The St Andrews Living Lab: Innovate, Integrate, Inspire

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Executive Summary

The St Andrews Living Lab is an interdisciplinary, collaborative platform that aims to foster innovation and community engagement by addressing sustainability issues in a real-life context.

This report presents a case for implementing a Living Lab (LL) at the University of St Andrews. In essence, a LL is about utilising a university’s research and teaching capabilities to address problems within the university’s wider operations, foster increased community engagement, and tackle the vitally important sustainability challenges the world is currently facing. The purpose of this report is to illustrate how implementing a LL at the University of St Andrews can increase the University’s already impressive sustainability work, as well as help attract an increasing number of students from across the world by boosting the University’s reputation both globally and locally.

This report is informed by extensive online research and a series of interviews conducted with academics, professional staff and students at the University. The report is split into three parts: the theory and history behind LLs; case studies of LLs from other universities; and the St Andrews LL.

The first part of the report discusses how LLs have changed over time. First coined in the early 2000s by MIT’s Professor William Mitchell, the term LL initially referred to a “purpose-built lab where the routine activities and interactions of everyday home life can be observed, recorded for later analysis, and experimentally manipulated” (Ballon and Schuurman, 2015: 5). As the term grew increasingly popular and gained geographical scope, it continued to adapt to the specific needs and wants of different institutions, in turn resulting in numerous definitions developing. Despite this, three common themes emerged: LLs aim to solve ‘real’ problems, they are locally focused, and they engage multiple stakeholders, building relationships between them. This information was used to inform the development of the University of St Andrews LL definition and principles.

Part 2 of the report focuses on various successful LL programmes at universities outwith St Andrews. The Universities of Cambridge, Edinburgh, Manchester and British Columbia are all discussed. There is firstly a focus on how each LL programme was established and is continually organised and managed, before a case study from each university is outlined.

The final part of the report is specific to St Andrews. The University has many sustainability goals already in place, as outlined in the Sustainable Development Policy and Strategy, and
the *University Strategy*. This report argues that many of these goals can be achieved through the implementation of a LL programme. For example, the University’s aims of promoting interdisciplinary learning, continuing to develop community engagement, and consolidating its position as one of the world’s leading universities all directly relate to the positive outcomes a LL programme will provide.

As the majority of interviewees were unfamiliar with the term ‘LL’ and what it could mean for the University, this report recommends that a specific St Andrews definition must be developed. Initially, there was a divergence of opinion surrounding the term, with some commenting that they found it confusing, whilst others noted that they liked it. However, once the concept was fully explained the vast majority of individuals indicated they understood the term and what it encompassed. However, in an attempt to make it clearer, this report recommends that the following sub-heading be adopted: *Innovate, Integrate, Inspire*.

Upon speaking to the 29 interviewees, it became clear that implementing an environmentally focused LL programme may alienate certain Schools and departments who may not consider themselves to be ‘green’. A focus solely on the ‘environmental’ pillar of sustainable development (SD) would also prevent the ‘social’ and ‘economic’ pillars from being addressed. As such, a programme that addresses SD in a holistic manner by looking at all three pillars is recommended. A number of interviewees also commented that simply having a local focus neglects to acknowledge our increasingly globalised, interconnected world. As such, this report argues that the University’s LL should not simply focus on conducting local research, but instead take a broader approach.

Three ways of implementing LL projects are recommended in the report. The first is through academic projects, such as coursework and dissertations. The second is through formal extracurricular projects, such as internships. The final area of implementation is through informal extracurricular projects, such as volunteer projects and student societies. This diversity of implementation is, however, only one of the many benefits a LL will bring to St Andrews. The report goes on to discuss in detail numerous other benefits the University will experience should such a programme be established. From boosting the University’s reputation both globally and locally to consolidating all sustainability-related work in one place, or from increasing the impact of academic research to saving the University time and money, this report outlines a diverse range of benefits St Andrews will experience once a LL programme has been established.
Various recommendations for establishing a successful LL programme were made in the report. The most important of these is that the LL be implemented gradually. Ideally, this will occur within the Proctor’s Office so to give the academic side of the University, as opposed to the business side, ownership of the programme and encourage student and staff engagement. A second key recommendation is that an online archive of LL case studies from the University be developed. This idea received positive comments from all interviewees, with some noting that it would “inspire” both staff and students. A further recommendation that received an overwhelmingly positive response from interviewees is developing an interdisciplinary internship scheme. Such a scheme would not only allow students to engage in research outwith their degree discipline, but it would also provide them with the professional skills necessary for employment post university. Recommendations such as these were put forward to help the University of St Andrews establish a LL scheme that will innovate, integrate and inspire its staff, students and surrounding community.
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1.0 Introduction

The St Andrews Living Lab (LL) can be defined as an interdisciplinary, collaborative platform that aims to foster innovation and community engagement by addressing sustainability issues in a real-life context. In essence, a LL is about utilising a university’s research and teaching capabilities to address problems within the university’s wider operations, foster increased community engagement, and tackle the vitally important sustainability challenges the world is currently facing. The term was first coined in the early 2000s by MIT’s Professor William Mitchell, and initially referred to purpose-built labs designed to replicate everyday settings. However, its meaning has since evolved, with an emphasis now being placed on projects that are conducted in a real-life setting, engage multiple stakeholders, and tackle locally relevant sustainability issues.

