LIVING LABS

Living Labs

*The Next Chapter for Sustainability in Tertiary Education*

First Edition, March 2017

Executive Summary

*This report makes the case for the tertiary education Living Lab as a highly effective tool for delivering practical benefits to an institution's core **education, research, practice,** and **engagement** activities. It simultaneously describes how Living Labs can help align sustainability with these activities by facilitating education for sustainable development, practice-based sustainability research, sustainability practice, and external engagement. This report argues that making investments in a Living Lab for either one or more of these areas is not only worthwhile, but also important for tertiary education institutions.*

A Living Lab (LL) is a holistic approach to sustainability that can enhance the way major activities of an institution are conducted. Essentially, it forms relationships between stakeholder groups to undertake real-world projects. It can connect any number of these four main areas and groups with each other:

- Education (students)
- Research (academics)
- Physical and administrative operations (professional staff)
- External engagement (external actors)
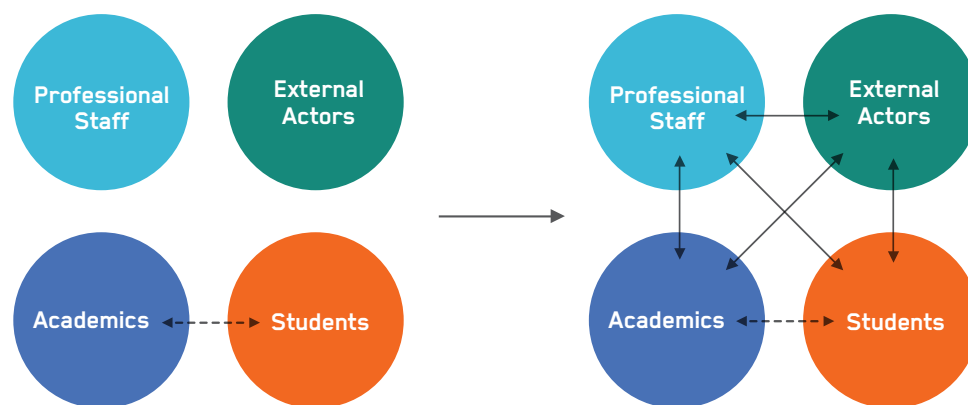
Academics and/or students can collaborate with professional staff and/or external actors in various combinations of project relations (refer to EAUC Living Lab model for more details (Waheed, 2017)).

Living Lab projects provide real, practical and agreed outcomes to all participants in a project, while directing everyone to collective action towards sustainability. Moreover, all participants are beneficiaries of Living Lab projects; none are expected to disproportionally contribute for the benefit of others (unless with agreement). As each stakeholder gives, they also gain. Students and academics offer time, intellectual potential and hands-on support.

In exchange, professional staff and external actors provide access to enhanced practical learning experiences necessary for meaningful sustainability education and research, that traditional academic methods cannot successfully provide. By aligning agendas, a Living Lab helps to reduce resources and time in accomplishing together what would have otherwise cost each participant more to do alone.

Living Labs projects are guided by seven principles that help achieve these positive results (section 2). Principles help dissolve boundaries between people from the same as well as different stakeholder groups to circumvent time, resource and cultural barriers in the way of collaboration.

Benefits for **students** can include (section 3):
• grounded practical experiences to foster intellectual and personal development
• professional and employability skills for students to help develop a sustainable society
• confidence of linking theory to practice, i.e. bringing classroom and academic research into the 'real-world'
• values and principles of sustainability incorporated into students as change agents
• greater engagement with other stakeholders and greater satisfaction
• supplementing current educational techniques with innovative new models

Academics can benefit through (section 4):
• access to a live test-bed to conduct innovative transdisciplinary research
• a way to consolidate and ease tension between theory and practice
• increase in engagement, reputation, and public perception
• challenging and evolving projects guide publications to be of more practical relevance
• a positive bearing on their surroundings, adding to the impact agenda

Professional staff and **external actors** can benefit by
(section 3 & 4; Waheed, 2017):
• harnessing the institution's academic potential to address social, economic, and environmental challenges they face
• increasing public reputation for working on sustainability issues
• frequently making time and monetary savings through relevant and successful projects
• positive impact, contribution and connection toward institution's research and/or education

Thus, all stakeholder groups can benefit in numerous ways (for diverse roles and benefits of each stakeholder group see: (Waheed, 2017: A.1-A.4)). Through matching the **needs** and **services** of stakeholder groups in one equation, the Living Lab makes a 'business' and 'common sense' case.

This research capitalises on recent attention gained by Living Labs to offer a timely response to the sector's needs. It fills important gaps in the tertiary education Living Labs theory, concepts and guidance. There are two parts to this research. **First**, this report document provides the **rationale** for the Living Labs as an important part of tertiary education institutions' sustainability work. **Second**, the accompanying publication (Waheed, 2017) details the EAUC Living Lab model; i.e. it **informs** what the Living Lab is and the many ways in which it can operate.

CONTENTS OF THIS REPORT

• **Sections 1 & 2** provide a brief history of the Living Lab concept and a summarise the EAUC approach to it.

• **Section 3** firstly illustrates how Living Labs involving students are not only congruous with Education for Sustainable Development (ESD), but themselves can be an effective ESD approach. Secondly, it highlights major barriers to ESD, and discusses ways in which Living Labs can help mitigate them.

• **Section 4** firstly highlights the importance of practice-based sustainability research and engaged scholarship in universities. Secondly, it discusses the complex national and institutional barriers in the way, and presents the Living Lab as a key approach that can help abate negative consequences and opens doorways for further transformational work.

• **Section 5** asserts the importance of Living Labs to the UK & Ireland tertiary education sector. Additionally, it discusses the time and resource investments required to establish the Living Lab as a major approach. It briefly highlights the relative benefits, 'return on investment', and increasing importance of the approach to the sector globally.

• **Section 6** briefly discusses the EAUC Living Labs Programme as a valuable vehicle for delivering the EAUC strategy that ultimately empowers members to take global leadership. Further, it highlights the impetus to collaborate with institutions, networks and bodies on an international level.

Foreword

> **EAUC Strategy 2017-2021** – *a world with sustainability at its heart.*
> *We exist to lead and empower the post-16 education sector to make sustainability 'just good business'.*
>
> **Goal 1:** Strategic Alignment – greater influence and alignment at the institutional level
> **Goal 2:** Advocacy – greater voice at the societal level
> **Goal 3:** Research and Knowledge Exchange – greater innovation at the sector level

The EAUC recognises the transformational potential of Living Labs. We are committed to repositioning sustainability as 'just good business' and have launched a powerful new strategy to achieve this. In our emerging Living Labs Programme, we see all three of our strategic transformational goals - alignment, impact and innovation being realised. In one tool this is rare and very powerful.
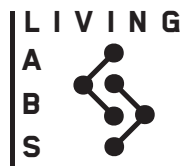
Having led this globally leading research, we have come to further appreciate the dynamism and flexibility of the Living Lab. Regardless of an institution's starting point, or the combination of interested stakeholders, Living Labs promise the opportunity of applied learning and employability skills for students, problem-solving for campus managers, a rich and real-world learning experience for academics and a redefined student experience and new levels of student retention and satisfaction for senior managers.

