EPSU
EUROPEAN PUBLIC SERVICE UNION

‘Carebots’ and the care crisis

Report for EPSU

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Preface: Can robots help address the care crisis?

Care services in Europe and in most of the developed world suffer from significant and growing labour shortages. Digital technologies have been promoted as a possible solution or at least a way of relieving the pressure on overworked carers. Care robots – "carebots" – of various kinds are being designed, developed and tested and raise important questions in relation both to their impact on care workers and the people they look after. EPSU has commissioned this report to deepen the understanding of workers and trade unions of carebots – what they can and can't do and whether they can make a serious contribution to tackling the care crisis.

In the meantime, EPSU is heavily committed to finding solutions to the staffing shortage in care and the challenging physical and mental working conditions that can be such a burden for the predominantly female workforce. There has to be urgent action to end the precariousness and low pay that are key factors in the problems of recruiting and retaining staff. Extending and strengthening collective bargaining and increasing union recruitment and organising of care staff will be important in the coming years and EPSU is putting these at the centre of its work.

Within the European Union, the European Commission's Long-Term Care Strategy (September 2022) and the Council Recommendation on access to affordable high-quality long-term care (December 2022) recognise these problems and the newly formed European social dialogue committee for social services will provide a forum for discussion but we are still some way off from effective solutions.

In this context, we cannot ignore the carebot challenge and the need to consider how to evaluate their use and how best to regulate them. Written by renowned health and care researcher Karol Florek, this report sets out the most recent available research and experience, underlines the risks and the huge dilemmas for workers that come with the use of carebots. We hope it contributes to the discussion and we would appreciate reactions and comments to advance the debate.

Jan Willem Goudriaan
EPSU General Secretary

Introduction: Rationales for care robots

Technological solutions, often prompted by commentary from politicians, periodically surface in the media as a response to the social care crisis. Optimism is a key feature of such narratives; robots are presented as an exciting, novel solution to chronic and growing labour shortages.[1] Many care workers meanwhile demonstrate more negative views on robotics, and some experts see it as a symptom of the crisis rather than its solution.[2]

Techno-solutionist narratives about 'carebots' are not new. In light of structural workforce shortages in the care sector, care labour has supposedly been on the cusp of automation for decades. Yet care labour is far from being replaced by robots. As one of the most labour intensive and hardest to automate occupations, care labour will remain an essential human function into the foreseeable future. In Japan, experiments with care robots have been pursued in as a matter of policy for nearly twenty years, with little to no success.[3] Yet, despite evidence that robots have poor potential to replace trained personnel in direct care work, sensationalist narratives about their ascendency persist. This is largely an effect of broader social policies that have prioritised labour-saving and cost-reduction objectives at the expense of quality outcomes. For instance, in light of post-pandemic trends of declines in health spending, falling life expectancies and increasing acute workforce shortages, the OECD has been heavily promoting digital health and AI technologies as a response to financial pressures.[4] Within this context, attempts to implement robotics into care settings carry risks of degrading the conditions of care work, leading to poorer outcomes, rather than enhancing labour in a way that improves the quality of care.

There are nonetheless significant innovations occurring in the field of robotics, AI, and other digital technologies that could have significant positive impacts in the short and medium term. Some of these developments are a continuation of longstanding trends. This includes, most notably, technologies for modifying the home environment or to enable or improve mobility. Most notably, robotics can serve to extend the functions of lifts and motorised wheelchairs with autonomous assistive technologies that support elderly and disabled people remaining independent at home. A separate branch of technologies is centred on medical-related functions, such as machines for monitoring, diagnostics, delivery of medication, or systems that help to address cognitive, sensory, and motor impairments. An important distinction needs to be made between tools that have specific medical or rehabilitative functions, those which improve the independence of elderly or disabled people, and those that purport to replace the labour of care workers with machines in high dependency settings.

Critical evaluations of research on attitudes to robotics in institutional care settings reveal that automation holds far greater positive potential when applied to functions such as janitorial services, logistics, and reception work rather than direct care labour itself. Significantly, there

[1] See for example, https://www.telegraph.co.uk/global-health/science-and-disease/ai-robots-elderly-homes-social-care-health-secretary/

[2] https://www.theguardian.com/society/2023/sep/06/robot-pets-are-a-symptom-of-a-crisis-in-care

[3] Wright, J. (2023), Robots won't save Japan: An ethnography of eldercare automation, Cornell University Press

[4] https://www.oecd.org/newsroom/digitalisation-of-health-systems-can-significantly-improve-performance-and-outcomes.htm

is evidence that introduction of digital technology into care, common workplace ITC rather than sophisticated AI, presents significant immediate benefits.[5] A key consideration in light of introduction of any digital technologies, however, is the need to respect the rights of both workers and recipients. Transparency in relation to collection and protection of personal data is important not only in relation to compliance with GDPR, but also to ensure safety and mitigate risks when dealing with vulnerable individuals. Human oversight over essential life-supporting care functions is essential to ensuring quality care.