For many years the University of St Andrews has been at the forefront of sustainability research. The undergraduate (MA and BSc) Sustainable Development (SD) programme was introduced in 2006, in 2011 Transition St Andrews was formed, and since 2010 the University has been developing an energy centre at the Eden Campus in Guardbridge to help achieve its aim of becoming the UK’s first carbon neutral university. In addition to this, many sustainability-related modules, research papers, policies and student-led initiatives have been developed and implemented. Nevertheless, the University is yet to successfully implement a LL programme, despite its ever-increasing popularity worldwide.

In 2017 the National Union of Students reported that for the past seven years, 80 per cent of students indicated that they want their university to do more work on sustainability. The purpose of this report is to illustrate how implementing a LL at the University of St Andrews can help achieve this, as well as help attract an increasing number of students from across the world by boosting the University’s reputation both globally and locally. In addition to presenting a positive case for a LL at the University of St Andrews, this report also makes a number of recommendations – based on a series of interviews conducted with staff and students and research into LLs at other universities – on how best to establish and successfully develop a LL programme.

2.0 Methodology

Two phases of investigation were undertaken as part of this study. Firstly, extensive online research was conducted. Academic articles, documents from educational bodies, and online
sources were thoroughly examined in order to understand the history, meaning and development of LLs. Furthermore, the websites of other universities who have successfully implemented LL programmes were investigated in order to understand how LLs were established there and how they have been continually managed since. This stage was key, as it will allow the University of St Andrews to take inspiration and learn from other universities; in turn meaning our LL is less likely to experience teething problems.

The second phase of investigation involved conducting interviews with academics (17), professional staff (8) and students (4) from across the University (see Appendix 1). The aim of this was twofold. Firstly, to evaluate what current sustainability teaching, research and practice occurs, and secondly to assess whether there is a desire for a LL at the University, and if so how best it can be established. These interviews, which lasted between 20 and 90 minutes in length, were conducted in a semi-structured format, allowing respondents to speak freely and ask questions, whilst still covering key areas of interest. This phase was particularly crucial, as it is important individuals feel their voice is heard and a LL that suits their needs is implemented. Note that each interviewee gave their own personal opinion, and whilst they may be able to make some generalisations regarding what they think the wider staff and student body within their School or unit would like from the LL, they do not speak for these individuals or for the School or unit itself. It must also be noted that no interviews were conducted with external stakeholders due to time restrictions and a lack of ethical approval. As such, it is recommended that local community members be interviewed in the future.

**Part 1: Living Labs, Theory and History**

### 3.0 What is research? Developments and shifts over time

There is evidence that in recent decades there have been “major changes in the way knowledge is being produced” (Gibbons et al, 1994: vii). Gibbons et al (1994) describe this change as a shift from Mode 1 to Mode 2 research. Mode 1 research refers to a Newtonian model of traditional science based on empiricism. In contrast, Mode 2 research is “characterised by a shift away from the search for fundamental principles towards modes of enquiry orientated towards contextualised results” (Gibbons et al, 1994: 19). Table 1 summarises the differences between the two.
It is important to draw attention to two key differences between them. Firstly, the scope of research varies. Mode 1 research is seen to be universal: applicable anywhere at any time, such as gravity. In contrast, Mode 2 research advocates for a contextualised approach. In other words, it is particular. This links closely with the idea that Mode 1 research is considered to be constant – gravity has never and will never change – whereas Mode 2 research is transient – it is situated, and therefore shifts over time and space.

A second key difference between the two is that Mode 1 research is disciplinary, while Mode 2 research is interdisciplinary. Mode 2 research recognises the complexity of the world, and therefore acknowledges that with any problem “the final solution will normally be beyond that of any single contributing discipline” (Gibbons et al, 1994: 5). Conversely, Mode 1 research tends to apply to one particular label to itself.

Orr (2004) notes that the traditional adoption of Mode 1 research within universities has meant “[w]e have fragmented the world into bits and pieces called disciplines and subdisciplines, hermetically sealed from other such disciplines” (11). Orr (2004) goes on to claim that organising education like “mailbox pigeonholes” (94) has created students whose “minds are taught to think in boxes and not taught to transcend those boxes or to question overly much how they fit with other boxes” (95). In other words, Orr (2004) argues that the Mode 1 research traditionally conducted in universities produces students who are “effective vandals of the earth” (5). It is here the importance and value of LLs become clear.