We have been delighted to see the interest in Living Labs within the EAUC community. However, to date, only a small number have successfully started long-term strategic initiatives. Although there is a positive trend favouring Living Labs, there is need for considerably more work across all institutions. This is especially true when compared to leading Living Labs initiatives across North America and mainland Europe. The immense potential of Living Labs and their power to elicit change towards sustainability has been largely unexploited in the UK & Ireland. This is partly due to a lack of sound guidance, tools, and examples. Beginning from this research, the EAUC aims to fulfil this gap nationally, with the potential for benefitting bodies and institutions internationally. While the report itself is oriented towards members in the UK & Ireland, the Living Lab Model is comprised of universally applicable guidance. As we move forward, the EAUC will continue to explore channels through which the international potential of the EAUC and our members' progress can be maximised.

Iain Patton,

CEO, EAUC

LIVING LABS: THE NEXT CHAPTER
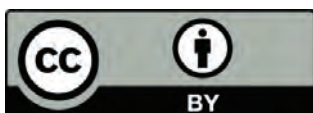# FOR SUSTAINABILITY IN TERTIARY EDUCATION

SAVE PAPER.
Please consider the impact of printing this report on our planet.

WHO IS THIS REPORT FOR?

This report is for both academics and professional staff. This report is targeted at staff with an interest in (or sympathetic to the cause of) advancing sustainability at their institution. It primarily aims to make a case for the Living Lab by explaining how it can meet challenges and needs of the institution's core agenda, while gradually aligning sustainability as a core component within it. The report explores the Living Lab as a flexible and crosscutting concept, applicable to education, research, institutional operations, administration, leadership, and/or external engagement activities. Since Living Labs have the potential to be relevant to most aspects of an institution's primary functions, this report attempts to retain a broad scope that is relevant to audiences of different levels and backgrounds.

LIST OF ABBREVIATIONS

ASU	Arizona State University
EAUC	Environmental Association of Universities & Colleges
ENoLL	European Network of Living Labs
ESD	Education for Sustainable Development
EU	European Union
FHE	Further & Higher Education
ICT	Information & Communications Technology
IT	Information Technology
MIT	Massachusetts Institute of Technology
NGO	Non-governmental Organisation
PSU	Pennsylvania State University
SD	Sustainable Development
SDGs	Sustainable Development Goals
UBC	University of British Columbia
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
LiFE	Learning in Future Environments (A tool by the EAUC)
LL	Living Lab

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Introduction

Since its popularisation at MIT, the Living Lab (LL) concept has been adapted and reshaped by several actors, including educational institutions, business communities, local governments, and EU-funded bodies (Robles et. al., 2016: 21; Lepik et. al., 2010; König & Evans, 2013: 4). It originally transpired from a combination of different research methodologies from European and North American universities. It has since continually been moulded as it crosses sector and discipline boundaries. The concept recently returned to tertiary education as a sustainability-oriented cross-cutting approach for education, research, practice and engagement (McCormick & Kiss, 2015; König & Evans, 2013). This latest resurgence is the most relevant form of the LL concept that this research builds on.

The unique characteristic of a FHE (Further & Higher Education) LL is that it combines an institution's intellectual potential with practical sustainability challenges on- or off-campus. It dissolves boundaries between the traditionally segregated activities of education; research; external engagement; and operational & administrative practice. It is a highly flexible tool that can combine these areas through various types of projects that provide a powerful and immersive experience for all. As an established approach, a LL can develop collaborative long-term relationships with more impactful, frequent and longitudinal projects.

For some, the term itself – 'Living Lab' – may exude natural sciences, technology, and academic knowledge more so than any other field. However, there is no disciplinary inclination in either the theoretical concepts & principles, or the recent practice of LL. In fact, a LL is open to any discipline and endorses transdisciplinarity (mutual learning by crossing disciplines and theory & practice (Waheed, 2017)).[i]

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i *This research draws from diverse practices of LL that include public, private and third sector LLs, and FHE LL initiatives based in arts & design, social sciences, humanities, environmental sciences, geography, business, natural sciences, and more.*

Additionally, the term itself is not as important as the methodology that can inspire and enable people to pursue their vision of the sustainable institution. There are several examples of LL initiatives that do not utilise the 'Living Lab' terminology for various reasons (e.g. Portland State University, Arizona State University (Beaudoin & Brundiers 2017a)). And there are examples of LL initiatives that do use the 'Living Lab' terminology, but incorporate a diversity of disciplines and sectors (Marcus et. al. 2015; PSU, n.d.).

Furthermore, both attaining a LL and thereafter receiving its ongoing benefits will take time, resources, mistakes, effort, and a learning process. A LL provides most benefits if it is treated as a mid-long-term, even though short-term projects may be of more concern to some. The LL approach does not require immediate progress to implement all its aspects; institutions should take time with it. Nor does it promise immediate results from investment; institutions should give time to it. Therefore, recognising existing small-scale and segregated LL work, providing support to enhance and evolve closely related efforts into the LL, and letting actors take ownership of the LL initiative can become critical to development. Taking time to build foundations can win support, bring people closer together, and increase the legitimacy of the LL. Thus, a LL does not serve as a replacement of ongoing work, but an enhancement.[i]

Additionally, non-LL sustainability work is, and will continue to be important for institutions.

i *A large proportion of institutions will already have some LL or LL-related work. A supportive approach would recognise and offer to enhance this work first, while allowing actors to continue their leadership. Further, existing and ongoing parallel sustainability work can be a crucial part of helping institutions 'on the road' to a LL, and inform its work once it is established.*

The Living Lab Defined

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The EAUC definition represents the needs and potential of FHE education and research as well as sustainability practice. To achieve this, it draws from several models of (FHE and non-FHE) LLs and associated concepts, to help bridge the academy with real-world practice (McCormick & Kiss, 2015; Robles et. al., 2016; van der Walt et. al., 2009; König, 2013; Evans et. al., 2015; Beaudoin & Brundiers, 2017b)[i]. In doing so, it encapsulates the various diverse perspectives important to the essence of the FHE LL. Crucially however, this definition should not be treated independently. It is based upon a comprehensive model that is necessary to fully understand the FHE LL. The model consists of two major components, relationships and principles, and is fully detailed in the Living Lab Model (Waheed, 2017).

The definition densely packs the seven key principles of a LL. The first three are core principles, and important to every project. The remaining four are also important to the essence of a LL, but may vary in application due to time & resource availability, difficulty, or inapplicability.

