

## **Thermostat wars and office politics: Digital interventions in workplace thermal comfort.**

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Negotiating comfort in a shared workspace is often difficult, and there is a governance and a politics to practices in the workplace which need to be taken into account (Whittle, 2015). Office workers in the UK have come to expect a narrow band of indoor temperature to be provided, which is static throughout the year, no matter what the temperature outside. Where automated mechanical heating and cooling systems are in place, occupants are generally at a distance from these systems, and have little control over their thermal comfort (Clear et al, 2018). Where more control measures exist (e.g windows opening, thermostat settings, fans and radiators) negotiating whether these are open, closed, on or off is a complex process which often satisfies few of the occupants.

Much of the previous research in Ubicomp technology (Scott et al 2011, Clear et al 2013, Jain et al 2017) has focussed on users in domestic settings, and the area of shared workspaces is currently under investigated. This is a concern as the greatest use of energy in offices (over 60%) is used for heating and air conditioning, and this technology will help deliver a significant energy saving. It is therefore important that we understand the tensions that may arise, in order to develop strategies for dealing with them.

With the increase in online control systems for domestic heating (Hive, Nest, Switchee etc.) practices around how we control our thermal environments are changing (Yang and Newman, 2013). In a domestic setting, we generally have control over our own comfort, or only have to negotiate with (usually) one or two others. However in the workplace, and particularly in large open plan offices, there are multiple, complex relationships and hierarchies to navigate, and technology is adding another layer of complexity to this negotiation.

The Socio-Digital Sustainability team at Lancaster University (<http://www.lancaster.ac.uk/scc-sds/>) has been designing a bespoke system to enable energy managers in large organisations to control their buildings on a room-by-room basis, enabling much finer granular data, which will eventually enable better control and reduce energy consumption. However there are considerable technical and human factors to be overcome.

In this presentation we will discuss some of the experiences and emerging issues from the project so far, focussing on the difficulties present in controlling temperature in shared offices, how temperature is negotiated, and how computer interfaces change the landscape of those negotiations by 'hiding' them in an action that is done secretly on your device or laptop, rather than openly manipulating a radiator valve. Personal devices now provide multiple remote opportunities to control temperature in these shared spaces, and governance of permissions around control needs further exploration. If you can remotely alter the temperature of the office on your phone whilst travelling in to work, where is the negotiation and agreement?

## References

1. Clear, A. K., Finnigan, S., Olivier, P., and Comber, R., 2018. ThermoKiosk: Investigating Roles for Digital Surveys of Thermal Experience in Workplace Comfort Management. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18). Paper 382. ACM.
2. Clear, A.K., Morley, J., Hazas, M., Friday, A., and Bates, O., 2013. Understanding adaptive thermal comfort: new directions for UbiComp. In Proceedings of the 2013 ACM international joint conference on Pervasive and ubiquitous computing (UbiComp '13) pp. 113-122 ACM.
3. Jain, M., Singh, A., and Chandan, V., 2017. Portable+: A Ubiquitous And Smart Way Towards Comfortable Energy Savings. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol 1, Issue 2, Article 14 (June 2017).
4. Scott, J., Bernheim Brush, A.J., Krumm, J., Meyers, B., Hazas, M., Hodges, S., and Villar, N., 2011. PreHeat: controlling home heating using occupancy prediction. In Proceedings of the 13th international conference on Ubiquitous computing (UbiComp '11) pp. 281-290. ACM.
5. Whittle, R., 2015. Guilt and elation in the workplace: Emotion and the governance of the environment at work. *Environmental Values*, 24(5), pp. 581-601.
6. Yang, R., and Newman, M., 2013. Learning from a learning thermostat: lessons for intelligent systems for the home. In Proceedings of the 2013 ACM international joint conference on Pervasive and ubiquitous computing (UbiComp '13) pp.93-102. ACM.