LLS engage in Mode 2 research: they are contextually situated in the local area, advocate for interdisciplinary research, encourage collaboration amongst stakeholders and value social accountability. In other words, LLs sharply oppose the “pigeonholes” mentioned by Orr (2004: 94). This report argues that implementing LLs within higher education is an effective means of engaging in Mode 2 research without conducting a complete overhaul and redesign of the traditional education system. Through a variety of avenues (see Section 11.2), LLs allow for Mode 2 research to be conducted despite the persistence of Schools and departments that are fragmented into ‘disciplines’. That is to say, LLs facilitate research that can address our current “planetary emergency” (Orr, 2004: 2) without the use of extensive
resources and without severe public backlash against change. Illustrating this point and further expanding upon it is one of the key aims of this report.

4.0 The history and development of Living Labs

The term LL was first coined in the early 2000s by MIT’s Professor William Mitchell, who used it to refer to a “purpose-built lab where the routine activities and interactions of everyday home life can be observed, recorded for later analysis, and experimentally manipulated” (Ballon and Schuurman, 2015: 5). Its innovative and practical approach helped the term develop in popularity, and soon its influence began to spread to other academic institutions across the US. Ballon and Schuurman (2015) note that soon after the concept migrated to Europe, however in the process there was a “fundamental reinterpretation of the US-originated home labs” (6). Instead of conducting research in a purpose-built lab, the ‘lab’ became the everyday life of the individuals involved. Alongside this, Ballon and Schuurman (2015) claim five key themes developed in European LLs:

1. Active user involvement
2. A real-life setting
3. Multi-stakeholder participation
4. A multi-method approach
5. Co-creation

In other words, LLs started to develop into interdisciplinary, practical ‘solutions-based’ projects with a local outlook. As this conceptual redesign continued to gain geographical scope, it continued to evolve and adapt to the specific needs and wants of different institutions, in turn resulting in numerous definitions and models emerging. It is this lack of a universal definition that has led Evans and Karvonen (2011) to claim that LLs are “[h]ugely powerful yet poorly defined” (12). Table 2 outlines every definition that was discovered during the research process behind this report, in turn highlighting the “large heterogeneity of living lab initiatives” (Ballon and Schuurman, 2015: 8). A number of key themes emerged upon comparing these definitions. To illustrate this, certain words and phrases in Table 2 are highlighted. The first key theme, highlighted in blue, is that LLs solve practical or ‘real’ problems. The second, highlighted in green, is that they are locally focused. The final key theme, highlighted in red, is that LLs engage multiple stakeholders and build relationships. These three core aspects of LL programmes were heavily drawn upon when developing the St Andrews LL definition (see Section 11.1).
<table>
<thead>
<tr>
<th>Source</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAUC 2017b; 2017c</td>
<td>A LL is “where real-world sustainability challenges are formally addressed in stakeholder partnerships” (3).</td>
</tr>
<tr>
<td>European Network of Living Labs</td>
<td>LLs are “user-centred, open innovation ecosystems based on systematic user co-creation approach, integrating research and innovation processes in real life communities and settings”.</td>
</tr>
<tr>
<td>Dell’Era and Landoni, 2014</td>
<td>“A Living Lab is a design research methodology aimed at co-creating innovation through the involvement of aware users in a real-life setting” (139).</td>
</tr>
<tr>
<td>Millard, 2011</td>
<td>A LL is a project that “encourages academics and practitioners to work together to produce knowledge relevant to the locality in which the research is being undertaken” (14).</td>
</tr>
<tr>
<td>Bergvall-Kåreborn, et al, 2009</td>
<td>Define a LL as: “a user-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values“ (1).</td>
</tr>
<tr>
<td>König, 2013</td>
<td>“Living laboratories provide a space for multiple stakeholders to address local challenges by jointly framing issues and producing new knowledge deemed by all an adequate basis for concerted action” (1).</td>
</tr>
<tr>
<td>Edinburgh Living Lab</td>
<td>The goal of a LL is to “bring together academic, the public sector, industry and the third sector together in order to work with citizens in co-designing, testing and implementing new services, processes and products that generate social, environmental and economic value”.</td>
</tr>
<tr>
<td>University of Leeds</td>
<td>A LL “brings together colleagues and partners from research, teaching and operational teams to co-produce innovative and transformational solutions to real-world sustainability challenges, using the campus as a test-bed. It is interdisciplinary and drives continual, sustainable improvement by tackling global challenges at the local scale” (Cooper, 2018)</td>
</tr>
<tr>
<td>University of Cambridge</td>
<td>The Cambridge LL “draws on the expertise and talent of students and staff at the University of Cambridge, encourages application of knowledge to the real-world context, enhances skills of those involved, increases connections between people, and provides more opportunities to reach the University’s mission”.</td>
</tr>
<tr>
<td>University of Edinburgh</td>
<td>“For us, treating the University as a Living Lab means using our own academic and student research capabilities to solve social responsibility and sustainability issues relating to our infrastructure and practices”.</td>
</tr>
<tr>
<td>University of Manchester</td>
<td>The Manchester LL “provides a platform for collaboration between researchers, students, external sustainability stakeholders and the Directorate of Estates and Facilities to deploy and monitor new technologies and services in real world settings”</td>
</tr>
<tr>
<td>University of Oxford</td>
<td>The Oxford LL is a “platform for collaboration between researchers, students, external stakeholders and Estates Services to support the University’s transition toward a sustainable, low-carbon, and resilient eco-system and drive world-class research across energy, transport, water, food and waste”.</td>
</tr>
<tr>
<td>University of British Columbia</td>
<td>“As a living laboratory, UBC faculty, staff and students and private, public and NGO partners use the University’s physical plant, combined with UBC’s education and research capabilities, to test, study, teach, apply and share lessons learned, technologies created and policies developed”.</td>
</tr>
</tbody>
</table>