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i *The model was also informed by several stages of feedback from: consulting academics and practitioners of FHE LLs in Europe and North America (Sep 2016 – Feb 2017); an initial survey of 20 members of the EAUC LL Community of Practice (Sep 2016); feedback from attendees of an EAUC LL event (Jan 2017); further feedback from the EAUC LL Community of Practice (Feb 2017); and further feedback from LL practitioners internationally (Feb 2017).*

Core Principle
Real Sustainability Challenges

All LL projects should address real sustainability challenges. These will typically be provided by professional staff and/or external actors.

Core Principle
Formal Participation

Students can participate in LL projects through curricular activities (e.g. courses, dissertations, compulsory volunteering/projects) or formal extracurricular programmes (e.g. internships, summer schools); *academics* as part of their teaching & research; *professional staff* through their formal responsibilities; and *external actors*, if relevant and possible, as part of paid work.

Core Principle
Stakeholder Partnerships

All participants in LL projects are equitably involved as stakeholders. Aspects to observe include: involvement in decision-making, active participation, and transparency.

Learning Loops

The LL project takes advantage of knowledge and outcomes 'looped' back into it from a similar/related LL project(s) in the past or present.

2.1 EAUC Living Lab Definition

A Living Lab is where real-world sustainability challenges are formally addressed in stakeholder partnerships.

A Living Lab encourages co-creation & co-implemention of transformations through transdisciplinary efforts, over a series of learning loops, to sustainably develop a geographically-bounded test-bed.

Transdisciplinarity

The LL project draws participants from various backgrounds (different academic disciplines and different practical areas) in mutual learning and knowledge production for addressing complex sustainability challenges.

Co-Creation & Co-Implementation of Transformations

The LL project aims to deliver real change, where stakeholders collectively research, experiment, prototype, test, create and implement practical transformations. These could be one-off 'solutions' for simple circumstances, ongoing projects, or 'situational improvements' for complex scenarios.

Geographically-Bounded Test-Bed

The LL project directly addresses sustainability challenges in a physical location designated as a LL. This geographic zone, with its infrastructure, processes, environment, and social life, is also subject to other past, present or future LL projects.

2.2 WHY A LIVING LAB MODEL?

This FHE-specific LL model has three main purposes.

Firstly, it distinguishes the LL from other concepts which align or overlap, for example: open innovation; user innovation; LAB studio model; FormIT; experiential learning; applied research; action research; problem or project-based learning; solution-oriented sustainability learning; transformative learning; service learning; internships; independent student projects such as theses and dissertations (Beaudoin & Brundiers, 2017b: 9; Heikkinen & Stevenson, 2016; Wiek & Kay, 2015; Ståhlbröst & Holst, 2012; Robles et. al., 2015).

The LL is complementary with most of these models. However, it differs from them in a number of ways. **One** important distinction is that no other concept incorporates all the principles and relationships that make the FHE LL as unique as it is. **Another** reason which distinguishes a LL is that it is much broader than an innovative research or teaching methodology. An FHE LL is equally relevant as a sustainability practice and engagement methodology. However, more importantly, it also has the potential to serve as a way in which an FHE institution operates and govern agenda. As such, a LL can become a part of transformative institutional change that draws on both top-down and bottom-up strategies. Therefore, unlike most other pedagogical or research frameworks, a LL can not only deliver change through the sustainability challenges it engages, but also through the way an institutions' primary activities are carried out; i.e. it can change the very methods with which education, research, external engagement and operations/administration are conducted. This holistic change can encompass policies,

culture, behaviours, the physical environment, infrastructure and other activities and practices. Thus, in addition to serving as a methodology, a LL ultimately aims to systematically transform the very area that it is applied to.

However, a LL does not discredit or replace any of the abovementioned approaches; it can complement or work alongside them. LL projects can also incorporate these approaches into projects – like action research, applied research, project-based learning and others.[i]

The second purpose of the LL model is to fulfil the need for a shared sector-specific notion of what a LL is. Since LLs are interpreted and described in many different ways globally, a recognisable approach allows institutions to more easily confer, communicate and collaborate with each other. This FHE-specific model incorporates all the relationships and principles important in observing the important characteristics which define the LL approach at an FHE institution. It is also purposefully broad and interpretable through a range of colourful possibilities, without constricting imagination or setting a rigid outline. Thus, the model accommodates diverse needs, while being simple enough to communicate with.

Finally, there is a shift in the social contract of FHE institutions. As uniquely placed public bodies, FHE institutions are under increasing external pressure to be more proactive in helping to face the great sustainability challenges of our time. For example, effective community engagement; participation in policymaking processes; 'on the ground' impactful sustainability projects and research; and responsible investment are just some of the externally facing activities now expected of institutions.

i *Pallot et. al. highlight how some of these approaches may overlap with and through the LL (Pallot et. al., 2010). Although, the FHE LL model proposed by this research is much broader than the LL model that Pallot et. al. originally incorporated. The LL approach has since evolved and grown, but this paper remains relevant.*

At the same time, there are requirements to deliver more sustainability benefits **internally**. Institutions are expected to reform curricula so their graduates can deal with rapid societal change (e.g. systems thinking; leadership; real-world work experiences; professional and employability skills; avoiding technological unemployment etc.).

Research is expected to not only inform about, but also help solve the practical challenges facing society. Institutions are also expected to become examples of how organisations can operate sustainably against demanding economic challenges.

Traditional modes of practice, teaching and research are no longer enough; society is demanding alignment with societal challenges.

A LL is a critical way for institutions to respond to these challenges.

Therefore, this LL model serves its purpose as a timely initial step to help the sector better understand what LLs are, how they can work to the advantage of FHE institutions, and how they can be implemented to respond to this changing social contract.

SUSTAINABILITY IN THE ACADEMY

The main section of the report is split into two parts. The first part discusses the barriers for education for sustainable development and how LL projects involving students can assist institutions in mitigating them (section 3). The second part will focus on the barriers for more engaged, practical and transdisciplinary academic research, alongside ways in which the LL approach involving academics can help address those (section 4).

Education for Sustainable Development

"When one is climbing mountains, one oftenspots a peak, imagining this to be the summit with endless vistas below. On reaching this point, however, it is apparent that one's previous perspective had limitations.

There are yet more hidden peaks to climb. And so it is with sustainability education. Goals which previously seemed the pinnacle are now seen as landmarks on a bigger journey."

(McGibbon & Van Belle, 2015: 82)

Learning & teaching is the main purpose of a FHE institution. Therefore, it is the most important activity to harmonise with sustainability. The most profound contribution that FHE institutions can make towards sustainability is instilling within graduates the skills, attributes, values, knowledge, and passion for working towards a sustainable world. Education for Sustainable Development (ESD) is the most widely regarded concept that underpins sustainability pedagogy (science of learning & teaching). ESD was developed in the image of attributes and knowledge that people urgently require for working towards a sustainable world. It is applicable at all levels of education as well as in social contexts outside of formal education. ESD can be loosely defined as "a transformative and reflective process that seeks to integrate values and perceptions of sustainability into education systems" (Waas et.al., 2012: 14).