A nuanced approach to technology is therefore important to exert influence on the changes that may occur within the care sector in the short-to-medium term. It is crucial to approach such questions politically rather than through a technological-deterministic lens. Ultimately, decisions concerning the introduction of new technologies need to be made on the basis of what improves the quality of care, rather than according to a financial cost-benefit analysis. Critically, any successful implementation of new technologies requires them to welcomed by both workers who perform care labour as well as care recipients. As this report argues, however, current EU-funded research projects show a questionable level of commitment to such priorities. There is unfortunately a lack of effort to engage trade unions in such projects.

Types of care robots

Social robots

Most robotics research aimed at care settings and the elderly has a focus on so-called autonomous 'social robots'. This is a broad category as such robots can be designed for vastly different functions, such as supporting daily living activities or cognitive assistance. Social robots typically require an AI system, sensory inputs, and ways of communicating. Such robots typically provide non-contact assistance.

Physical assistance robots

Physical assistance robots (PARs) are a distinct category of robot designed to perform physical tasks that support vital functions of elderly or dependent persons. Examples include robotic hoists and stretchers for lifting or moving patients, devices to assist in bathing, cleaning, feeding and other bodily functions. Significantly, while most often promoted with the aim to automate the most labour-intensive aspects of direct care, as a category of care robots PARs demonstrate the weakest evidence for effectiveness and have been the least successfully implemented.[6]

[5] https://www.theguardian.com/us-news/2021/jun/03/care-bots-on-the-rise-elder-care

[6] Kenny, C. (2018), Robotics in Social Care, PostNote 591, Parliamentary Office of Science and Technology, Houses of Parliament (UK), https://researchbriefings.files.parliament.uk/documents/POST-PN-0591/POST-PN-0591.pdf

Robotic pets

By far the most widespread and successful category of robots that have been utilised in care settings are therapeutic toys, a type of social robot. It is in this area that we are most likely to see further developments in the short term.

The most popular robot currently used in the care of older people is Paro, the robotic pet baby seal. Originally developed in the 1990s by Japan's National Institute of Advanced Industrial Science and Technology, Paro has been on the market in Japan since 2005. It entered Europe and the US in 2009,[7] followed by the UK in 2018.[8] In Japan, the Paro robot is mostly owned as a robot pet by individuals. In Europe and the US, however, it is almost exclusively used in institutions for therapeutic functions. They are used in a similar way to animal-assisted therapy in nursing homes and hospitals to stimulate patients with Alzheimers and dementia.[9] The benefits and limitations and the ethical implications of using this robot have been studied for over a decade.[10] The robot is generally assessed positively as an effective 'Biofeedback Medical Device' but there is no suggestion that it is capable of providing care or replacing human contact. Furthermore, the clinical effectiveness of the Paro robot has received mixed results, with three separate studies – carried out in Australia, Japan and Denmark - finding no difference between Paro and a soft toy, or between Paro when it is on, and 'placebo Paro' when it is turned off.[11] To date, the robotic pets have been most widely adopted in Denmark, especially into public nursing homes, where they have been introduced in 80% of municipalities.[12] They are also being introduced into nursing homes in Norway, the Netherlands, and Germany.[13] Paro is marketed as a medical device, and for this reason, the robot is expensive; each unit costs approximately €6000. However, its actual status of certification according to medical device standards in the EU is more complex (see below).

In September 2023, a new robot toy started to be trialled in care homes in the UK, the 'Joy for All Companion Pets' developed by Ageless Innovation. These units cost only €100. In contrast to Paro, they are mainstream children's toy that found a secondary market amongst the elderly. Much like Paro, it is now being marketed as a therapeutic robot targeted for patients with dementia.[14]

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[7] Shibata, T. "Therapeutic Seal Robot as Biofeedback Medical Device: Qualitative and Quantitative Evaluations of Robot Therapy in Dementia Care," in Proceedings of the IEEE, vol. 100, no. 8, pp. 2527-2538, Aug. 2012, doi: 10.1109/JPROC.2012.2200559.

[8] https://www.paroseal.co.uk/public/site/pdf/press/Paro-Sense-Medical-Press-Release.pdf

[9] Parviainen, J., Turja, T., Van Aerschot, L. (2019). Social Robots and Human Touch in Care: The Perceived Usefulness of Robot Assistance Among Healthcare Professionals. In: Korn, O. (eds) Social Robots: Technological, Societal and Ethical Aspects of Human-Robot Interaction. Human–Computer Interaction Series. Springer, Cham. https://doi.org/10.1007/978-3-030-17107-0_10

[10] Calo, Christopher J.; Nicholas Hunt-Bull; Lundy Lewis; Ted Metzler (2011). Ethical Implications of Using the Paro Robot with a Focus on Dementia Patient Care (Report). Association for the Advancement of Artificial Intelligence. https://www.researchgate.net/publication/221604198_Ethical_Implications_of_Using_the_Paro_Robot_with_a_Focus_on_Dementia_Patient_Care

[11] Abdi J, Al-Hindawi A, Ng T, et al. Scoping review on the use of socially assistive robot technology in elderly care. BMJ Open 2018;8:e018815. doi:10.1136/bmjopen-2017-018815, p. 11.