Table 2: Living Lab Definitions
4.1 The EAUC

In recent years, the Environment Association for Universities and Colleges (EAUC) has become the key organisation pushing for increased adoption of LL programmes across the UK. Founded in 1996, they aim to raise awareness and uptake of environmental management by working as an environmental and sustainability champion within higher education.

The EAUC describe a LL as being “where real-world sustainability challenges are formally addressed in stakeholder partnerships” (2017b, 2017c: 3). They argue that there are two stages in implementing a LL. The first stage is termed the ‘basket of relationships’, and refers to the fact a LL “dissolves boundaries between the traditionally segregated activities of education; research; external engagement; and operational and administrative practice” (EAUC, 2017a: 1). In other words, LLs aim to build relationships. The EAUC notes there are four major stakeholder groups that contribute to the relationships within university LLs (EAUC, 2017c):

1. Students (being educated)
2. Academics (teaching and conducting research)
3. Professional Staff (enabling research and teaching through operational support)
4. External Stakeholders (local communities, businesses, NGOs and authorities)

Arguably this stage is the most important as it “facilitates a bridge of collaboration” between stakeholder groups (EAUC, 2017c: 3). Note, the benefits of implementing a LL for each of these stakeholder groups are further outlined in Section 12.0.

The second stage of implementation is termed the ‘basket of principles’, and refers to the various principles that are involved in the LL model. The EAUC outline seven principles, three of which they consider to be ‘core principles’ and recommend are included in every LL project. Table 3 summarises these principles. This report draws upon the information presented in this table, however as Section 11.0 indicates, there are a number of divergences from the EAUC model that are recommended for the St Andrews LL.
**Formal Participation (CORE)**

The EAUC (2017b) aims for work on SD to be an “established process” carried out by all (15). Hence, formal participation ensures dedication from participants. The EAUC recommends that for students this be via assessed work or internships; for academics and professional staff this be through their formal responsibilities; and for external stakeholders this be via paid work, where possible.

**Stakeholder Partnerships (CORE)**

The EAUC believe it is essential all participants involved in a LL project are *equally* involved. In other words, “projects should not privilege a small group of actors and neglect others, but rather strive towards transcending existing models of governance-as-usual” (EAUC, 2017b: 17).

**Transdisciplinarity**

In recognition of the fact “[r]eal sustainability challenges do not respect disciplinary boundaries or theoretical models”, it is necessary for LLs to transcend these “narrow lenses” (EAUC, 2017b: 21). The advantage of working with such a transdisciplinary outlook is that “[h]aving a diverse group of participants encourages divergent and convergent thinking which in turn provides a compelling environment for innovation” (EAUC, 2017b: 21).

**Geographically-Bounded Test-Bed**

The EAUC (2017b) believe that universities “should set an example by making their own campus and local area the subject of transformation through a LL before proposing to influence the practices of others” (23).

**Learning Loops**

In order for LLs to have continual positive impact, the EAUC (2017b) note that the knowledge produced from projects must be reported back so to “provide the ability to ‘loop’ the lessons back into new projects that revisit the same or similar subjects” (22).

**Co-Creation and Co-Implementation of Transformations**

The EAUC (2017b) believe it is important that within LL projects, “stakeholders collectively research, experiment, prototype, test, create and implement practical transformations” (3). In other words, it is important there is a “collaborative effort” (EAUC, 2017b: 19).

