

Academia, digital and the built environment

Ideas on providing an enhanced learning experience which supports a more efficiently run estate



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Introduction and Overview

Creating partnerships to enrich learning and enhance estate operations

This paper, from our Head of Consulting & Professional Services Malcolm Stagg, discusses the value to universities/colleges and their students that can be gained through collaboration between Higher Education (HE) institutions and the world of industry. This approach could also expand the opportunity for universities and colleges to stake a valid claim to the many funding opportunities that arise from government-led initiatives.

A note on the author

Malcolm Stagg has more than 32 years' experience in the design and construction industry, working in roles across civil and structural engineering, design management, on-site construction, systems and information management, Building Information Modelling (BIM), digital engineering, digital strategy, and digital transformation.



Section One: The university as an incubation hub



A new breed of professional entering the industry comes with a new appreciation of collaboration, how to achieve it, and what its benefits are, not least in avoiding such issues. HE can invest that new breed with the essential skills to change the industry. HE can become an incubation hub for driving change and improving quality of outcomes.

Section Two: Getting ready for the real world



Students with real experience can expect to get the best jobs, with the best salaries, and the best prospects. The irony is that this expectation can be delivered within an HE institution's estate, in real-time, with real problems, real solutions and, what's more, real data; effectively bringing the job placement into the place of learning.

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The campus as a teaching tool

Any campus can be a challenging physical environment to manage, sustain, and develop. Buildings and facilities are often at varying lifecycle stages, requiring different disciplines and skills (from preserving historic and listed buildings to running laboratories and hi-tech specialised facilities).

With built environment investments running into the hundreds of millions, the way in which the built asset – and its myriad working parts – is maintained, is a core enabler of ROI and sustaining and extending asset life.

We believe that universities, colleges, and other higher education places of learning in the UK have an opportunity, and a responsibility, to combine theory and practice for their students (in the built environment faculty plus data science and other aligned subjects) by using the campus itself, and the disciplines brought to bear by a university's estates department in managing, maintaining, and enhancing highly complex campus property portfolios and diverse assets.

Recent advances in technology are introducing new possibilities for improved asset performance and understanding, through the development and management of a 'digital twin' (a fully connected digital replica of a built asset that remains linked with the physical asset and mirrors its condition and performance, all whilst reporting its status. This then enables and informs better decision making, through data, to sustain and extend asset lifecycles, improved usage and further maintenance efficiencies).

Convergence, collaboration, and continuity

Many HE institutions can exist where there is no formal bridge between the resource that handles the challenges and practicalities of running a complex campus every day, and the academic faculty, where students are being taught the theory. They are often two different worlds with little interaction between them. Significant value can accrue to academia, students, and industry, if these parallel worlds converge to become one; real-life everyday exposure for students to use real-time data, in practical situations, both unique (solving problems) and recurring (preventing them), rather than simply studying it.



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Section One: The University as an Incubation Hub

Digital construction and the disciplines of Building Information Modelling (BIM), along with a raft of new technologies, are facilitating collaboration across the construction sector, from concept through to handover and operations. Of the many technological and procedural factors making this all possible there is one approach that is pivotal, that is the use of the digital twin. Herein lies the future of the built environment, the shape of future roles for those looking to work in it, and the foundation of a platform for collaboration with Higher Education.

The digital twin embodies the trends of a digital world. It releases operational value through smart use of data, collaboration and the technologies that enable it, and the practices of BIM.

In addition to recognising these trends, total expenditure (TOTEX) thinking is also key to long-term financial and efficiency benefits for any large campus. This is an approach that makes no distinction between capital expenditure (CapEx) and operational expenditure (OpEx). It is about getting the job of asset management done with an overview of the total economic picture and lowest overall cost. How can that picture be more reliably formed?



The smart campus

The Centre for Digital Built Britain is in the process of developing the principles of a 'national digital twin', creating an ecosystem of connected digital twins, saying "Digital twins – digital replicas of physical assets and processes – are intended to inform better decisions through building lifecycles, from design and build, into operation, maintenance and use."

It's time for universities to give serious consideration to the evolution of the 'smart campus' (connected, digital, and hyper-efficient to operate and to work within) and for those not yet moving in this direction, to take the first steps in doing so.

