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Using sensors in the office to support knowledge workers with self-management of well-being

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The project SWELL¹ aims to support knowledge workers to self-manage their well-being. We extend traditional approaches (like questionnaires and department wide interventions) by developing an interactive system that can provide situated support. In our approach (see Figure 1), behaviour data is captured with sensors and then interpreted into a format that is intelligible, e.g. the users current working context and mental state (Koldijk et al., 2012). This captured information can then be used to provide tailored interventions which are proven to be more effective than non-tailored (Hawkins et al., 2008).

We conducted an experiment to investigate which, preferably, unobtrusive and readily available sensors can be used for estimating the user's state. 25 participants performed knowledge worker tasks, like report writing, under different working conditions: no stressors, email interruptions and time pressure. Questionnaires were used to assess the users subjective experience (NASA-TLX, RSME, SAM, perceived stress). The following sensors were used: computer logging, video of facial expressions, Kinect 3D sensor of postures and body sensors.

We found that our stressor working conditions caused experience of higher mental effort and more arousal. We also found effects in our recorded sensor data, e.g. faster typing under time pressure or activity in certain facial action units which correlated with perceived mental effort (Figure 2). Our initial analyses suggest that it is possible to estimate the user's state from sensors in the office.

This research is a first step towards tailored feedback. We aim to investigate whether giving feedback on mental state and context can give users insight in the influence of their work-behaviour on well-being and can enable them to change their behaviour accordingly. We will further investigate which form and timing of tailored feedback is most appropriate for supporting self-management of well-being.

¹ www.swell-project.net

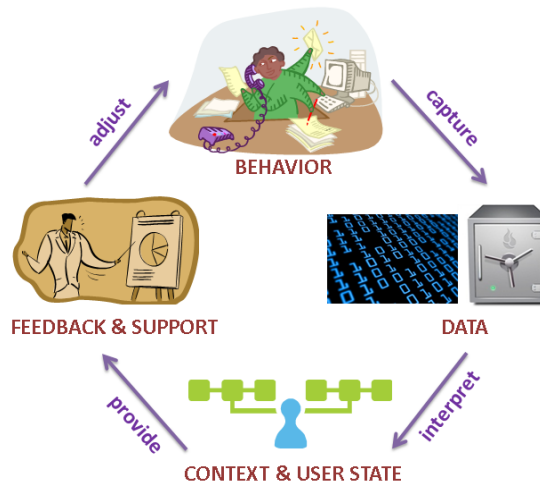


Figure 1 - Envisioned approach. Behavior data is captured and interpreted. Intelligible information is provided as feedback for the user to adjust behavior and improve well-being.

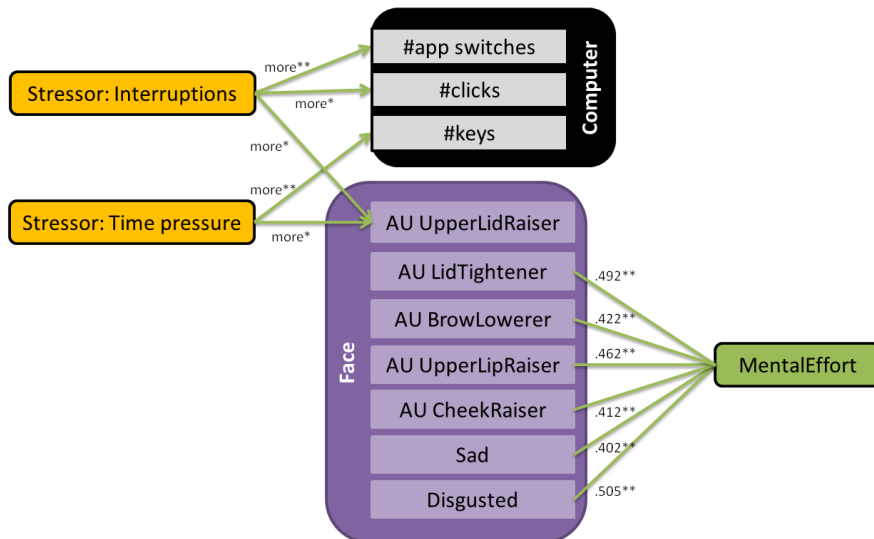


Figure 2 - Results of our research. Left part: The stressors caused differences in (computer-use) behavior. Right part: Mental effort correlated with our sensor data of facial expression (* significant at 0.05 level, ** at 0.01 level).

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References

Hawkins, R., Kreuter, M., Resnicow, K., Fishbein, M., & Dijkstra, A. (2008) Understanding tailoring in communicating about health. *Health Education Research*, 23(3), 454-466.

Koldijk, S., Neerincx, M., & Kraaij, W. (2012). Unobtrusively measuring stress and workload of knowledge workers. In: *Proceedings of Measuring Behavior* (Utrecht, The Netherlands, 28-31 August 2012).