Three major principles of ESD include[i]:

- transdisciplinary learning (Biberhofer & Rammel, 2017);
- collaborative learning experiences (Ralph & Stubbs, 2014: 87);
- fostering personal development and intellectual capacity within students as change agents, not just delivering sustainability knowledge or 'content' (Jones et. al., 2008).

FHE institutions are a crucial for ESD, since they occasion the highest level of education to impressionable students who have the greatest impact on the world as graduates. FHE graduates must immediately be able to adapt and thrive in complex, transdisciplinary and evolving work environments within academia, businesses, governments, and NGOs. They must also possess the values and principles of sustainability to be able to act as change agents professionally and in civil society. The past decade has seen a general shift towards a consensus in the sector: sustainability in FHE curriculums is a necessity.

Furthermore, surveys show that over the past six years approximately two-thirds of UK students have expressed to learn more about sustainability (NUS, 2016: 2). This national shift was partially catalysed during the UN Decade for ESD (2005-2014) which sought to promote ESD internationally and at all levels (UNESCO, 2005).

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i *How to implement ESD, or what ESD even is comprises a contested field of enquiry. However, for the purposes of this research, we adapt these three widely recognised principles*

Education for Sustainable Development & the Living Lab

This section will discuss how the LL can be a highly effective approach for ESD. The abovementioned principles of ESD will be discussed in relation with the LL approach.

The first major principle of ESD, 'transdisciplinary learning', involves breaking silos or ivory towers present in the current educational programmes to instil a greater sense of systems thinking, mutual learning, and awareness of practical realities (Biberhofer & Rammel, 2017). The curriculum must achieve more than just theoretically training students within one discipline. Students should be able to mutually learn and produce practically relevant knowledge by navigating between two types of gaps. They should have the skills to "identify boundaries, **understand different cultures of knowing and practice**, and conduct integrative research by **bridging gaps between knowledge fields** [stresses added]" (Vilsmaier & Lang 2015: 51). This is crucial as graduates need to effectively face real sustainability challenges which do not respect disciplinary boundaries or limitations of theoretical models. Thus, students' formal education should cover several disciplines and real-world practice, in addition to the traditional theory-based education. ESD results in graduates that are specialists of one discipline, but versatile with several in theory and practice.

A LL incorporates this principle in two ways. **Firstly**, LLs centre on exactly the kinds of sustainability challenges that students may face as graduates. In every LL project, students work on a real-world circumstance in stakeholder partnerships with either professional staff, external actors, or both. This experience provides opportunities to better understand the differences between reality and the theo-

retical models we construct to try to better understand real phenomena. A LL experience in itself covers a major part of transdisciplinarity (bridging gap between theory & practice). **Secondly**, transdisciplinary itself is an important LL principle that can be incorporated into LL projects (Waheed, 2017: section 2.5). A LL project incorporating this principle could provide students with some of the most immersive opportunities. Such projects integrate students from different disciplines with practitioners from different backgrounds in mutual learning, knowledge-exchange, and knowledge production. Therefore, a LL bridges both, the 'different cultures of knowing and practice' and the 'gaps between knowledge fields' required by ESD.

The second major ESD principle revolves around 'collaborative learning' (Ralph & Stubbs, 2013). Collaboration can be with fellow students, non-student learners, institutional staff, or external actors. There is no defined boundary for the types of actors one can engage as part of an ESD learning exercise. The priority must be to deliver experiences that enhance students' reflective and intellectual processes. "Learning...is better conceived of as a collective process that unfolds through a wider community of stakeholders than as some individual process of self-discovery" (König & Evans, 2013: 9). In other words, learning is a social process that requires social interaction with people who can draw out the best from each other. These experiences address preconceptions, dissolve boundaries

and provide the skills needed to communicate, connect, deal and work with others. As a result, graduates become more socially integrative and prepared for work in the external environment.

The LL can help achieve such collaborative learning through two means. **The first way** is through offering students the opportunity to work in LL projects that adapt one or more principles that focus specifically on such collaborative learning. These include[i]:

* 'stakeholder partnerships' (this is a core principle, which every project will involve)
* 'co-create and co-implement transformations'
* 'transdisciplinarity'

The second way a LL promotes collaborative learning is through the relationships it forms. In all LL projects, students form a relation with either professional staff or external actors. This exposes them to diversity, complexity and types of circumstances that will challenge and expand their reflective and intellectual capacity. It also builds skills like communication, teamwork and independent work important for their future.

A LL offers plenty of flexibility for defining and implementing collaborative learning experiences. For example, one LL project may value closer collaborative learning with just one student paired with one professional staff or external actor. Another project may prioritise student group-work and multi-stakeholder relations with many different participants. Each enhances students' understanding of the working world and ability to connect and learn with others in a valid way.

The final principle of ESD, 'fostering intellectual and personal development', is important in making ESD a transformative approach. To be regarded as ESD, an initiative must demonstrate that it is preparing students with the attributes to face the major challenges of our time. These attributes include an ability to understand and deal with complex systems, technical & degree related skills, practical skills, professional & employability skills, reflectivity, and values that positively shape character. These are achieved largely through reflective ways of learning. Manolas & Iliadis (2007) summarise four different ways of learning with respect to ESD:

* 'being told'
* 'imitation' of a performance
* 'trial and error'
* thinking'

While current curriculums excel at the former two, there lacking provision of the latter two. However, it is impossible to allow students to '**trial**' without being able to provide a safe space for '**error**'. There is pressing need for spaces where students are not required to constantly evaluate long-term repercussions of their grades and negative consequences of transformational learning experiences. They should be allowed to focus on learning through experimenting, innovating, and prototyping on practical issues.

Additionally, catalysing a deep level of '**thinking**' within students is not possible in a content-driven curriculum. There is a narrow limit to the amount of 'content' that can be 'told' to students, and a further limit on what proportion of that content students can retain, and yet another limit on the remaining content that will be practically useful to them as graduates. In fact, simply adding content to any subject with the intention of enhancing it has been acknowledged as a chief cause of lower quality in teaching for over a century (Gillespie, 2011: 67). Adding sustainability content alone cannot be considered ESD since it fails to take bold steps towards training students for 'wicked

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i *These are three principles of the LL Model, briefly discussed section 2.1 and further explored in LL Model (Waheed, 2017: sections 2.3, 2.4 & 2.5)*

problems' that are "characterized by high levels of complexity, ambiguity, controversy and uncertainty both with respect to what is going on and with respect to what needs to be done" (Lotz-Sistka et. al., 2015: 73). This is because content alone does not train students to develop answers to 'wicked problems'. A content-driven curriculum does not add more. It simply follows traditional methods like delivery of information in classrooms, and standardised testing to encourage efficient reproduction of information.