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**Table 3: The ‘Basket of Principles’**

(EAUC, 2017b)

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**Part 2: Living Labs Outwith St Andrews**

This part of the report focuses on a number of successful LL programmes in place at other universities. Note that various other universities were researched, however those outlined below were considered to offer the most detailed and applicable information for the St Andrews LL to take inspiration from. Each case study is split into two sections. The first is intended to give background on each university’s LL, with the aim of illustrating how they were established and how they are now organised and managed. The second section
outlines a specific LL project case study to highlight the positive impacts they can have for staff, students and community members alike.

5.0 The University of Cambridge

The University of Cambridge LL was founded in 2012 with funding from Santander. It was initially set up as a two-year project to help “improve the sustainability of the University of Cambridge by using the estate to test and research real world environmental problems while improving the educational experience of students attending the University” (University of Cambridge, 2013: 1). The programme was developed within the Environment and Energy Section of the Estates unit of the University, and was headed by a ‘Living Laboratory for Sustainability’ Coordinator. In addition, there was a LL Advisory Group that consisted of Estate Management staff, academics and students. A few months in to the project, a LL website was developed to promote the programme and archive its results. With the success of these first two years, funding was extended to allow the University of Cambridge LL to continue. Over time it has developed and improved, with the programme now focusing on four key areas, each of which has a section within the LL tab on the University’s webpage. These sections highlight the methods through which the University implements LL projects. They are detailed in the following table:

<table>
<thead>
<tr>
<th>Academic Projects</th>
<th>Research projects conducted by students that contribute to their degree or research.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internships</td>
<td>Paid internships that allow undergraduates or recently graduated students to conduct research for 8 weeks during the summer.</td>
</tr>
<tr>
<td>Voluntary Projects</td>
<td>Individual or group projects carried out by students that are external to their compulsory academic studies.</td>
</tr>
<tr>
<td>Awards</td>
<td>An annual competition called <em>The Cambridge Carbon Challenge</em> that invites staff and students to submit ideas for reducing carbon emissions across the University. Each year there is a different theme (2017: reducing building energy use; 2018: reducing air miles), with the winning team receiving a hamper of prizes.</td>
</tr>
</tbody>
</table>

Table 4: Methods of Implementation at the University of Cambridge LL
(University of Cambridge, no date)

In addition to outlining the four key areas of the LL programme, the website also gives information to staff and students on how to get involved in projects. For those interested in conducting an academic or voluntary LL project, an email address is given so individuals can
speak to someone within the Environment and Energy unit and gain further information and advice. Under the ‘Internship’ tab there is information on each of the available internships, as well as the requirements students must meet and how they can apply (with a CV and cover letter). The internships available vary year-by-year. This summer (2018) there were three internships available: Sustainability Engagement, Biodiversity, and Air Travel. Under the Awards tab there is information on what The Cambridge Carbon Challenge is, the terms and conditions for taking part, and an online application form. In summary, for those interested in engaging with the Cambridge LL, the website is simple and clear on how projects can be undertaken and how to take the first step in establishing a project.

5.1 Case Study: Building a Sustainable Food Policy

Between 2015 and 2016 the University of Cambridge LL ran numerous projects that aimed to improve the sustainability of the University’s catering service. Interdisciplinary academic projects were run with the departments of Geography, Psychology and Zoology. In addition, a “‘spotlight on food’ month saw 14 events held by different departments and colleges around the University to further engage people in this topic” (University of Cambridge, 2017: 5). Student societies got involved too, with many conducting plant-based cooking workshops. The University (2017) reports that, collectively, these projects resulted in a decrease in:

- Ruminant meat purchases by 54 percent
- The cost per kg of meat by 16%
- Water by 25.9 million litres
- CO₂ food-related emissions by 28 percent (109 tonnes CO₂e)

As a result of these overwhelmingly positive outcomes, the University of Cambridge achieved a Green Gown Award (University of Cambridge, 2017).

6.0 The University of Edinburgh

The University of Edinburgh have a LL programme established within their Social Responsibility and Sustainability (SRS) unit of the University. This LL was established in partnership with the Edinburgh Living Lab, which itself was initially developed by a team of academics from the University’s Informatics, Social and Political Science and Design departments. The University’s website claims that “treating the University as a Living Lab means using our own academic and student research capabilities to solve social
responsibility and sustainability issues relating to our infrastructure and practices” (University of Edinburgh, no date). In operation, this means that the University of Edinburgh focuses on generating knowledge in interdisciplinary partnerships that can be trialled in a real-life settings with the hope of solving real-life problems (University of Edinburgh, no date). The LL tab on the University’s website has two key sections. The first of these is the LL toolkit, which gives individuals guidance on how to complete a LL project. The information available from this toolkit is summarised in Table 5 below.