[12] Shibata, T.; Hung, L.; Petersen, S.; Darling, K.; Inoue, K.; Martyn, K.; Hori, Y.; Lane, G.; Park, D.; Mizoguchi, R.; et al. PARO as a Biofeedback Medical Device for Mental Health in the COVID-19 Era. Sustainability 2021, 13, 11502. https:// doi.org/10.3390/su132011502

[13] https://www.bbvaopenmind.com/en/articles/life-innovation-with-therapeutic-robot-paro/

[14] https://www.theguardian.com/society/2023/sep/01/its-almost-magical-how-robotic-pets-are-helping-care-home-residents

Care worker attitudes to robots, digital technologies, and AI

A recurring theme in care robot research and development is the lack of engagement with care workers in terms of the benefits of robotics. As noted in a recent review of 20 different care robot projects, the emphasis of research in the field of 'social robots' is on product design and marketability. Such research is often carried out by engineers 'who have limited knowledge about social aspects, including what sociality actually entails'. Instead, the emphasis is on commercial products, primarily designed to be marketed to consumers and orientated around questions of economic gain rather than their utility in real world care settings. Economic rationales for lowering costs of care through replacing human caregivers with machines are given primacy over the needs of care workers.[15]

A 2018 review of studies concerning the attitudes of health and care worker attitudes towards assistive robots concluded that workers were generally not threatened by robots, that they primarily engaged with the question in relation to benefits to patients rather than to their own work. However, attitudes depend significantly on the function of the robot. Workers had generally favourable attitudes in relation to assistive technologies around functions such as monitoring vital signs, enabling communication with family members, reminding patients of medications. Meanwhile, robots associated with physical functions such as general nursing care, feeding, hygiene, physiotherapy, etc. were perceived most negatively.[16]

Lessons from Japan

The introduction of robotics into the Japanese care sector is both comparatively advanced and highly politicised. For at least 15 years, Japan has pursued a technology-driven approach to alleviating care workforce shortages (at times counter-posed by politicians as an alternative to mass immigration). In 2015 there were 40,000 vacancies in nursing care workers and by 2035 the government predicted it to reach 790,000.[17]

Multiple studies on the introduction of care robots in Japan have found that, contrary to their labour-saving promises, they tend to increase rather than decrease employment. According to one recent study on robot adaptation and impact on staffing across 860 nursing homes, the number of nurses increased by 28% and care workers increased by 39% in nursing homes where robots were introduced. Significantly, these increases in employment were almost entirely for non-regular workers on flexible labour contracts. A decrease in wages for regular employees of 22% was also reported in facilities that had introduced robots.[18]

[15] Khaksar, Weria & Lindblom, Diana & Bygrave, Lee & Torresen, Jim. (2023). Robotics in Elderly Healthcare: A Review of 20 Recent Research Projects. (preprint) https://arxiv.org/ftp/arxiv/papers/2302/2302.04478.pdf

[16] Papadopoulos, I., Koulouglioti, C., & Ali, S. (2018). Views of nurses and other health and social care workers on the use of assistive humanoid and animal-like robots in health and social care: a scoping review. Contemporary Nurse, 1–18. doi:10.1080/10376178.2018.1519374

[17] https://bowgl.com/elderlycare-staffshortage-2/

[18] Despite this, the researchers drew a largely positive interpretation from this data. They record an improvement in workforce retention in nursing homes where robots were introduced, noting that many of the changes in

In his book, *Robots Won't Save Japan: An Ethnography of Eldercare Automation*, Dr James Wright argues that where robots are introduced, the tasks of workers tend to shift toward supervising machines and giving increased attention to the care for machines rather than residents: 'Instead of saving time for staff to do more of the human labor of social and emotional care, the robots actually reduced the scope for such work'.[19]

Other research from Japan suggests that rather than futuristic robotic devices, the introduction of digital workplace technologies into care has much greater potentials to increase efficiency of work. In contrast to advanced robotics, effective ICT systems that synchronise, transfers and shares patient data can make the daily work routines more efficient, reducing the time that care workers otherwise spend on record keeping and administration. Such innovations that alleviate mental stress (rather than physical burdens) also tend to be more welcomed by care workers, freeing up more time for direct care and interaction with residents.[20] The Japanese trade union Jichiro confirms these findings, noting the prohibitive cost and poor implementation of robotic technologies in contrast with the advanced adaption of ICT which has been introduced into 70% of nursing homes.[21]

Lessons from Finland

In the European context, much of the research focused on care worker attitudes towards robots derives from Finland. Within the European context, Finland is distinguished by the quality of its elderly care system which features better ratios, a higher skills mix including reliance on practical nurses, and the organisation of public services at the municipal level. We therefore should be cautious when extrapolating attitudes of care workers in Finland to those of other care workers in Europe. On the other hand, it is significant that the findings of available studies carried out in Finland mirror many of the findings from Japan.