ESD prioritises education **for** sustainability over sustainability content (Whitbread, 2015: 23). That is, transformative education for students that trains for action towards a sustainable world, for work towards achieving it, and for questioning what sustainability even means. This requires practical experience and hands-on work (Daneri et. al., 2015: 16). This leads to 'fostering intellectual and personal' capacity in students as independent lifelong learners required by ESD. Importantly, ESD does not undermine the role and importance of theoretical knowledge and classical academic training. It seeks to balance it with the educational needs of the great challenges of our time.

Medicine degrees are a very potent example to demonstrate this concept. They are among the most academically demanding degrees that usually require a high level of theoretical understanding and deliberation. However, they also put students through a rigorous programme of practice that is recognised to be necessary because it is what medicine graduates are required to do as doctors. If institutions fail, lives will be lost due to ineffectual graduates. Whereas, this obvious association is lost for almost all other degrees. However, the consequences are more severe in this scenario: the whole planet is being lost

The LL aligns with this ESD principle by essentially treating students as real practitioners. The aim of 'connecting the classroom to the real world' (Brundiers & Wiek, 2011: 109) is achieved in its most original sense.

A LL assumes that the only way to train students for the 'real world' is by exposing them to it, providing them with the opportunity to experience it, work in it, to physically change it, to learn from it, to prepare for it, and to live it, rather than attempting to saturate them with second-hand information about it. Progressive educators for ESD have consistently called for "pedagogical innovations that provide interactive, experiential, transformative, and real-world learning" (Brundiers et. al., 2010: 309).

The LL is a pedagogical innovation that delivers on these accounts. Student work in a LL reaches an equilibrium between theoretical study, research, and practical application. It does so by pertinently focusing on how to conduct research on and face practical sustainability challenges with partners, just as they would encounter them as graduates. Resources and knowledge of academics in a LL facilitates students in relation to their practical work. Through these experiences graduates become better critical thinkers, more socially integrative, experienced, prepared and intellectually and personally adept.

The close connection between ESD principles and the LL mean that student-based projects which adapt the relevant LL principles can be considered as an effective ESD approach.

Living Labs & the Barriers to Education for Sustainable Development

This section will explore key barriers to ESD, and the potential ways in which LLs can mitigate their impact.

There are various degrees to which sustainability can be incorporated into the curriculum. Sterling recognises 4 major institutional responses to the appeal (Sterling, 2004):

• 'denial' – treating it as a fleeting hype, and not taking any major steps
• 'bolt-on' – greening the curriculum by adding on sustainability elements
• 'built-in' – integrating sustainability within curriculum
• 're-design' – re-thinking the educational system

Despite significant efforts at national and institutional levels, change in FHE curriculums has largely fallen short of incorporating ESD. Thus, most institutions occupy the territory between 'bolt-on' and 'built-in' sustainability, which mainly involves adding increasing degrees of 'content' to the curriculum. Though this has led to more knowledge of global issues in sustainability, it is nevertheless bound within the limits of the traditional FHE experience. These efforts utilise the traditional pedagogies of 'being told' and 'imitating' performance. They prove insufficient for instilling the necessary skills and competencies required for graduates to be successful change agents. 'Re-design' entails fully integrating ESD principles into a transformative curriculum that facilitates 'trial and error' and 'thinking'. At the sector level, such a 're-design' response remains largely elusive.

This inadequate transformation has attracted substantial criticisms (König, 2015; Lotz-Sisitka et.al., 2015; Young et.al., 2015; Blewitt, 2013: 52; Whitbread, 2015: 23; Jones et.al 2008; Budwig, 2015: 100; Daneri et. al., 2015:16)[i]

Although educators largely understand this urgency for change, they remain uncertain about how efforts can succeed beyond just 'content' in the system they are currently operating within. The majority of 're-design' efforts are unable to navigate systemic barriers, mostly failing or being demoted to fit within boundaries of existing structures as 'bolt-on' or 'built-in'. In order to holistically integrate ESD across the curriculum, an initiative has to navigate the main barriers for the kind of transformations a 're-design' approach requires.

3.2.1 BARRIER 1: RESOURCE CONSTRAINTS

One major barrier has been market-based state regulations resulting in financial changes in the sector (Platje, 2007: 248). This has been triggered by two main policy devices. **First**, FHE has been slowly starved of block public grants, being forced to adapt increasingly 'efficient' teaching and research practices with inevitable consequences for quality. **Second**, over the past few decades, policy pressure has shaped

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i *This is a small proportion of the literature on a consensus that: first, current modes of education and the way in which ESD has been interpreted is not adequate or transformational and, second, there is urgent need for revolutionary transformations in curriculums.*

the FHE sector increasingly into the image of a competitive academic market. Collectively, both forces have pressured institutions to adapt business-oriented perspectives that have lead their evolution toward corporate entities (Blewitt, 2013: 52; Lawrence & Sharma, 2002: 661; Burawoy, 2011: 29).

This has been a highly challenging barrier against transforming siloed degrees into progressive curriculums. This is because it facilitates modularisation of tertiary education into convenient 'bite-size' knowledge products: courses that can be efficiently produced, managed and delivered. The market does not form any exceptions for education. It treats education as 'content' to be delivered to students as resource-efficiently as possible. Further, this pressure plays an important part in preventing transformational changes to the curriculum since they require resources and risk.

This affects staff of all levels, creating tensions and compromises where they are least needed in the educational system. Senior management are constantly under pressure to improve the overall quality of education with diminishing resources, which they are increasingly tasked to fund through business activities which commercialise institutions. Academics are provided with insufficient resources to be able to deliver the level and type of education that is expected and demanded of them. Professional staff have little to no capacity and remit to engage with educational activities while as they are under pressure to reduce costs. Thus, FHE institutions are unable to deliver the quality of education that they have the expertise for due to a lack in resources committed. This is in large part due to a sector-level process that renders ESD "as expendable as anything else if it does not pay its way" (Wals, 2013: 11).

At this stage, FHE LLs are unable to directly address the core issues that are at the heart of these policies, e.g. legislation & regulation. But they are nevertheless able to provide a powerful and feasible alternative which helps counteract many of the symptoms of these policies. There are two main ways that a LL help achieve this.

First, LL projects (even pilots) can enable ESD incredibly effectively, without requiring a significant amount of additional resource. This approach is beneficial especially if it is challenging for an institution to attain resources in early stages of a LL. While for the most part, sustaining and growing any LL will necessitate expertise, time and resources, small projects just require a basic knowledge of the LL and some time commitment.

The LL at the Swiss Federal Institute of Technology, Zurich was originally started by students without any major resource or an institutional mandate. Though it is not advisable to base a LL on voluntary action or on a small number of students, both of which can be temporary. However, this example demonstrates the possibility of what a LL approach can accomplish with a small amount of time. This LL evolved into the 'Seed Sustainability' programme that was eventually formally incorporated by the university into its sustainability programme (Brundiers & Wiek, 2011). In fact, in some cases with an experienced LL practitioner, LL projects do not require any additional resources (Robinson, 2016). Although, reliable funding streams are always advantageous for long-term and large-scale LL efforts.

