

## Developing lab equipment with healthcare researchers: a participatory design analysis

*Keywords: healthcare research, lab equipment, participatory design*

In this paper, we explore how participatory design (Margolin, 1997) can be applied to scientific research in the field of healthcare and medicine. Though user-centred practices are already employed to support patient-side healthcare activities (Driver et al, 2011), not as much has been done to investigate how different design methodologies can engage researchers, being a crucial workforce for medicine (De Covreur et al, 2011). We compare case studies taken from design history (Maldonado, 1993, Margolin, 1992, Papanek, 2005, Roozenburg et al, 1995) with an experiment of our own, concerning the design of an Oscillating Perfusion Bioreactor, a bio-medical device now being used as a research platform for tissue engineering and regeneration. Taking autologous cells, the OPB performs 18 parallel cell culture threads, in a multi-array of confined chambers.

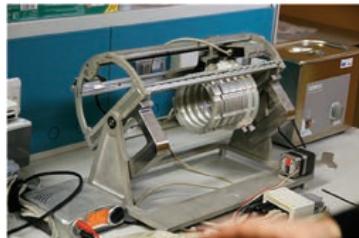


Figure 1: OPB: early model, Milan 2011

Our design intervention started from the perfusion patent and an early prototype of the machine (fig. 1), presenting issues in weight, scalability, kinemat-

ics and affordance. How can designers intervene into research to evolve its equipment? How can industrial design get involved as a structured discipline into the development of science? What can designers improve in the performance of the final product? How can design research support research in science? Our research methodology concerns a step-by-step analysis of both the evolving research environment and healthcare researchers, evaluating their habits, expectancies, behavioural and cultural schemes (Papanek, 2005, Whiteley, 1993), providing clues for engaging better design practices, both in terms of final product qualities and time-effectiveness. The findings provide an answer to these questions, with a detailed theoretical position concerning the disciplinary code of industrial design (McDonough et al 2002) and practical indications for taking better policies when dealing with users (Boztepe, 2007) and applying design management to healthcare research.

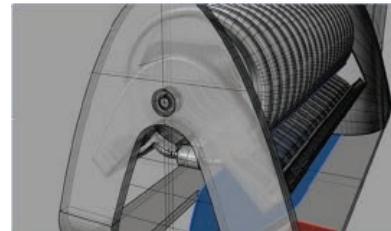


Figure 2:  
CAD model under development, Milan 2011



Figure 3: Engaging users in design, OPB: Milan 2011

## References

- Allenby, BR, Sarewitz, D 2011, *The techno-human condition*, MIT Press, Cambridge.
- Boztepe, S 2007 'User Value: Competing Theories and Models', *International Journal of Design*, vol. 1, no. 2, pp. 55-63.
- De Covreur, L, Grossens, R 2011, 'Design for (every)one: co-creation as a bridge between universal design and rehabilitation engineering', *CoDesign: International Journal of Co-Creation in Design and the Arts*, vol. 7, no. 2, pp. 107-121.
- Driver, A, Peralta, C, Moultrie, J 2011, 'Exploring how industrial designers can contribute to scientific research', *International Journal of Design*, vol. 5, no. 1, pp. 17-28.
- Giddens, S, Giddens, O 2002, *Future techniques in Surgery*, Rosen Publishing Group, New York.
- Maldonado, T 1993, *El Diseño Industrial Reconsiderado*, Editorial Gustavo Gili, Barcelona.
- Margolin, V 1992, 'Thinking about design at the edge of the Millennium', *Design Studies*, vol. 13, no. 4, pp. 343-354.
- Margolin, V 1997, 'Getting to know the user', *Design Studies*, vol. 3, no. 18, pp. 227-235.
- McClellan, M 2003, *Organ and tissue transplants: Medical miracles and challenges*, Enslow Publishers, Berkeley Heights.
- McDonough, W, Braungart, M 2002, *Cradle to Cradle: Remaking the way we make things*, North Point Press, New York.
- Papanek, V 2005, *Design for the Real World. Human Ecology and Social Change*, Academy Chicago Publishers, Chicago.
- Roozenburg, NJM, Eekels, J 1995, *Product Design: Fundamentals and Methods*, John Wiley & Sons, Chichester.
- Whiteley, N 1993, *Design for Society*, Reaktion Books, London.
- Zeng, Q et al (eds.) 2011, '5.534 – Skin tissue engineering', in *Comprehensive Biomaterials: Tissue and organ engineering*, ed. P. Ducheyne, Elsevier Science, Amsterdam, vol. 5, pp. 467-500.