| Stage 1: Identifying and Formulating a Project | Individuals must identify a real-life situation or problem in need of address, and identify key stakeholders they wish to work with. After this process, the SRS department must be informed of the project. |
| Stage 2: Developing a Partnership | It is recommended individuals draft a partnership agreement and outline key features such as the intended research objectives, the timeline of work, the frequency of meetings and an agreement on what information will be shared publically. |
| Stage 3: Accessing and Generating Data | Individuals should analyse existing datasets “in order to verify known issues, or to reveal issues not yet known about”. Students should then think of how they will generate their own data, for example through observation, interviews etc. |
| Stage 4: Ethics, Consent and Confidentiality | Individuals should look at the ethics policy within their School and subsequently develop consent forms for all participants. |
| Stage 5: Staring Data and Findings | Individuals should make their project data available to allow others to continue building upon it. This ensures that the “work can keep ‘living’ ”. Edinburgh’s SRS unit require individuals to complete a 1-2 page summary of their findings for this purpose. |

The second key LL section is termed the ‘project database’. This tab is an archive of past, current and proposed LL projects, with a search engine that allows individuals to type in key words. Each project has a brief description (1 sentence – 1 paragraph) and gives the project dates, project brief, applicable subject areas and a contact for further information. An example taken from the database can be seen in Figure 1 below. Section 17.3 of this report recommends the St Andrews LL adopt a similar database to allow individuals to gain access to and learn from previous research.
6.1 Case Study: WayOKay travel project in Inverleith

In 2014 the Edinburgh LL conducted a 10-week long pilot project with the *Inverleith Neighbourhood Partnership*. The project involved teams of Design Informatics masters students experimenting with ideas for increasing the uptake of cycling and walking in Inverleith. A total of six projects were developed, one of which being the WayOKay project. This project aimed to discover “what makes cyclists feel unsafe in the streets of Inverleith, by measuring how much pressure they exert with their hands while riding their bicycles” (Edinburgh Living Lab, no date). The students built a series of prototypes using pressure sensors and a GPS device, which were placed in the gloves, brake levers or handlebars of bikes. This allowed the students to determine how hard cyclists gripped while riding their bicycles. From there, the students could “identify locations on a route where high pressure [was] exerted, plot the locations on a map and correlate them with other factors such as altitude, gradient and speed” (Edinburgh Living Lab, no date). After analysing the information with Google Maps and Google Street View, the students found that most “locations that correlated with tension were wide junctions, blind corners, or non-signalized streets” (Edinburgh Living Lab, no date). This information was then used to devise practical solutions to address both the real and the perceived issues of road safety amongst cyclists. With many St Andrews students cycling to and from lectures, conducting a project such as this within our LL would be immensely valuable, and may encourage more people to take up cycling as a sustainable, healthy method of transportation.
7.0 The University of Manchester

The University of Manchester LL was established in 2013, with the aim of developing a campus as a “site for applied teaching and research around sustainability and low carbon” (The University of Manchester, no date). Between February and July of 2013 there was an initial ‘set-up’ phase, during which a team of individuals investigated what sustainability-related research and teaching was already underway at the University, and how best a LL could be set up. This team consisted of two academics whose research centred on sustainable living and cities, two researchers, and the University’s environmental sustainability manager from within the Estates unit. The first task undertaken by this team was to develop a database of all teaching, research and Estate activities that related to sustainability, and tagging each entry with keywords. The second task was to conduct in-depth interviews with key stakeholders from across the University (8 professional staff and 13 academics) in order to “understand the needs of key stakeholder groups and opportunities for collaboration” (University of Manchester, 2013: 1). The third objective of the team was to gradually initiate the LL on campus. This was achieved by working with the Estates unit and developing projects that demonstrated the value of LLs. A website was also created to allow ease of access to information.

It is clear from these three steps that the University of Manchester took a gradual approach to setting up their LL, ensuring they were well informed of what academics and professional staff wanted from the LL and how it would fit with the University’s current sustainability work. When conducting research during this internship on the St Andrews LL, the University of Manchester and its approach to implementation was drawn heavily upon for inspiration. Much of this inspiration came from the University of Manchester’s LL website, which was very informative and easy to navigate. One of the first tabs on the website is a ‘news’ tab, where the most up-to-date information is published. This includes when project ideas become available, when a LL paper has been published, or when there is a LL presentation or workshop individuals can attend. The website also has a section that lists all the names of and links to the profiles of staff who engage in sustainability research in some way, and a section that lists all the modules throughout the University that engage in some level of sustainability teaching.