Driving change for better outcomes

Meanwhile, there is a disconnect within the construction industry of which the industry itself is only too well aware. This is the need for, and the current lack of, a seamless connection between design, build, and operate; the collaboration which BIM aims to stimulate.

The construction industry is aware of the often-adversarial nature of project contracts (where parties enter the contract with an overwhelming self-preservation instinct for when things go wrong, or over budget, or over time, or more fundamentally through misinterpretation of intentions along the way). It is changing, but slowly.

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Section Two: Getting Ready for the Real World

The demand for new skills

Courses designed to equip students with increasingly in-demand skills – in disciplines such as design, architecture, the built environment, the construction sector, civil engineering, surveying, data specialisms and Internet of Things (IoT) capabilities, to name a few – share a common theme: an essential need to understand the intricacies and technologies involved in using and understanding data; for example, data mining, manipulation, cleansing, data lakes, and the evolving compliance environment that affects any organisation handling (and sharing) data.

In the construction sector, the ultimate destination for many students of the course types outlined, the 'data theme' is core in the growing adoption and influence of BIM.

Are universities responding to the needs of industry, and students?

A report from Universities UK, 'Solving Future Skills Challenges', states:



“Nearly 50% of the subject knowledge acquired during the first year of a four-year technical degree is outdated by the time students graduate”.

The report calls for closer partnerships between higher education and industry:

“The linear model of education–employment–career will no longer be sufficient. The pace of change is accelerating, necessitating more flexible partnerships, quicker responses, different modes of delivery and new combinations of skills and experience. Educators and employers need to collaborate more closely, and develop new and innovative partnerships and flexible learning approaches.”

Being relevant

It is important to take in other factors affecting essential change in university approaches to working with industry partners. Such collaboration can address new skills and ensure that skills do not reach and exceed their sell-by dates while students are still in the process of acquiring them.

It is highly possible that universities not responding to this requirement will eventually attract fewer students than those which accompany academic learning with an almost hands-on apprenticeship in practical skills they will end up using in real life, and be expected to have working familiarity with. Undoubtedly, job placements as part of HE courses fill a clear need for practical insight, but are they really 'fit-for-purpose'?

¹https://www.designingbuildings.co.uk/wiki/Adversarial_behaviour_in_the_UK_construction_industry

²www.universitiesuk.ac.uk/policy-and-analysis/solving-future-skills-challenges.aspx

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In these placements, a problem can be encountered. Although many employers who take on work experience students treat the responsibility seriously, and expose students to solid and valuable problem-solving challenges, it is not always possible for them to provide a meaningful experience for part-time team members.

Project deadlines are harsh task masters. A commercial organisation cannot afford to slow things down simply to train people it may never see again. For this reason, students are often given the 'grunt' jobs. Such jobs help move the project forward, rather than the student. The result is that students return to their studies at the end of a work placement possibly none the wiser in real terms.

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Final Thoughts

What if...

What if a university itself, the campus, the buildings, the facilities and the multiple considerations with which a university's estates department contends every day, were embraced as an integral facilitator of the education process?

What if the estates department were to be considered no longer as an independent discipline serving as a resource, unremarked in the background?

What if, as much as smarter people make buildings, the converse was also true; smarter buildings make smarter people?

What if people, process and technology were to come together and really change the game?

Universities are under pressure to do more with less; the same pressure with which industry and the commercial world has always had to struggle. A real opportunity exists to do just that.



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Leading the way

By collaborating with industry partners and external consultants, HE can extend the horizon for students, becoming more attractive to new students and, for individual institutions, enhancing their competitive advantage.

In so doing, universities and colleges can improve the management of their own assets by embracing data, not least through the digital twin concept and exploration of the possibilities of the Internet of Things (IoT: Devices connected through the internet to exchange and receive data independently of human intervention) in creating a smarter campus, to inform future investment decisions. Costs across the university estate will be more tightly controlled and asset life will be extended.

There will be no shortage of organisations within industry prepared to support this ground-breaking initiative; from software developers, to architects, to the broader construction sector and specialist industry bodies and professional organisations.

Symetri would welcome the opportunity to work in partnership with HE institutions. It's a big journey. It's a big conversation, but it starts with our making the connection together, to see where collaboration can take us.



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