Hazard reduction through rescue robots
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Purpose Vulnerable people such as older people or people with disabilities experience the greatest proportion of casualities during and after natural disasters compared to the younger population (cf. American Red Cross, American Academy of Nursing, 2020). Their needs should be taken into account in prevention and in the actual crisis situation. The rescue service is breaking new ground with the non-profit association German Centre of Rescue Robotics (Deutsches Rettungsrobotik-Zentrum e.V. (DRZ e.V.)) which was founded in 2018. Its aims are to promote the development of robotic systems to assist in the rescue and protection of people and property. **Method** In order to achieve its goals the DRZ e.V. which is a non-profit organisation made up of various interest groups from research to industry and users, has developed and implemented a variety of activities, such as piloting and testing of robotic technologies for disaster management and developing vocational training to use the technology efficiently in disasters, considering the overall disaster situation. Unlike industrial applications, disasters are not standardized and are always specific. Therefore, the technology must be adaptable to the different hazards such as fire, floods, etc. Robots and drones are remotely controlled and can provide an insight into the danger zones. **Results and Discussion** Although DRZ e.v. focusses on testing and trials, the city of Dortmund can request the support. Initial experiences show that the request comes in the second wave, in order to gain a detailed insight into the hazardous situation. For example, the rescue services can send the robot directly into a burning building. 3D images make it possible to identify whether and where people are inside the building, or even to deploy fire hoses using sensor. Robots are always co-bots providing the task force with detailed information of the hazardous area and automatic analysis of hazardous substances, thus enabling more informed and targeted decision making about next steps. The challenges are to consider the socio-technical system which includes the training of rescue forces in these new technologies, and to develop an understanding of the implications and potential in a hazardous situation, but also an understanding of the needs of vulnerable groups in hazardous situations.

References
American Red Cross, American Academy of Nursing (2020). Closing the Gaps: Advancing Disaster Preparedness, Response and Recovery for Older Adults.
Kruijff-Korbayova, et al. (2021). German Rescue Robotics Center (DRZ): A Holistic Approach for Robotic Systems Assisting in Emergency Response. *IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR) 2021*. https://doi.org/10.1109/SSRR53300.2021.9597869
Surmann, H., et al. (2024). Lessons from robot-assisted disaster response deployments by the German Rescue Robotics Center task force. *Journal of Field Robotics, 41*(3), 782-797. https://doi.org/10.1002/rob.22275

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