However, perhaps the most important tab is the ‘opportunities’ tab that has a link to a list of project ideas that staff and students can take on board. This document lists over 50 topics that have been set by a diverse range of organisations that focus on sustainability in the Greater Manchester area. These projects “are completely free to use and can form the basis of any piece of credit or non-credit bearing work, no matter how big or small” (University of
Manchester, no date). The document gives a brief description of each organisation, before outlining the project ideas they have developed. This can be seen in Figure 2, which has been taken from the document itself. As already noted, the projects are available to all staff and students at the University, the only requirement being that if an individual chooses to work on a project they must inform the LL team and give them access to their findings, which will then be passed on to the organisation who set the project. Section 17.6 below recommends that the University of St Andrews LL produce a similar document to this. It is a clear, useable document that is sure to be of immense interest to students looking for dissertation ideas or inspiration for research.

**Friends of the Earth Manchester**

Friends of the Earth Manchester is an environmental group, creatively campaigning on local, national and international issues. Friends of the Earth work on a diverse range of issues including food, sustainable transport, climate change, biodiversity, resource use and justice. The group are closely aligned with city-level policy change. They campaign for Greater Manchester, lobbying for action, and they work closely with Manchester: A Certain Future, the city’s Climate Change Action Plan and stakeholder steering group.

16. *Estimating the cycling sector in the Greater Manchester Low Carbon Economy*

The 2016 report "Deep Dive: 06 Low Carbon and Environmental Goods and Services" attempts to provide an overview of the ‘The Low Carbon and Environmental Goods and Services’ (LCEGS) sector in Greater Manchester.

However, the report used a definition of LCEGs which doesn’t include active travel (walking and cycling). Greater Manchester has a growing number of cycle-related businesses involved in cycle training, cycle logistics, cycle shops, sports and recreational cycling and cycle tourism. This project would aim to examine the scale of the cycle-related sector within Greater Manchester. Report available here:


17. *Environmental footprint of car parking space(s)*

A car parking space typically takes up a minimum of 12 square metres for each car. Across the UK 7 million front gardens have been concreted over for car parking. [1] Surface parking lots create “heat islands” and are sources of polluted storm water runoff. [2] View the Trafford Centre on Google Earth to see how much space is taken up with the 11,500 car-parking spaces. [3] And yet, for up to 96% of the time the car sits unused and empty [4] and we do not calculate (or charge) the true costs of parking. Yet, there is no such thing as free parking – the true costs are borne by society. This project will seek to estimate the environmental and climate change footprints of parking space in Greater Manchester.

**Figure 2**: LL Project Opportunities at the University of Manchester

(University of Manchester, no date)
7.1 Case Study: An On-Street Parking Study of Manchester City Centre

In 2017 an individual at the University of Manchester conducted a study into the “complexities of on-street parking and how they relate to the broader transport policies of Manchester City Council” (University of Manchester, 2017: 1). This was done in conjunction with the organisation Friends of the Earth Manchester. The study investigated several transport policies, specifically those relating to on-street parking, within other European cities that have been successfully implemented in order to gain inspiration for Manchester City Council’s approach. The overall focus of the report was to investigate how more sustainable modes of transport, such as cycling and walking, could be prioritised instead of continuing to remove inner-city space for car parking. This was achieved by analysing available policy documents and conducting a discourse analysis of various media sources. A key recommendation was that Manchester City Council should give “priority to more sustainable road users over private car owners… [as this would] encourage more people to use these modes of transport” (University of Manchester, 2017: 13). Ultimately, the report conclude that “facilitating and encouraging behavioural changes among the local population is the most important factor as without a desire to use the infrastructure built, it will receive minor uptake” (University of Manchester, 2017: 13).

8.0 The University of British Columbia

The University of British Columbia’s (UBC) LL was formed in 2010, and since then has become one of the world’s leading LL initiatives. The University claims that they view their “entire campus as a living laboratory, a kind of giant sandbox in which here is the freedom to explore – creatively and collaboratively – the technological, environmental, economic and societal aspect of sustainability” (UBC, no date). The University becomes a LL through its SEEDS (Social Ecological Economic Development Studies) Sustainability Programme, which aims to advance “campus sustainability by creating partnerships between students, operational staff, and faculty on innovative and impactful research projects” (SEEDS Sustainability Programme, no date).