The second way in which a LL counteracts this barrier is by offering practical benefits that outweigh its cost. These benefits are usually a direct or indirect result of project outputs, and could help generate revenue, save costs or otherwise justify investment into LL projects.

Benefits that could gain support for the LL include: progress to comply with environmental regulations; improving reputation; social benefits; more innovative and engaged research; addressing the community engagement agenda; a case for student-related benefits like employability, professional skills, and course satisfaction[i]

If a strong case is made, LL benefits can become crucial factors in the overall management equation, essentially offering attractive 'returns on investment'. In many cases, these benefits will be crucial in appealing to decision-makers or gatekeepers.

A LL pilot project to study air conditioning was carried out through a course at Georgia Piedmont Technical College. The project highlighted some major inefficiencies in the system. After demonstrating significant
carbon reduction and monetary savings of few hundred thousand dollars the senior management provided an institutional mandate
to scale LL activities
(Cohen & Lovell, n. d.).

Providing the 'business case' has been a crucial factor in the success of all major LL initiatives. By arguing for and demonstrating that it will provide a significant (monetary, or other valued) return, a LL can attract progressively larger amounts of internal
and external investment.

3.2.2 BARRIER 2: TIME FOR RESEARCH OR EDUCATION?

Another barrier for ESD curriculum 're-design' results from the constant pressure on academics to produce research. This barrier is specific to universities, and most problematic for research intensive institutions. As quality and quantity of research determines funding, a primary source of revenue, institutions devote immense resource towards sustaining and managing it (Barker, 2007: 3). In some cases, "the prevailing model rewards research far more than teaching or service" (Krajewski et. al. 2003: 104 Pet). This results in a time, resource and effort disparity that impacts teaching quality on troublesome levels at institutional and sector levels.

Authentic ESD efforts have traditionally demanded some additional time and resources for planning and teaching, but have largely failed to negotiate those against research commitments. While this internal competition impacts teaching quality, it also places unsustainable workloads on academics who attempt to be effective in both pursuits (this barrier is discussed further in relation to research, section 4.2.1).

This system has been a longstanding problem. In fact, in a review of the UN Decade for ESD for UNESCO, Wals explains that because of this imbalance, universities that are strong in research also "tend to pay less attention to both ESD and sustainability in general" (Wals, 2013: 11).

A LL offers an opportunity to counteract this barrier by combining research and teaching together. Instead of a competition, research and teaching can operate symbiotically in a LL.

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i *Several LL case studies evidence a substantial increase in student satisfaction, engagement and interest in their education as a direct result of participation in LL projects (McCormick & Kiss, 2015: 48; Wells et. al., 2008; Young et. al., 2015).*

Malmo Innovation Platform, the LL at Lund University (Sweden), is a vivid example of this combination. Researchers at this LL have initiated 20 social and technical experimental projects ranging from heat to water and waste in the local area (McCormick & Kiss, 2015: 45). Alongside the research, the LL operates educational projects which mirror the academics' work in various ways. This includes student projects that are informed by, or form as a sub-set of the larger academic research project. In some Masters course projects, teachers enter among students as equal learning partners in developing solutions (McCormick & Kiss, 2015: 48-49). This allows researchers to closely involve students within urban sustainability projects without having to significantly increase the burden on either their teaching or research responsibilities.

This relationship reflects what Prussian geographer Wilhelm von Humboldt originally described as the chief purpose and benefit of housing both research and education within a university: to enable better knowledge flow among academics and students (Holmwood, 2011:13). Students would have proximity to experts who would teach with the latest knowledge produced in their research, exposing

students to their field much more effectively and directly. Due to time, resource and systemic constraints in the modern FHE institutions, this relationship has been largely inhibited, veering towards a model with "production of new knowledge and...dissemination of the old" (Kennedy, 1990). A LL unlocks the possibility of bringing a larger number of students closer to original research than ever previously possible.

Despite the LL offering a way to address this barrier, it will nevertheless be challenging and not always possible. In this scenario, another way of overcoming the barrier is by reducing the level of 'content' that is to be delivered through a course and allowing students to lead the development of projects through courses. This is based on the concept of more material being generated by students themselves, requiring less delivery time and funds and more support from instructors. Another way is to face this barrier is through linking LL projects through independent work (i.e. dissertations) and extracurricular programmes (e.g. internships) that require student initiative.

Other ways of overcoming this barrier include finding creative ways of transforming current courses, or making the business case for more resource/funding (as described in response to the previous barrier, section 3.2.1).

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3.2.3 BARRIER 3: TRADITIONAL EDUCATION CULTURE

A third barrier to ESD is an outdated content-driven and disciplinary focussed educational culture (Ralph & Stubbs, 2014: 73). This considers the educator as one who must impart knowledge onto the student, who must temporarily absorb it and reproduce it upon instruction. This engenders the types of techniques and systems that pioneering educators have grappled against for over a century (Gillespie, 2011). Pedagogical theories that account for needs of the 21st century graduate recognise that knowledge is 'occasioned' (ibid) through a two-way process which is strengthened through ties of practice, place and relationships (Budwig, 2015: 99-100).

Further, this culture also promotes entrenchment of knowledge within tightly bound and segregated academic disciplines (Barth et. al., 2007). Whereas, sustainability cannot be addressed within traditional structures of knowledge; real sustainability challenges flow across several disciplines at a time. ESD educators argue for the need to evolve beyond single-discipline lecture, exam and essay-based courses, but are limited by institutionally "accepted boundaries" (König, 2015: 106). This barrier has been reinforced through traditional practices, systems and structures due to the cultural legacy of the academy.

While at this stage LLs are unable to themselves accomplish a cultural revolution, they are nevertheless a powerful tool for an increasing number of staff and students searching for more progressive ways to introduce ESD into the curriculum.
This traditional system already receives a great degree of criticism, and almost all institutions have some internal efforts to overcome it (Jones et.al., 2008; Winter & Cotton, 2012: 792; Ralph & Stubbs, 2013: 86).

However, it is based in structures and practices running deep within institutions. Academic disciplines are physically and organisationally separated into different schools, often with separate budgets, systems, administration, policies and structures.

Thus, FHE institutions themselves, in the way they exist and operate, somewhat hinder the quality and relevance of their education. There is no simple or right sector-wide solution to this problem.

In these circumstances, a LL can serve as an empowering tool. It can help to establish a community of practice and help build momentum for sustainability on campus by bringing actors of different stakeholder groups together to work on a common cause(s). A LL can serve as a **converter** of the energy and enthusiasm of willing staff and students into high-impact sustainability projects. Rather than trying to confront the whole system at once, the LL can serve as a 're-design' approach to ESD that can win staff and students for sustainability by demonstrating an attractive live alternative.