Despite a tendency of some studies to spin positive conclusions despite negative results, there is a considerable agreement among researchers about the lukewarm attitudes of care workers towards robots especially in direct care situations. For example, one study concluded that professional care workers and healthcare educators perceived robots to increase productivity, despite only 39% of workers surveyed claiming that the introduction of robots would be useful. The authors of the study presented the replacement of care workers with robots as both inevitable and desirable. Yet, 57% of workers suggested the use of robots would be most appropriate only in indirect nursing care situations, such as laundry and cleaning rather than in direct patient care.[22] Similar conclusions were also reached by other researchers looking at attitudes towards robots among home care workers in Finland.[23]

the workforce profile result of promotion of part-time work and flexible contracts, supported by Japanese trade unions. For example, the introducing monitoring robots enables fewer workers to be present on night shifts, reducing need for regular employees.
Eggleston, Karen, Yong Suk Lee and Toshiaki Iizuka (2021), 'Robots and labor in the service sector: Evidence from nursing homes', National Bureau of Economic Research, Working Paper no. 28322 https://www.nber.org/papers/w28322

[19] https://www.technologyreview.com/2023/01/09/1065135/japan-automating-eldercare-robots/

[20] Gabriele Vogt & Anne-Sophie L. König (2023) Robotic devices and ICT in long-term care in Japan: Their potential and limitations from a workplace perspective, Contemporary Japan, 35:2, 270-290, DOI: 10.1080/18692729.2021.2015846

[21] Correspondence between EPSU and Jichiro, 15 August 2023

[22] Vänni, K. J., & Salin, S. E. (2019). Attitudes of Professionals Toward the Need for Assistive and Social Robots in the Healthcare Sector. Social Robots: Technological, Societal and Ethical Aspects of Human-Robot Interaction, 205–236. doi:10.1007/978-3-030-17107-0_11

[23] Rantanen, T., Lehto, P., Vuorinen, P., & Coco, K. (2018). The adoption of care robots in home care-A survey on

Meanwhile a study was undertaken with assistance from two Finnish trade unions - The Finnish Union of Practical Nurses and the Union of Health and Social Care Professionals in Finland found that 64.5% of workers did not find robot use compatible with their personal values. This study represents one of the largest attitude surveys of its kind, involving a total of 3800 workers. This trade-union supported study looked at the views of care workers through a prism of human dignity premised on human touch, in which social robots should not aim at replacing humans. They concluded that *social robots should be designed to improve the quality of care rather than just to save money in the health care sector.* Mirroring the other findings from Finland, the study found that care workers regarded robot use as most desirable in tasks unrelated to physical contact whereas robotic assistance in bathing, dressing and in the toilet was the most negatively perceived.[24]

Regulation of robots in the EU

The regulatory approach

There is no single regulatory framework in the EU specific to robotic devices utilised in care settings. As robots are products, regulation at the EU level occurs through various regulatory frameworks that harmonise product safety standards, integrate safety and security mechanisms into product design and define liability provisions. European harmonized standards are developed by one of the three European Standardization Organizations (CEN, CENELEC, or ETSI) on a specific request from the Commission.[25] The process of harmonising product standards in the EU typically has a basis in legislating around recognised international standards set by the ISO.

Currently, different regulatory frameworks apply to products depending on whether the robotic product might be classified as a medical device, a toy, or a personal care assistance robot (among other possibilities).

The relevant EU regulatory frameworks include:

- Artificial Intelligence Act (December 2023)
- Product Liability Directive (upcoming)
- Machinery Regulation (2023)

the attitudes of Finnish home care personnel. Journal of Clinical Nursing, 27(9-10), 1846–1859. doi:10.1111/jocn.14355

[24] Parviainen, J., Turja, T., Van Aerschot, L. (2019). Social Robots and Human Touch in Care: The Perceived Usefulness of Robot Assistance Among Healthcare Professionals. In: Korn, O. (eds) Social Robots: Technological, Societal and Ethical Aspects of Human-Robot Interaction. Human–Computer Interaction Series. Springer, Cham. https://doi.org/10.1007/978-3-030-17107-0_10

[25] https://single-market-economy.ec.europa.eu/single-market/european-standards/harmonised-standards_en

- Medical Devices Regulation (2017)
- General Data Protection Regulation (2016)
- Radio Equipment Directive (2014)
- Low Voltage Directive (2014)
- Electromagnetic Compatibility Directive (2014)
- Toy Safety Directive (2009)
- Measuring Instrument Directive (2004)
- General Product Safety Directive (2001)

Although there is no specific regulatory framework that exists for care robots, the potential of emergent technology causing harm to elderly people – and in particular immaterial harms – has been specifically identified in a Commission report in 2020 is an area for consideration for future EU legislation.[26]

Toys, medical devices, or mobility aides?

