Designing a robotic platform for disabled employees: some practical ethical considerations

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***Abstract*— In this short paper, we will outline how we approached the challenge of bringing together the perspectives and concerns of a variety of different stakeholders. We tried to uncover the potential unintended consequences of introducing elements of AI, automation and robotics into a socially and ethically complex and potentially fragile scenario.**

I. INTRODUCTION, RELATED WORK AND METHOD

In this paper, we report on a part of the study of a Korean business that employs people with cognitive and developmental disabilities (DDs) across a variety of business to business outsourced and direct service operations. The goal of the study was to contribute to the development of scenarios involving the use of a robotic platform to enhance the work-experience of the disabled employees. We were not specifically interested in addressing broad societal concerns with "robot dystopias" at the outset of the project. This was due in part to the fact that we were not looking to sell futuristic visions of what robots might achieve, but rather to work within the current state of the art and deliver a design proposal that could be realistically integrated in a workplace within one or two years.

We were however quite conscious of ethical concerns and risks related to forcing technological innovation onto a potentially vulnerable population (disabled employees). Furthermore, being ourselves representatives of a research organization involved in AI and the design robotic platforms and services, we knew the project would organizationally be characterized by a strong technology push. In particular, we were conscious of the fact that the push would involve not only the desire to put our own specific technology at the center of the "solution" to whatever design challenge we might identify, but also to view the introduction of a robotic platform in a work environment as an inherently positive intervention. We also knew that we would be managing more than one model or organizational configuration of disability: our own as HCI researchers, that of the organization that employs the disabled workers, that of the customers on the receiving end of the provided service, and that of the employees themselves, with the latter having potentially the weakest direct representation in the design process [1].

In this short paper, we will outline how we approached the challenge of bringing together the perspectives and concerns of a variety of different stakeholders around future design scenarios, and how throughout that process we practically tried to uncover and address the risk of the unintended consequences of introducing elements of AI, automation and robotics into a socially and ethically complex and potentially fragile scenario.

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II. THE SETTING

The self-described goal of the organization we are collaborating with is to show the value of disabled workers and develop their skills within the company. They have over two hundred employees with degrees of DDs and run most of their operations at a profit. They deliver products which are undistinguishable from what might be provided by any other printshop, florist, or bakery, and with very short turnaround. They achieve this by breaking down their workflows to basic tasks and implementing a strict division of labor. This means that many of their employees are engaged in repetitive activities requiring limited initiative or creativity, basic coordination of tasks, and little need to deal with unexpected occurrences.

We felt therefore there was an opportunity for robots to enhance the work experience of employees while maintaining the efficiency of the service. Robots could assist the employees to perform their tasks more efficiently while respecting their role in the process and prioritizing their social and professional skills above the process optimization. Robots with an appropriately designed information management system or interface could also enable new types of tasks by providing a structure that standardizes activities not currently performed by the employees due to their flexible nature or their higher level of complexity.

III. DESIGN APPROACH

For the design of such a robot, it is important to understand the perceptions and values that designers or roboticists have about technology. It affects their view of "human", "machine" and "robots" [2], [3], [4], [5]. The technology stakeholders' hold different values, very strongly [6]. They aim to raise a specific kind of experience or quality in their design.

In prior research of robots being introduced amongst people in workplaces [7], [8], [9], it was found that robots may affect social settings and be interpreted to display social behavior simply by being and acting among people. The envisioned future of robots working alongside DD employees, requires careful consideration of the organizational, ethical and societal consequences and values around robots.

Practically speaking we are facing the challenge of finding a robotic deployment scenario which balances the technological ambition of our own organization with the extant business model of the recipient one. The disabled employees themselves are potentially caught in the middle and have the weakest voice in the design process. Futuristic Autobiographies (FABs), inspired by design fiction, allow us to understand the societal impact of future technology and help elicit values and perspectives from participants such as prospective users, designers and researchers [10]. Through the use of this method, we aimed to restore the future users, people with DDs, to the central position in minds of our participants when anticipating, designing and evaluating the future of robotics.

We conducted the FABs with 8 Korean participants, 6 male and 2 female between the age of 24-50. 2 (P1, P2) participants were managers from the Korean organisation employing the people with DDs with no prior experience with robots. The other participants were from the robotics organisation. 2 (P3, P4) were User Experience Designers responsible for ergonomics of the robot and its interaction with people and the remaining four were Robotic engineers (P5-P8). Each participant was presented with three FABs that were specifically designed according to their stakeholder group. The authors researched each participant's background (prior observation of their tasks, their portfolio of work, published articles and researches etc) to create the FABs. They were less than 80 words, with interesting and plausible scenarios which facilitated open-ended discussions on multiple themes around work collaboration of robots with developmentally disabled people.

IV. FINDINGS

The FABs exposed differing viewpoints on the intended roles of robots and the effect of workplace collaboration with them.

A. Roles of Robots

They imagined the robots to be "assistants", "collaborators" or "supervisors" of the people with DDs.

As assistants, the robots would have very specific roles like "carry heavy stuff, guidance robots, surveillance robots" (P8), "cleaning robot" (P7), "delivery robot" (P6). As collaborators, participants saw the robots as team members. Some participants believed that robots will be successful only if they are more intelligent than the people with DDs. They imagined the robots to be like a manager, either replacing or helping them in their existing tasks taking the role of supervisors. While participants discussed robots replacing jobs, it was always the manager's job that was thought to be replaceable, not the employees with DDs. This is also aligned with the organizations mission statement to provide more employment to people with DDs.

B. The Robotic Future

Most participants believed that for a successful future collaboration, the robot has to be capable of "understanding human intentions and emotions" (P7), be "self-learning and updating" (P2), be "autonomous in movement, taking decisions and achieving self-diagnosis" and give "more human-like feedbacks" (P1).

Through the futuristic stories, participants were probed about changing behaviour of humans due to the collaboration with robots. One participant was concerned about the potential de-skilling due to the dependency on robots in the workplace and how that will have an impact on their ability to learn new skills in general. In this case, people with DDs will have to invest themselves in learning the new and complex "survival skills" of operating a robot for work and life in general. This can also lead to extreme alienation of this vulnerable population.

Other participants imagined robots replacing emotional attachment by less human contact through the jobs that they do like "taking care of babies" (P3) or "delivery services". One participant stressed on the need to give authority to the robots for successful implementation and discussed how to make people respect them by institutionalizing negative consequences for inappropriate behaviours.

Hence, the discussions on "robotic future" brought out structural disruption in the society, loss of emotional connection and alteration in workplace hierarchy.

V. CONCLUSIONS

Coming from a tradition of ethnography-based design [11], in our project we treated socio-technical issues as practical, emergent matters to be understood from the perspective of the actors we are designing for. As Dewsbury et al [12] point out, an applied technology project moves forward not through political rhetoric but through recommendations for design.

But the methodological exercises we engaged in with our stakeholders allowed us to appreciate the risks of unintended consequences that were not obvious to us at the start of the project. And we found that the perspectives of our stakeholders on the ethics and possible social impact of robots were heavily influenced by the tasks they performed in their jobs. Roboticists' take on the futuristic stories had technology as a central theme. While the designers and executives were more user-centred.

Using FABs allowed people to express their particular perspective as stakeholders and ensure that it was well represented in the design process around a fairly specific scenario. At the same time it allowed everyone to draw potential connections between technology, business models and employee skill development and confront the broader ethical implications of technology intervention and the use of robotic platforms for employees with developmental disabilities.

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