3.3 A LIVING LAB FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT

If an ESD initiative cannot successfully navigate the above barriers, the likelihood of its success reduces. While a LL also faces these barriers, its attractiveness is in its ability to offer alternative ways to introduce ESD as well as prevent demotion from a 're-design' to 'bolt-on' or 'built-in'.[i]

Thus, a LL's qualities have potentially substantial implications for enhancing FHE education practice, impact and quality.

i *While this report discusses the theoretical ways in which the LL can help mitigate barriers, the LL model (Waheed, 2017) discusses the practical features of the LL that help overcome these challenges. Beaudoin & Brundiers (2017b) also demonstrate how to establish and scale a student-based LL (their term: 'solution-oriented learning' or 'applied sustainability learning' can be considered as a LL approach.*

Research

This section will discuss the main motivations for and major barriers in the way of practice-based academic sustainability research.

4.1 A CASE FOR THE LIVING LAB IN ACADEMIC RESEARCH

University research has profoundly influenced the world. They shape practice within the public sector, businesses, NGOs and personal lives globally. More recently, there has been a commendable amount of work in institutional research agendas to tackle the major global sustainability challenges. This has played an instrumental role in understanding our natural and social world to produce knowledge that lucidly explains the declining state of affairs and what to do about it.

However, there is a growing body of literature arguing that knowledge production is not sufficient as end in itself (Trencher et. al., 2015: 56). The words of Ernest Boyer, American educator, are all the more important: institutions

should adapt an even greater level of 'practicality and reality and serviceability' for social good (Boyer, 1990). The argument is for "a shift from knowledge production as end in itself, to knowledge production as a means to trigger societal transformations" (König, 2015). The need for this shift is reinforced by the shifting social contract of universities that seeks better alignment of public institutions with the public challenges (Dempsey, 2010). The sustainability researcher's remit is required to extend from just creating knowledge to taking leadership in applying it to create change.

It is important to appreciate that there is some applied research and other related methodologies in action within most institutions. However, this transformational 'shift' requires a more in-depth 'scholarship of engagement' that offers opportunities to academics from different faculties to be involved in diverse ways (Clifford & Petrescu, 2012). A LL is an innovative tool that has the potential to involve researchers in flexible and unique ways.

Living Labs & Barriers
to Sustainability Research

Notwithstanding the need and benefits of an 'engaged scholarship', there is limited progress towards it. As in the case of ESD, this is not due to a lack of efforts, but rather two major barriers that have impeded attempts. The remainder of this section will deal with these barriers and how LL as an approach may present potential responses.

4.2.1 BARRIER 1: CAREER PROGRESSION & PUBLICATION

One major barrier for engaged scholarship is its potentially negative impact on career progression. Career advancement in institutions is, for a major part, based on publications in esteemed journals which are most often disciplinary and focused on theoretical knowledge. Research that is based on real sustainability projects may not easily attract attention from these journals since it tends to be trans-disciplinary and practical (Clifford & Petrescu, 2012). Such sustainability projects are also presumed to be too contextual (not generalisable enough). Thus, publication requirements "encourage specialization, to the detriment of multidisciplinary 'sense making'" (Krajewski et. al., 2003: 104). Favouritism towards 'high science' and disciplinary specialisation has also been institutionalised within funding mechanisms and research evaluations (Barker, 2007: 3).

The Research Excellence Framework (REF) lacks recognition for transdisciplinary sustainability research. Further, the scoring takes a lax interpretation of its research 'impact' factor, rewarding public and cultural engagement no more than commercial application

(Terämä et. al., 2016). REF pays a lot of attention to 'innovation' and 'impact', though it is lacking actual mechanisms that focus on the kind of research that is highly innovative and most directly consequential to society. The recent REF guidelines have stated support for 'interdisciplinarity'. This recognition is welcome, but work to progress actual policy and funding mechanisms to actively promote it has not been undertaken. Additionally, the long-term impacts on institutional practices take time, resources and policy guidance. Thus, for meaningful changes, practice-based research and engaged scholarship need recognition as priority areas of focus in upcoming REF reforms.

Furthermore, practice-based research in many cases can take longer and also includes 'non-academic' outputs (i.e. work that does not directly contribute towards a publication). This reduces the rate of academic output, having further consequences on the rate of publication. Overall, there is lack of support for practice-based researchers from, both, funding and publication mechanisms. Therefore, conducting such research projects could affect the publication record or even harm the reputation of a scholar, with potential negative impacts on career advancement. Despite being a very attractive prospect for many researchers, and having a potentially greater and more direct impact on the world, the uptake of practice-based research is low. This is especially the case among early career researchers, many of who may have the mind-set and enthusiasm to make an impact, but often must decide between career advancement or

engaged scholarship.

This is a complex barrier that results from institutional culture, practice, and policies to national regulations and policies, to international publishing centres and conventions. A LL cannot address all of these issues; nor easily able to facilitate publications which are as 'prestigious'; nor facilitate outputs as quickly as conventional research. But it can mitigate negative impacts of this barrier, enough to support the numerous academics who want to be more engaged.

Firstly, the LL can serve as a relation-building platform which collates opportunities and matches suitable project partners (Polk et. al., 2013: 190). An active institutional LL means researchers face a lower risk of mismatch in expectations since the LL serves as a match-making platform. Relationships between researchers and practitioners are formed by identifying projects that help advance issues important to all parties. Researchers can therefore be assured of having basic requirements met before making any major commitments to a project. For example, assuring it is a case that can be funded, has agreeable amount of practical engagement, will be complete in a suitable timeframe, and has reasonable potential for publishable research.

Secondly, a LL project typically involves strong engagement among stakeholders from the outset (Waheed, 2017: section 2.3). This allows for both the practitioners and researchers to clearly communicate, understand and address each of their needs, abilities and responsibilities. These formal and informal discussions help form agreements that allow researchers access to (gather) data, visit sites, interview individuals, conduct required experimentation and guarantee other assistance needed for their publication.

Thirdly, a LL dissolves boundaries which constrict innovation. Sustainability challenges are complex and messy in practice, promoting more innovative ways of conducting research and developing alternative answers through unconventional thinking. LLs accommodate exactly this type of innovative research by encouraging a mix of expertise in real projects. This helps researchers "find new outlets for scholarship, a diversity of potential work partners, and a network of 'outside' resources that opens doors to new opportunities" (Clifford & Petrescu, 2012: 88). The LL 'test-bed' for joint-experimentation gives rise to disruptive innovation for systemic change (Evans & Karvonen, 2014). In fact, LLs have been demonstrated as "one of the best tools to promote highly innovative action research in different application areas" (van der Walt et. al., 2009: 422).

