Realism in Perspectives on Robots

Policy recommendations from
Responsible Ethical Learning in Robotics (REELER) www.responsiblerobotics.eu

Disrupting Robotics

We need a reality check on our imagined robotic futures. Robots, with or without AI, are necessary for creating better societies, combatting climate problems and providing new solutions in healthcare, education, agriculture, construction, etc. However, robots are not like the creature often portrayed in media: human-like, intelligent, autonomous and smoothly working in all kinds of social and physical environments. Across 11 ethnographic case-studies of robot types in the interdisciplinary European project REELER, we have found robots to impose new demands on both humans and their environments – even without the robot makers ever noticing how they have affected the humans' everyday lives. We need public debates about robots and their effects, which are not hampered by images of overly well-functioning, scary or human-like exaggerated media-robots. We need political action that addresses the actual effects and sometimes unintended consequences when robots are being developed and introduced in real life settings.

Society needs political action that gives voice to the realities and concerns of affected stakeholders. Since there is limits to the degree of awareness we can expect from robot makers and since affected stakeholders cannot force their voice into the inner circle, we suggest a two-pronged strategy:

Two main recommendations to ensure ethical and responsible robot design

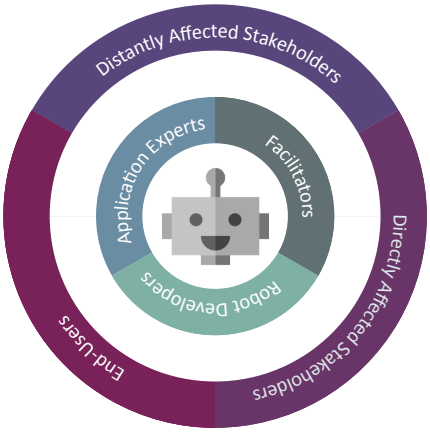
1. Develop and disseminate tools that enhance robot developers' (engineers, mostly) awareness of what is to be gained from collaborating with and taking end-users and affected stakeholders' perspectives into account early on in the development phase.

2. Develop alignment experts as a new profession, where people are educated in methods of aligning the views and visions of robot makers and affected stakeholders. Alignment experts can also give voice to distantly affected stakeholders, when relevant.

Identified Problems

REELER research identifies five main problems with the way robots are developed and presented to the public.

1. **A closed robotic environment**
   Development of robots occurs in a small circle of *robot developers* (mainly engineers), *facilitators* (advisors, lawyers, grant donors), and *application experts* or employees of robotics companies - in brief *robot makers*.



   Robot makers know and understand each other's motives for developing realistic robots, but they lack a realistic understanding of the people who have to use robots or are influenced by them. Robot developments often begin with identifying technical problems to be solved with new technical solutions, rather than identifying problems experienced by people in everyday life. The actual *end-users*, may be asked to test the robot in its final stages, but otherwise knowledge of peoples' everyday lives are presented by *spokespersons*, as when a hospital manager speaks for the cleaning staff expected to operate the cleaning robot. Although ethics is part of engineering education curricula, REELER research shows it does not sufficiently raise robot developers' awareness of how their robots may affect people in real life. Robot developers remain good at developing technical solutions, but not at identifying people's needs and concerns.

2. **A normative design process**
   Because robots are developed in the inner circle and from primarily technologically driven definitions of problems, robot designs are based on what is already familiar and normal to robot makers. Just as the public hold unrealistic imaginaries of robots, robot developers unrealistically imagine ordinary people's everyday environments, cognitive skills and body features as mirrors of their own reality. As a result, they design robots on normative understandings that are not tailored to real-life people and cause that resistance to use among people.

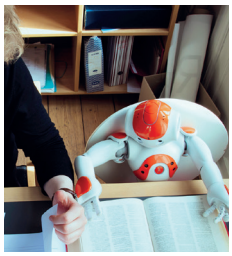
3. **Overlooking consequences**
   Robots rarely capture the diversity and complexity of affected stakeholders' actual lives, because thorough studies of the situated context are not made. When a new cleaning robot is introduced at a hospital, it not only affects the people using it. Nurses and patients meeting the robots in the hallways may begin to compete with the robot over hallway space. An unforeseen consequence of the robot is the changed environment that makes nurses take detours, cause people to work against the robot, or more costly requires new, special, elevators for the robots. When consequences are overlooked in the design phase, robots may be mothballed, be met with resistance, seen as failures, or create problems instead of solving them.