The **Medical Devices Regulation** is arguably the strongest regulatory instrument. The definition of medical devices relates to diagnostic, monitoring or therapeutic functions relevant to any vital physiological processes. The regulation covers any device, including software, with an intended medical purpose (including any device that is similar in principle to medical devices). Medical devices are regulated by the European Medicines Agency (EMA). They must meet strict clinical standards and need to be registered on EUDAMED (European database of medical devices).[27]

The new **Machinery Regulation** is intended to fill gaps and inconsistencies in product coverage, to address security risks of digital components as part of machine safety, focusing on emerging technologies such as AI, 'internet of things' (IoT) and collaborative robots.[28] It incorporates various international safety standards including ISO 13482:2014 on personal care robots. This includes three categories of autonomous robots: mobile servant robots, physical assistant robots, and person carrier robots.[29] Crucially, this standard applies only to 'personal care' and it *specifically excludes medical applications*.

For the purpose of regulating robots in care settings, the distinction between these two regulatory frameworks is critical. As noted by one legal expert in the field of robotics, there is no place for any ambiguity. The type of robot being designed has to be defined concretely and unequivocally. Not only the characteristics of the robot are important but also 'how the

[26] 'Explicit obligations for producers of, among others, AI humanoid robots to explicitly consider the immaterial harm their products could cause to users, in particular vulnerable users such as elderly persons in care environments, could be considered for the scope of relevant EU legislation.' https://commission.europa.eu/publications/commission-report-safety-and-liability-implications-ai-internet-things-and-robotics-0_en
[27] https://eur-lex.europa.eu/eli/reg/2017/745/oj
[28] https://eur-lex.europa.eu/eli/reg/2023/1230/oj
[29] https://www.iso.org/standard/53820.html

end users will use it'. However, the problem relates to the vagueness and ambiguity around the concept of 'personal care'. While a robot may be designed according to standards for personal care, as soon as it starts being used for functions such as rehabilitation, it becomes a medical device subject to different standards.[30]

Therefore, in theory, all robots that are used for monitoring vital functions, administering medication, or treating physical and cognitive impairments should fall under this definition of medical devices and conform to the standards. In practice, however, it is unclear what mechanisms might exist to regulate the use of robotic products when there is a mismatch between product design and usage.

The popular Google-owned Fitbit watches, for example, despite being used for health and wellbeing monitoring, are not certified in accordance with the Medical Devices Directive. The range of products are not considered to be medical devices but instead designated as 'smartwatch' or a 'wireless activity tracker'. They comply with the Radio Equipment Directive (2014) and the Restriction of Certain Hazardous Substances Directive (2011).[31]

A similar issue exists in relation to toys that can be used as quasi-medical devices for the elderly. This problem is not new. Paro the robotic seal has been certified since 2009 in the US as a class-2 medical device yet it does not appear to have such classification in the EU where it appears to only be certified to the **Low Voltage Directive** and the **Toy Safety Directive**.[32] It therefore does not appear to be regulated by the European Medicines Agency (EMA) or registered on EUDAMED, despite being referred to as a medical device and being approved and purchased by various government health institutions at a national level, such as in Denmark.

Recent developments

Emergent digital technologies have been the central focus of efforts to address gaps in EU regulatory frameworks dealing with product safety and liability provisions. Three concepts – AI, robotics and the 'Internet of Things' (IoT) – are approached as related, sharing common characteristics as well as risks.[33]

There are currently two major pieces of EU legislation in the final stages of negotiation, the new **Artificial Intelligence Act** and an update to the longstanding **Product Liability Directive** (adopted in 1985).