These type of research outputs can help attract attention from both funders and publishers. But most importantly, these research projects can help to highlight the issues with the current criteria for. Although LLs may not immediately cause policy change, they can champion realistic examples research that is more innovative, impactful and enterprising, but potentially regarded as less prestigious and productive by the system. LLs can highlight that policies are in need of reformation; the number of discipline-focused publications is not necessarily the best measure of an institution's contribution to society.[i]

4.2.2 BARRIER 2: MORE TIME & MORE RESOURCES REQUIRED?

The second major barrier for engaged schol-

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i *Examples of LLs that have demonstrated this include: The Centre for Interactive Research on Sustainability at the University of British Columbia; The Malmö Innovation Platform at Lund University; Mistra Urban Futures at Chalmers University and others; The Institute for the Study of Children, Families and Communities at Eastern Michigan University; Institute for Sustainability Solutions at Portland State University; Urban Sciences at Newcastle University; SusLab involving several North-West Europe universities.*

arship is the additional time and resource requirements. A large proportion of academics are mandated with what is effectively the work-load of two jobs within a single role: teaching and research. This aspect has already been discussed in relation to ESD (section 3.2.2); however, in this section it will be discussed in relation to sustainability research. As discussed, to advance their careers, academics are expected to meet challenging targets for research as well as teaching that can often consume them within a continuous cycle of time shortage (Shore, 2010; Sikes, 2006). This leaves little to no time for an engaged scholarship. Though many researchers either respect or support the need for an engaged scholarship, it is also highly likely that practically all of them suffer from a chronic deficiency of time and resources needed to meaningfully carry it out.

LL helps mitigate this barrier in two main ways.

Firstly, as mentioned (section 4.2.1), a LL reduces time for researchers by finding the right match and centralising the process of matching actors while also helping to establish project agreements. This allows researchers to simply propose a series of subjects of interest, and select the suitable query. Additionally, researchers can view available project opportunities that practitioners have presented and choose the most relevant one. This shortens the otherwise tasking search, trust and relation building, and project establishment phases.

Secondly, the LL can build on existing work and learning by involving researchers who have or had a career in practice (Polk et. al., 2013: 190) or possess experience and strong links with relevant potential project partners (Clifford & Petrescu, 2012: 88). These researchers better understand the key barriers for a practice-based research, increase the likelihood of success of initial projects due to their experience/links, serve as champions to inspire other

academics, benefit the profile, reputation and legitimacy of the LL internally and externally, and help establish the processes and best practice for others to follow. This allows LLs to follow a more comfortable learning trajectory and possibly avoid some common failures. Importantly, however, successful (and unsuccessful) projects with impact and beneficial outcomes provide a robust case for such research to be better recognised and rewarded through the institutional criteria.

However, as with the previous barrier, the LL can be a potent way to highlight the need for institutional policies and national regulation to respect the additional time that such research can take. While a LL will still face this barrier, it will allow more willing researchers to participate.

4.3 A LIVING LAB FOR PRACTICE-BASED SUSTAINABILITY RESEARCH

By offering diverse ways of mitigating both barriers, a LL can become a symbol and channel of engaged scholarship. Additionally, the benefits that LL projects produce (e.g. monetary/carbon savings, addressing campus/community challenges) can also help to gain wider support and balance the 'productivity' losses when compared to conventional research. A LL is best viewed as a multi-faceted approach that draws on several areas to provide effective ways of enabling sustainability. This flexibility and creativity will have to be harnessed by researchers at the institutional level to help provide answers to these challenging barriers.

Living Labs and the FHE Sector

While offering short-term solutions to mitigate the impact of ESD and sustainability research barriers, a LL also serves as a vehicle for assisting long-term systemic shifts. The flexibility and potential of the LL elevates its use beyond a small 'innovative' project in one corner of the institution. It can be utilised as a powerful "governance tool that pragmatically links academic capacity with [sustainability] challenges" facing FHE institutions and their partners (König & Evans, 2013: 2). As a LL expands its impact and reveals this potential, the case for time and resource investment becomes stronger, while the barriers of time and resource in the way of ESD and sustainability research become weaker. A LL can eventually become a 'sensible' option from both the business and academic perspectives. This research treats LLs as valuable tools that use this approach to gradually enhance education, research, administration, operations, and/or external engagement activities, while also integrate sustainability as a theme into them.

As discussed, LLs have time and investment costs attached to them. But these investments are worth making. Institutions with LLs will reap not just financial, but also reputational, and academic impact dividends in the mid-long-term. While a LL cannot solve all internal and external barriers in the way of sustainability, it can help to play an important part by helping to initiate and sustain the momentum needed for grander transformations. Depending on how a LL is deployed, it can have impacts on: policies, strategies, governance, leadership, culture, career incentives, curricular and research agenda reform, operational and administrative policy revisions, and a whole host of other areas of work. LLs are beneficial because they can be established without changes in all these areas, and can in turn help catalyse them if required.

While a significant amount of interest for LLs has arisen internationally, a comparatively smaller number of institutions have invested in LLs nationally. Of those, relatively few have invested into their LLs as important long-term strategic initiatives. Although there is a positive trend favouring LLs, there is need for considerably more work across the sector in the UK & Ireland. The urgency of this work is amplified when compared to the number, size and impact of LL initiatives across North America and mainland Europe. The potential of LLs and their power to elicit change towards sustainability has yet to be fully realised in the UK & Ireland.

The EAUC Living Labs Programme

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The EAUC LL Programme is built upon an understanding of LLs transformative potential. The Programme will serve as a key vehicle to deliver the EAUC Strategic Plan to 2021 (EAUC, 2017), intended to help lead the development of LLs across the FHE sector.

It also has the potential to help align other EAUC-led programmes such as the LiFE tool (Waheed, 2017: section 2.1) and the Green Gown Awards. In addition, in the long-term institutions will also be able to align the LL with the SDGs, in recognition of the wider benefits like extending the scope of the LL, better global alignment, and better exposure.

Beginning from these two publications, the EAUC aims to help fulfil gaps in knowledge, guidance, best practice and understanding. The Programme will seek means to assist institutions in initiating and expanding their LLs; produce highly relevant, quality and practical tools; provide ongoing advice to institutional LLs; and support them through other means such as training and knowledge-exchange opportunities.

The LL Community of Practice will continue to allow members to exchange knowledge and best practice.

This research also opens the gateway for international collaboration. The EAUC will also continue to explore channels through which the international potential of LL collaboration can be maximised. There are significant potential benefits in drawing institutions/bodies to participate in the development of the LL Programme for the benefit of members. As LLs continue to provide significant positive impacts, the EAUC envisions that members will take a world-leading role in continuing the development of the concept. This will include innovations in LL concept and theory, establishing guidelines, frameworks and processes for projects, and finding different avenues to expand LL work.

The EAUC recognises that it derives its legitimacy and strength from the support of its large and diverse membership. The LL Programme is similarly dependent on members acting as co-creators to develop a successful future for it.

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