

# A living lab campus: A unique opportunity to not be a “smart city”.

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**Abstract**—A unique opportunity lies in the hands of the resource managers and sustainability officers of campus universities. These campuses give opportunities for retrofitting technologies (e.g. wind turbines, solar PV panels), IoT sensing and actuation (e.g. electricity monitoring, HVAC controlling), and large-scale data collection of real time smart campus data (e.g. electricity generation and consumption, thousands of sensors worth of data). In many ways, these campuses are not dissimilar from smart cities, but they are of a much smaller and more manageable scale. As microcosms of cities, where people live, work and study, much of the population is also at an interesting and significant transition point in their lives—where in many cases they cease to be under the protective care of their parents who provide food and energy for them, and have to start engage with supporting themselves, and crystallising the behaviours, practices, thinking and obligations that will carry them forward as productive, or possibly, sustainable members of society. This poster proposes a new discussion surrounding ‘living-lab and ‘smart’ university campuses, and how such an initiative should be guided and shaped by sustainable ICT.

## I. POSTER PROPOSAL

This sounds like the usual rhetorical ‘resource man’ [1] centric motivation that has encouraged the research and development of smart homes, smart cities and smart meters. But, firstly, beyond optimisation within an infrastructure, can such a resource become a living lab for encouraging more sustainable practices? How might we reshape the socio-technical complex to encourage and promote more sustainable ways of living? Smart cities and smart homes operate under the assumption that more data and more modelling will lead to more sustainability. Secondly, rarely do these projects consider the environmental impact of their deployments, focusing primarily on savings of money and fossil fuels. Even less often do these projects consider the energy and emissions impacts arising through large scale data collection (e.g. the impact of the sensors and network infrastructures), storage (e.g. the impact of storage large amounts of data), and processing (e.g. the energy required to model and process live data).

The benefits of sensing, actuation, prediction, and modelling of energy on a campus scale have the potential to reduce hundreds (if not thousands) of tons of CO<sub>2</sub> per annum, saving hundreds of thousands GBP on energy bills, and providing a large data set and platform for experimentation that can be utilised for both research and teaching.

We believe that campus wide sustainability projects should be at least as concerned about CO<sub>2</sub> reduction through changes in practices as they are about saving money through reductions in energy consumption (and the associated costs of such systems).

With that in mind, this poster is proposed as a springboard for discussion of the directions that a smart campus should take. In our opinion, a smarter campus should be about making the community of employees, students and all campus stakeholders ‘sustainably smarter’ people, and not just about big data and automation being utilised to save on energy bills. Affecting and sustaining changes on the campus and of the stakeholders and people should be the primary goal of any ‘living-lab’ or ‘smart’ campus vision.

With sustainability on a campus scale posing some unique research, ethical and sustainability challenges we ask the audience to participate in an open discussion of both exciting potential avenues of new research alongside the risks and barriers. For example, how can thousands of rent paying individuals become motivated to participate in more sustainable lifestyles? The people that work and live on campus expect certain levels of services and infrastructures that might not be deemed as sustainable.

This poster is proposing four main questions of this approach: 1) how can a living lab campus be leveraged to support campus wide changes in practice (e.g. not just individuals, but departments, businesses, and stake-holders alike), 2) what are the unique opportunities and problems for researchers that can be foreseen in a the vision of a living lab campus, 3) what new and radical trials and changes does a campus environment enable over that of a smart city or smart home? 4) what are moral and ethical bounds on sustainable ICT in reshaping practice, for example by changing the expectations around access to resources such as energy, thermal comfort and so on, where people live and work.

## REFERENCES

- [1] STRENGERS, Y. Smart energy in everyday life: Are you designing for resource man? *interactions* 21, 4 (July 2014), 24–31.