Debates concerning the **Product Liability Directive** centre on the digital economy and the treatment of intangible digital products, especially pertaining to the liability regime concerning operators of digital platforms. Attributing liability for damage caused by products such as commercial software or AI is complicated by the fact that such products are typically both utilised and modified by other economic actors, and damage caused can be classified as immaterial.[34]

[30] Fosch Villaronga, E. (2016). ISO 13482:2014 and Its Confusing Categories. Building a Bridge Between Law and Robotics. In: Wenger, P., Chevallereau, C., Pisla, D., Bleuler, H., Rodić, A. (eds) New Trends in Medical and Service Robots. Mechanisms and Machine Science, vol 39. Springer, Cham. https://doi.org/10.1007/978-3-319-30674-2_3

[31] https://www.fitbit.com/global/us/legal/safety-instructions

[32] http://www.asturhealth.com/wp-content/uploads/2020/06/PARO-CE-Declaration-of-Conformity-MCR-900EU1DK-in-English.pdf

[33] https://commission.europa.eu/publications/commission-report-safety-and-liability-implications-ai-internet-things-and-robotics-0_en

[34] https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/739341/EPRS_BRI(2023)739341_EN.pdf

The **Artificial Intelligence Act** is intended to set concrete technical requirements for the safety standards of AI systems within the framework of the EU's harmonised standards.[35] In particular, the legislation sets different rules for different risk levels associated with AI systems, including subjecting 'high-risk' AI systems utilised in workplaces to specific requirements that protect the health, safety, and fundamental rights of workers. It also bans AI systems that are classified at the unacceptable risk level. The EU Parliament adopted its amendments to Act in June 2023, and at the time it was hailed as the first AI regulation in the world.[36] However, following intense lobbying from European and American Big Tech companies, trialogue negotiations stalled over the question of regulating so-called AI foundation models such as ChatGPT.[37] Perhaps even more alarmingly, many governments sought to establish exemption to prohibited uses of AI, to allow for the military and security use of biometric surveillance AI.[38] This is a concerning development in light of the geopolitical context of the debate; AI targeting systems are enabling a 'mass assassination' program against the civilian population in the Israel-Gaza war.[39] The AI Act was passed on 8 December 2023 following intense negotiations, although at the time of writing the full text of the legislation is not yet available. The AI Act marks the first legislative attempt to protect people in workplaces and includes transparency provisions,[40] however, digital rights advocates have criticised the outcome as 'mostly a shell of the AI law Europe really needs', a watered-down version of original proposals.[41] Criticisms have focused on the limited safeguards, the very broad loopholes concerning high-risk AI, inadequate penalties for violations, and the issue of state-security exemptions established for prohibited uses of AI. According to ETUI senior researcher Aida Ponce del Castillo, the real objective of the AI Act is 'deregulation in disguise', providing maximum support to AI companies in Europe.[42]

EU-funded robotics research

There are two multi-billion **Public-Private Partnerships (PPPs)** financed through the EU's Horizon Europe research program (2021-2027). Both have a role in financing R&D into robotics with potential applications in healthcare, although the role in care settings is more ambiguous.

The **European Partnership on Artificial Intelligence, Data and Robotics** is a continuation of two former H2020 PPPs, Big Data Value and Robotics, and has a total budget of €2.6 billion with €1.3 billion EU funding.[43] The AI, Data and Robotics Association (ADRA) is the private side of the partnership. Its member include:

- Big Data Value Association (BDVA) , a not-for-profit (AISBL) industry organisation with 230 corporate members across Europe – the leading industry member of BDVA

[35] https://oxil.uk/publications/2021-12-02-oxford-internet-institute-oxil-harmonising-ai/Harmonising-AI-OXIL.pdf
[36] https://artificialintelligenceact.eu/the-act/
[37] https://corporateeurope.org/en/2023/12/big-tech-lobbying-should-not-derail-ai-act
[38] https://www.reuters.com/technology/stalled-eu-ai-act-talks-set-resume-2023-12-08/
[39] https://www.972mag.com/mass-assassination-factory-israel-calculated-bombing-gaza/
[40] https://etuc.org/en/pressrelease/ai-act-sets-stage-directive-ai-systems-workplace
[41] https://edri.org/our-work/eu-ai-act-deal-reached-but-too-soon-to-celebrate/
[42] https://www.socialeurope.eu/the-ai-act-deregulation-in-disguise
[43] https://ec.europa.eu/research-and-innovation/sites/default/files/bmr-2022/ec_rtd_bmr-2022-ai-data-and-robotics-fiche.pdf

appears to be Siemens; the PPP was initiated with BDVA, before it expanded into the broader ADRA industry umbrella

- Confederation of Laboratories for Artificial Intelligence Research in Europe (CLAIRE)
- European Laboratory for Learning and Intelligent Systems (ELLIS)
- European Association for Artificial Intelligence (EurAI)
- euRobotics – healthcare topic area is led by Assoc. Prof. Dr. Françoise J Siepel – a Technical Physician in the field of Robotics in healthcare at the University of Twente (Netherlands)

The activities of the PPPs are opaque. No reporting framework outlining projects could be located. In the area of healthcare, BDVA has a taskforce but it appears to be inactive (the coordinator position is vacant). ADRA has minimal reporting aside from statutes, mission statements and a corporate presentation. Its roadmap mentions robotics for care and assisted living for an ageing population as a high impact area.[44] The official EU website for the PPP was offline at the time of research.[45]