> *People are fighting over the elevators. At some point, we need the robot to get prioritized. Some people cannot accept that. So now, you have a robot standing right in front of the elevator, and you can hardly get in and out, but somebody turned off the switch, so the robot cannot do anything.*
>
> Mathias, system integrator, engineer health care robot

4. **Overlooking stakeholders**
   REELER has identified a wider group of people than the imagined end-users, and we argue it is relevant to consider this overarching group of *affected stakeholders* when funding and designing robots. Affected stakeholders comprise end-users, directly affected stakeholders and distantly affected stakeholders. This group of people is affected in various ways, by facing replacement or changes in job-functions, needing reskilling or risking a life on universal basic income. They often lack the educational skills, vocabulary, and power to voice how they experience the impact of robots. While most of the robotic-related consequences for directly affected stakeholders could be addressed in robot design, it is the responsibility of politicians to address the consequences of robots for distantly affected stakeholders.

5. **Believing imaginaries**
   Marketing of commercial robots and popular news media influence how people perceive robots. This creates public imaginaries of robots as more effective, future-proof, or human-like, capable of having emotions and being social than the machines observed in the REELER research.
   Moreover, robots are often marketed as autonomous and intelligent in the sense that they function without human support. Yet, robots never work without support





and assistance of humans (e.g. humans program, make physical and social adjustments, and at times control or teleoperate robots). Across REELER cases, the robots are always dependent on both end-users and directly affected stakeholders to adjust their bodies and social routines to accommodate the robot's movements and design.

Believing imaginaries generate erroneous assumptions about robots which result in three main consequences:

1. Citizens tend to either fear robots or become fascinated and subsequently disappointed by them.
2. Policymakers introduce legislation and make funding calls based on imaginaries instead of reality.
3. Robot developers must contend with unrealistic expectations from affected stakeholders.

Solutions – Awareness-raising tools

REELER recommends awareness-raising tools to help robot makers expand collaborations beyond the robotic inner circle

REELER recommends increased awareness of affected stakeholders in the inner circle of robotics through awareness-raising tools to be used by *robot developers, facilitators*, and *application experts.* Such tools must raise awareness of own normativity in design work and how insufficient collaboration with actual users in the development phase can lead to robots that, when ready for market, turn out not to fit the body size of the end-users, e.g. patients, or are uncomfortable for staff (e.g. nurses) to work with. REELER also recommends further awareness of how what is considered 'intuitive' technology by an engineer tends to be incomprehensible to the actual end-user.

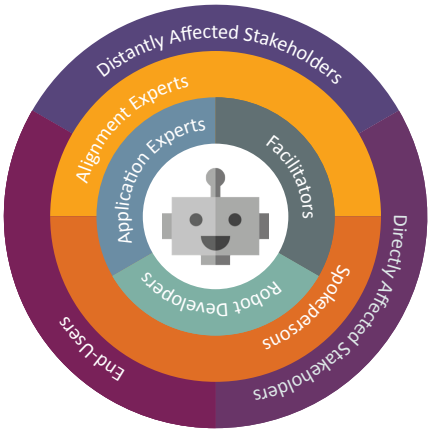
> *"It can be very uncomfortable for a patient to be strapped up in a [wearable robot]. It is a harness you get around the body. Between the legs it is really tight, with a lot of pressure on the sides. And that in itself can be associated with discomfort. Some patients cannot tolerate it, they cannot stand it. It is simply too strenuous for them. I have probably had four persons who have said they will under no circumstance ever be strapped up in that robot again. And we have to respect that, if they are generally clear-headed. And then we say: "Okay, well, we must find another solution."*
>
> Nina, physio-therapist at a hospital, affected stakeholder, REGAIN

REELER has developed five awareness-raising tools (accessible on *www.responsiblerobotics.eu*).

