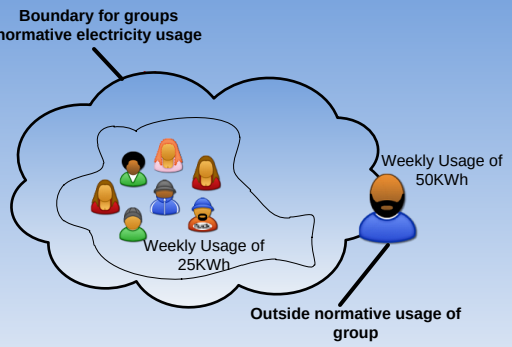
Using social technology and gaming to positively affect energy usage behaviour in higher education and the local community

slawson@lincoln.ac.uk, defoster@lincoln.ac.uk http://lisc.lincoln.ac.uk

Web: http://www.electro-magnates.com Twitter @ ElectroMagnates

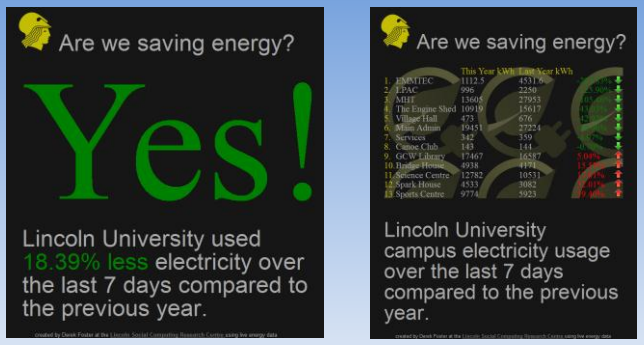
This project will design, implement, and evaluate a suite of **social software applications** – including games - to encourage positive changes in **energy consumption behaviour** in **HE and local authority work-places** and environments. Personal **desktop applications** (social widgets) and **situated displays** will be used to deliver energy feedback to **individuals, groups and communities** about their own – and others' - energy usage to foster exchange of performance and to support **constructive competition** to reduce consumption. The delivered tools and systems will be **rigorously evaluated** in both a HEI and local authority workplace setting as well as piloted in on-campus **student accommodation**.



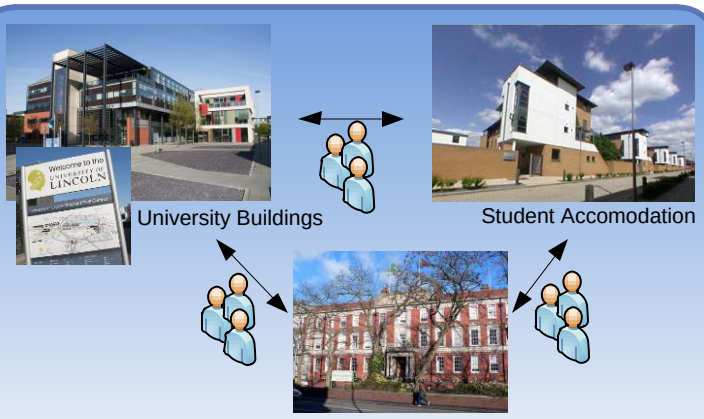
Social normative effect facilitating competition and peer pressure

Requirements for the project's end-user software components will be captured and evaluated largely using **HCI research methodologies**, ensuring adherence to a **user-centred design** process. **Participatory design** workshops will be run to develop lo-fi/hi-fi and paper prototypes for interface design and mapping energy metaphors. Additionally, other user-centric design tools will be used such as **ethnographic studies**, **cognitive walkthroughs** and **contextual inquiry**.

A back-end system was built that collects consumption data (Energy, Water and Gas) for use in our applications from **on-site monitoring technologies**. We have also opened the data to the 'cloud' using open standards that freely allow **other services** and **web applications** to **consume** the data.

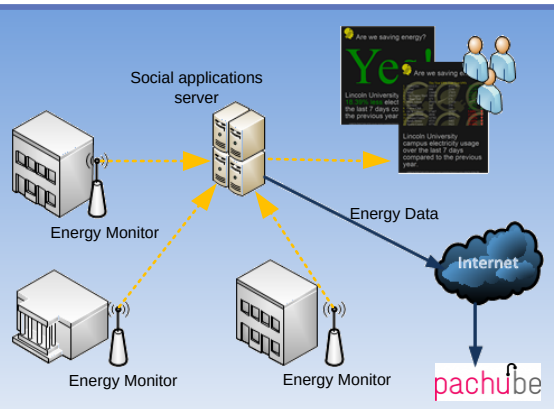


Prototype interface examples for large situated displays



Our research approach lies in the emerging research area of **persuasive technology** and exploits ideas recently popularized by Thaler and Sunstein[2] in that individuals can be '**nudged**' to make better health and lifestyle decisions given the right environment in which to do so.

The **work environment** affords powerful opportunities for facilitating **'friendly' competitive behaviour** – for instance Siero et al[1] demonstrated that when a group of employees received information not only about their own energy usage, but also about that of a 'competing' group of similar people, they significantly altered their energy usage behaviour compared to a situation in which they only received information about their own usage.



Simplified overview of Electro-Magnates technical implementation

Electro-Magnates follows a rigorous **experimental design**. We plan to conduct a sequence of two month trials during which we will expose our prototype software to large numbers of users then refine the software based on the findings of the trials. The three trials are: (i) a short usability trial (Months 5-6) with around 20 University staff; (ii) an initial major on-campus trial with 75 (Month 9-10), (iii) a major trial with 150 University staff and 50 LCC staff (Months 15-16) and (iv) a shorter exploratory trial with 100 students in on-campus accommodation (Month 21). **Quantitative data** captured for analysis will include raw energy data (measure possible reductions) and server log data (measure user engagement with software). **Qualitative data** will include findings from focus groups, questionnaires and semi-structured interviews.

[1]Siero, F.W., A.B. Bakker, G.B. Dekker, and M.T.C. van den Burg. (1996). Changing organizational energy consumption behavior through comparative feedback. Journal of Environmental Psychology 16: 235-246.

[2]Thaler, R and Sunstein, C. (2008) Nudge: Improving Decisions About Health, Wealth, and Happiness: Yale University Press.