The **Innovative Health Initiative Joint Undertaking (IHI JU)** has a budget of €2.4 billion, with €1.2 billion EU funding. Its goals are to help translate scientific knowledge into innovations, foster innovations that respond to strategic unmet public health needs and drive cross-sectoral health innovation. The private side of the PPP is represented by four industry organisations:

- COCIR – European Trade Association representing the medical imaging, radiotherapy, health ICT and electromedical industries
- EFPIA – European Federation of Pharmaceutical Industries and Associations– trade and lobbying organisation for pharmaceutical industry (including Vaccines Europe)
- EuropaBio – The European Association for Bioindustries – largest biotech industry group in Europe
- MedTech Europe – European trade association representing the medical technology industries

There do not appear to be any current projects in the field of robotics or social robots for care settings, although this may change. Of the four industry associations, MedTech Europe has a sectoral focus area on Homecare & Community Care; while this encompasses Long Term Care, most of the actual R&D focus is on primary care and medical technologies that reduce pressures on hospitals (eg. Remote Patient Monitoring in the home).[46]

There are several **EU funded research projects** that directly and indirectly concern robotics in the care sector.

[44] https://adr-association.eu/wp-content/uploads/2023/07/ADRA-roadmap-May2023_PostConsultationVersion.pdf
[45] https://ai-data-robotics-partnership.eu/
[46] https://www.medtecheurope.org/homecare-community-care/

TEF-Health – Testing and Experimentation Facility for Health AI and Robotics (Dec 2022 – Dec 2027) is a consortium involving 51 partner institutions from nine EU countries, coordinated by Prof. Petra Wobst, neuroscientist at Charité – Universitätsmedizin Berlin. TEF-Health receives €60 million in EU and national funding as well as additional investment of up to €220 million in Testing and Experimentation Facilities to boost the uptake of AI and robotics in Europe. It is expected to achieve long-term financial sustainability.[47] Part of the European Strategy for Artificial Intelligence, the EU is financing four TEF projects in high-impact sectors (the others being agri-food, manufacturing and smart cities). TEF-Health's priorities are focused on research and development of medical devices to be used in four key areas: 1) Neurotech, 2) Cancer, 3) CardioVascular and 4) Intensive Care.[48] At this stage there is no evidence for activities relating to robots in care settings.

SPRING – Socially Pertinent Robots in Gerontological Healthcare (Jan 2020- May 2024) is a project funded for €8,360,385 that involves eight partner institutions in France, Italy, Czechia, UK, Israel and Spain.[49] It is an engineering and computer science project that seeks to address gaps in the perception and sensory capabilities of social robots which currently prevent them from being useful in real-world situations in gerontological healthcare settings. The project involves testing capabilities of eight different robots in a day-care hospital for the elderly[50] (likely to be the Assistance Publique–Hôpitaux de Paris, the largest hospital in Europe). The project has generated a large number of outputs including, for example, experimental research on using social robots as medical receptionists in hospital waiting rooms.[51] The focus for the experiments has focused on functions such as reception, information, assistance, orientation, entertainment rather than physical provision of care.[52]

ReHyb – Rehabilitation based on Hybrid neuroprosthesis (Jan 2020 – Dec 2023) is an EU-funded project for €7,153,874 which aims to deliver intensive, long-term rehabilitation treatments for stroke patients through the use of adaptive computer games (aka serious games) in both clinical and home settings. The ultimate goal is to connect the 'digital twin' of the user with a neuroprosthesis medical device which functions as an 'upper-limb exoskeleton to allow elderly to maintain a healthy and active living environment'.[53] The project involves a consortium of 11 partners in six countries, and is coordinated by Technische Universität München (TUM).[54] High costs are identified as a key barrier to widespread adaptation of this technology. The system is being tested in Germany and Italy.[55]

Robotics4EU – Robotics with and for Society – Boosting Widespread Adoption of Robotics in Europe (Jan 2021 – Dec 2023) is an EU-funded project for €2,998,937 to promote community acceptance of AI-based robotic solutions in the EU's priority areas of healthcare, inspection, maintenance of infrastructure, agri-food and agile production.[56] The project appears to have purely communications objectives. It is coordinated by CIVITTA, a management advisory firm

[47] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/projects-details/43152860/101100700/DIGITAL
[48] https://digital-strategy.ec.europa.eu/en/activities/testing-and-experimentation-facilities#tab_2
[49] https://cordis.europa.eu/project/id/871245
[50] https://spring-h2020.eu/about-spring/
[51] https://ieeexplore.ieee.org/document/9900827
[52] https://spring-h2020.eu/news/user-feedback-from-the-intermediate-validation-experiments/
[53] https://rehyb.eu/
[54] https://cordis.europa.eu/project/id/871767
[55] Stakeholder analysis document, see: https://cordis.europa.eu/project/id/871767/results
[56] https://cordis.europa.eu/project/id/101017283

in Estonia. Other partners include marketing agencies active in the field of robotics in Estonia and Portugal, but also government agencies including the Laboratoire national de métrologie et d'essais (France) and the Danish Board of Technology.[57]

