano-robots inside the body
TYPES OF ROBOTS AND HUMAN PROXIMITY

2. Wearable exo-skeletons
TYPES OF ROBOTS AND HUMAN PROXIMITY

3. Robots touching your body
   - Wrist surgery
   - Da Vinci surgery
TYPES OF ROBOTS AND HUMAN PROXIMITY

4. Robots helping doctors
   - Telemedicine
   - Stroke aid
   - Blood pressure
   - Blood taking
REELING ETHICS: 
MORE THAN 20 ETHICAL ISSUES FOUND

REELER Responsible Ethical Learning in Robotics
ETHICAL ISSUES: CASE 1

Given the close proximity of many health robots, should affected stakeholders like family members be more involved in the physical design of the product; how it looks, how it feels to wear, how it feels to operate/work with?

ETHICAL ISSUES: CASE 2

Professional pride and engagement

To what extent should human professional pride and engagement be prioritised in the encounter with robots? How not to build robots that do turn affected stakeholders into submissive and thus potentially irresponsible persons?
Should roboticists be aware of the ways in which they exclude specific people through their design? How will the excluding mechanisms unfold when the robot is used in practice? Who is responsible for taking care of those people who are excluded from using the robot?

Do roboticists have a responsibility to communicate realistic ideas and visions about their robots? What effects does public images of robots – that are often unlike the robot in development and practice – have in society among policy and decision makers for example?
Telenoid in Japan and Denmark

Same robots in healthcare and classrooms
Paro and Silbot in Denmark

Experiments far from movies
REELER FINDING: ROBOTS ARE BASED ON FORMER ROBOTS AND AVAILABLE TECHNICAL SOLUTIONS

- **Retrainer Abacus**
  - University of Hertfordshire
  - Integrated
  - Social
  - Operative
  - Operated or commanded by a person
  - Worn or implanted on a person

- **KASPAR**
  - LBR iiwa
  - Kuka
  - Cooperative
  - Operative
  - Operated or commanded by a person
  - Interacts socially with a person

- **EZ-10 Easy Mile**
  - Robosoft
  - Parallel
  - Operative
  - Operated or commanded by a person
  - Interacts socially with a person

- **Apple Gripper**
  - Festo
  - Minimal
  - Operative
  - Operated or commanded by a person
  - Interacts socially with a person

- **B-Droid**
  - Warsaw University of Technology
  - Minimal
  - Operative
  - Operated or commanded by a person
  - Interacts socially with a person

- **Smart Platform**
  - Ocado
  - None
  - Operative
  - Operated or commanded by a person
  - Interacts socially with a person

- **Integrated Social Cooperative Operative Minimal None**
- **REELER**
- **FINDING:** ROBOTS ARE BASED ON FORMER ROBOTS AND AVAILABLE TECHNICAL SOLUTIONS
SOLUTIONS BEFORE PROBLEMS?

Solutions are co-producing how to define ‘problems’.

Robots as a solutions to a problem come with certain perspectives, values, identities, and rooms for reflection.

Social technologies at work
PROBLEMS AND SOLUTIONS

An anthropological perspective:

How can we find new solutions to elderly care?

How do robots in practice influence?
- Social relations
- Kin
- Moral obligations

A technical perspective:

How can robots help with healthcare issues?
The project aims at aligning roboticists' visions of a future with robots with empirically-based knowledge of human needs and societal concerns through a new proximity-based human-machine ethics that take into account how individuals and community connect with robot technologies.
REELER APPROACH

HUMAN PROXIMITY SPECTRUM

- Retrainer Abacus
- KASPAR University of Hertfordshire
- LBR iiwa Kuka
- EZ-10 Easy Mile Robosoft
- Apple Gripper Festo
- B-Droid Warsaw University of Technology
- Smart Platform Ocado

**Integrated**
- Worn or implanted on a person
- Interacts socially with a person
- Cooperates physically or socially with a person
- Operated or commanded by a person
- Works independently alongside a person
- Independent, unlikely to contact a person
- Protected from contact with a person

**Social**

**Cooperative**

**Operative**

**Parallel**

**Minimal**

**None**
MAIN CONCLUSION

“As the chapters have made clear, Telenoid most often becomes something completely different to what its designers intended and clearly changes purpose in actual use ‘to the point where its original function may be lost altogether’”.

Leeson 2017, 229-230