- *The REELER Toolbox* gives a chance to explore specific issues of problems in robot development from a stakeholder-informed perspective.
- *BuildBot* is a board game that allows players to reflect on responsible robotics by selecting design features that fulfill needs expressed by different stakeholders (affected stakeholders, policy makers, robot buyers).
- *Mini-Publics* provide a forum for knowledge transfer and debate among experts and the general public. Participants are invited to learn about and discuss particular issues pertaining to a given topic.
- *Action Methods* contain both established and new explorations into drama as an awareness-raising tool.
- *Human Proximity Model.* An analytical tool for understanding roles and relations in robot development.

The Human-Proximity Model depicts the new REELER vocabulary used to explain the roles of people involved in and influenced by robot development, as well as proximity (or lack hereof) to the robot. In the blue inner circle, robots are developed through distributed collaborations between **robot makers**, consisting of *robot developers, facilitators*, and *application experts*. Their design and uptake of their robotic creations could benefit from the voices of **affected stakeholders**, who comprise: *End-users, directly affected stakeholders,* and *distantly affected stakeholders* (the purple circle). In the orange circle, which illustrates the **intermediaries** linking affected stakeholders and robot makers, powerful *spokespersons* sometimes represent end-users, but a gap between the purple and blue circles often exists. To ensure better alignment between affected stakeholders and robot makers, REELER suggests the introduction of *alignment experts*.

The use of these tools may benefit both affected stakeholders, who will be more recognized, and robot makers, who can save time and money by making robots that are actually appreciated (rather than mothballed and sabotaged)



Alignment Experts

Mediating between groups to align diverging motives and expectations

Awareness-raising tools cannot stand alone for four reasons:

a) Despite significant efforts towards ethics in engineering education, it proves difficult for robot developers to integrate ethical awareness into practice.
b) Directly affected stakeholders are, like distantly affected stakeholders and sometimes even end-users, consistently overlooked by robot makers.
c) Certain ethical issues in robotics are beyond the scope of robot developers' responsibility and professional competences.
d) Most citizens lack the agency, vocabulary, and access to engage with robot makers directly.

To bring the voices of affected stakeholders into play in the inner circle of robotics, REELER also recommends introducing alignment experts as a new profession in robot and AI development.

Alignment experts can help avoid disappointments, create better foundations for legislations, open the eyes of robot developers for directly affected stakeholders and adjust their imaginaries of affected stakeholders and end-users in general.

REELER sees alignment experts as one of the new professions foreseen by economists to arise in an increasingly roboticized society. This new profession would be placed at the crossroad between Responsible Research and Innovation (RRI) and Social Sciences and Humanities (SSH). Their competences should emphasize skills in ethnography, economics, and technology, and would have, as a core expertise, *the ability to align different groups of people in order to create ethical and responsible robots and AI.* They would be trained to identify robot makers and affected stakeholders' diverging motives and find solutions before it is too late in the development process.

> *Many nurses hate that robot because it's so revoltingly boring to be involved in surgery now because the nurse is completely reduced to nothing, as the robot surgeon switches between the instruments [but the nurse still has to be there for small tasks]. The biggest challenge is keeping awake. I have several photographs of my nurse colleagues, who have fallen asleep during surgeries like those.*
>
> Gina, surgeon, affected stakeholder, SPECTRUS-case, REELER

Alignment experts must be able to speak on behalf of affected stakeholders, irrespective of, for instance, monetary interests of the involved companies, and as such provide perspectives that supplement the existing spokespersons. In order to give voice to the affected stakeholders, alignment experts must work directly with potential affected stakeholders (users, directly and distantly and consumers). This will allow them to identify collaboration possibilities and to bring their needs and expectations back to the inner circle.

Furthermore, alignment experts must identify further needs for awareness-raising educational tools, be capable of arranging mini-publics and expanded council systems identifying realistic needs for robots and AI, calculate economic consequences of ethical robots and AI and suggest new ways of using existing technology and help develop new ideas based on insights from affected stakeholders. Finally, alignment experts will take on the important role of providing reality checks on robot imaginaries.

Find out more at our homepage: www.responsiblerobotics.eu

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