METRICS – Metrological Evaluation and Testing of Robots in International Competition (Jan 2020 – Dec 2023) is a project for organising international competitions for robotics in Europe around the four sectoral priority areas, including healthcare. It is coordinated by Laboratoire national de métrologie et d'essais (France) and has received €1,999,748 in EU funding [58] One of several competition events took place between 29 May and 1 June in London, involving setting challenges for various assistive robots which are tasked with fetching items in a person's home.[59]

LIFEBOTS Exchange – creating a new reality of care and welfare through the inclusion of social robots (April 2019 – March 2023) was funded by the EU for €740,600 and aimed to build a network for enhancing cross-sector, international and interdisciplinary collaboration in the area of social robotics technology for care. The focus of research was on studying the impacts of social robots in care in three areas: medical practice, residential care, and family care. The project was coordinated by the Norwegian University of Science and Technology and involved 12 institutions in Europe (universities, care providers and robot developers), as well as a partnership with the Korea Advanced Institute of Science & Technology.[60] The project appears to have been suspended due to the COVID-19 pandemic.[61]

In addition to EU-funded research projects, there are numerous others projects financed by national funding institutions. For example, the **Caring Robots** project launched in mid-2022 seeks to explore useful human-robot interactions across various case studies in the care sector, from the perspective that both acceptance and utility of robotic technologies has so far been low. It is financed by the Austrian Science Fund (FWF) and is a collaboration between Technische Universitat Wien, Paris Lodron Universitat Salzburg, Techniches Museum Wien and Caritas Wien.[62]

[57] https://www.robotics4eu.eu/consortium/
[58] https://cordis.europa.eu/project/id/871252
[59] https://metricsproject.eu/healthcare/assistive-robot-challenge-icra-2023/
[60] https://cordis.europa.eu/project/id/824047
[61] https://lifebots.eu/activities
[62] https://www.caringrobots.eu/

Recommendations

- **Robot device developers** must include care professionals from the outset when engaging in research and development of new technologies aimed at care settings. Care professionals must be recognised as experts on care and should be given a central role throughout the development process from planning to testing and evaluation. The focus of technological innovations in care must be to improve the quality of care, to bring tangible benefits for both care recipients while alleviating pressures on workers. This requires augmentation rather than replacement of human labour. Rationales premised on cost reduction are neither realistic nor desirable.

- **Employers** must invest in re-skilling and up-skilling of the existing workforce when undertaking automation in care settings which may fundamentally change the composition of work. All procurement of care robotics should include calculation of the environmental impacts as well as social impacts of robots (including retraining care workers, loss of privacy, isolation form human contact of patients etc).

- **Care professionals** have the right to access data and inferences derived from all robotic activities in situations where robotics is introduced into care settings, to know what data the robotics are collecting and for what purposes. Transparency in relation to collection and protection of personal data is important not only in relation to compliance with GDPR, but also to ensure safety and mitigate risks when dealing with vulnerable individuals. Human oversight over essential life-supporting care functions is essential to ensuring quality care.

- **EU and national regulatory bodies** must strictly enforce all relevant product standards for robots that are introduced into care settings. It is especially important that products sold as medical device are regulated as such. The Medical Devices Regulation needs to be applied. It is also in the interest of **robotic device developers** to maintain high quality standards, to prevent cheaper poorer quality products being introduced that undercut high quality medical devices.

- The **EU Commission** should follow through on its own suggestion, made in a report in 2020,[63] to introduce legislation that is aimed at regulating AI and advanced robots specifically in instances where there is potential for immaterial harms relating to vulnerable users such as the elderly in care environments. **Academic researchers** should work with **trade unions** to study the needs and attitudes of care workers in relation to different functions of robotics and technologies in care settings, to address the significant gap in research that currently exists. For example, a large-scale study undertaken recently in Finland with support of two trade unions could be replicated in other European countries.[64]

[63] Commission Report on safety and liability implications of AI, the Internet of Things and Robotics, 19 February 2020, https://commission.europa.eu/publications/commission-report-safety-and-liability-implications-ai-internet-things-and-robotics-0_en

[64] Parviainen, J., Turja, T., Van Aerschot, L. (2019). Social Robots and Human Touch in Care: The Perceived Usefulness of Robot Assistance Among Healthcare Professionals. In: Korn, O. (eds) Social Robots: Technological, Societal and Ethical Aspects of Human-Robot Interaction. Human–Computer Interaction Series. Springer, Cham. https://doi.org/10.1007/978-3-030-17107-0_10

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