The SEEDS section of the University website is very clear, with separate tabs for academic staff, students, and professional staff and community partners. Each section outlines how individuals can get involved in projects, as well as providing contact details and even specific projects students can apply for if they are looking to expand their research skills beyond that which is required for their academic degree.
An immensely valuable tab on their website is the SEEDS Sustainability Library, which has over 1,500 LL case study examples listed in chronological order. To help navigate this archive, there are two very helpful resources. The first is a search engine that allows individuals to type in key words. The second is the ‘themes’ column that allows individuals to quickly and efficiently understand what areas of sustainability each case study focuses on. The variety of themes available is shown diagrammatically above the archive, and can be seen here in Figure 3. Not only is this clear and efficient, but it is also visually captivating for individuals conducting research, too. An example of how each case study is laid out in the archive can be seen in Figure 4. Note that the report titles are links that provide further information on projects to interested individuals. Section 17.3 of this report recommends that the St Andrews LL develop a similar case study archive.
8.1 Case Study: Mushroom Furniture

Between 2014 and 2016, the UBC worked on a project to create and build sustainable mushroom stools for the University campus. These stools were developed using two key materials: mycelium bio composites (the root structure of mushrooms) and by-products from the local forestry industry. The project involved injecting sawdust with mushroom spores and allowing them to grow for around two weeks. This product would then be run through a chipper before being placed into moulds and left to grow for four-to-five days. Dahmen and Frid-Jimenez (2016) note that “Once the desired amount of strength has been achieved, growth is checked through the application of modest amounts of heat” (3). The end product is a natural, renewable, biodegradable and compostable product that has a typical strength comparable to that of expanded polystyrene (XPS), hence meaning it is a “possible substitute for these environmentally toxic architectural materials currently in wide use in building construction” (Dahmen and Frid-Jimenez, 2016: 5).

The UBC note they were limited to producing moulds that were half a meter wide in any direction, however to counteract this they created hollow products to diminish the overall volume of each mould and therefore grow larger shapes. An added benefit of producing hollow structures is that if the material fruits, it normally does so available voids (Dahmen and Frid-Jimenez, 2016). Each structure was covered with a smooth acrylic top, allowing individuals to see this natural process, yet not worry about sitting on the stools.

Once designed and developed, the stools were installed in a public square for a two month long period. The aim of this was to bring “the research out of the laboratory so that it could be directly experienced by a wide segment of the UBC community” (Dahmen and Frid-Jimenez, 2016: 3). The UBC also organised outreach projects, allowing students and other members of the UBC community to try moulding the mycelium.

Figure 5: Mushroom Stools on Campus at UBC (Dahmen and Frid-Jimenez, 2016)
Part 3: The St Andrews Living Lab

Parts 1 and 2 of this report outlined what a LL is and gave case study examples of other universities to highlight the diversity that exists. Part 3 of this report is specific to St Andrews and its needs and wants from a LL programme.

9.0 The University’s sustainability goals

Before presenting a case for a LL at St Andrews, it is important to outline the University’s current sustainability-related goals and organisational objectives in order to understand how a LL can help achieve these. These goals have been laid-out in two reports. The first is the Sustainable Development Policy and Strategy 2012 to 2022, which addresses SD explicitly by outlining the University’s sustainability-related aims and objectives. The second report is the University Strategy 2015 to 2025. This report is similar to the previous one, however it addresses the overall organisational aims of the University in addition to its sustainability-related aims. Below are a small handful of key aims and objectives from the reports that directly link to LLs and the benefits they bring.

One of the first statements made in the 2012 to 2022 report is that “[f]or universities, there is a need to continue both with discipline-specific research as well as to further develop new modes of intellectual investigation bringing together knowledge from many disciplines to engage with this complex, interlocking and ethically imbued problem set” (University of St Andrews, 2012: 2) (emphasis added). As Section 3.0 notes, LLs are perfect for this due to the fact they can help facilitate collaborative, interdisciplinary research whilst still enabling discipline-specific research to be conducted. This emphasis on interdisciplinary research can also be found within the 2015 to 2025 report, with the University claiming that it will “provide support to enable the realization of the added value of collective endeavours that are enabled by multi-School and inter-disciplinary Centres and Institutes” (University of St Andrews, 2015: 5).

A further element found in both reports that ties neatly with the aims of LL programmes is that of community engagement. The 2012 to 2022 report states the University has a desire to “[d]evelop an action plan that will support community engagement” (University of St Andrews, 2012: 7). This is reiterated in the 2015 to 2025 report, too, which claims “[w]e will continue to promote sustainable development throughout our community, in what we research, in what we teach and in how we behave” (University of St Andrews, 2015: 2). One
of the core characteristics of a Living Lab is stakeholder dissolution and ensuring the University’s research and teaching transcends the ‘lab’ and enters the ‘living’ space of the community. Implementing a LL will undeniably aid the development of this community engagement action plan the University desires.

Lastly, the 2015 to 2025 report claims that the overarching goal for the University is to “consolidate our position as one of the world’s leading Universities while continuing to be the top ranked University in Scotland” (University of St Andrews, 2015: 1). In conjunction with this, the University aims to continue expanding student cohorts, with hopes of having a student population of over 10,000 by 2025, 50 percent of whom will be international students (University of St Andrews, 2015). In an increasingly competitive world, the University of St Andrews must ensure it is providing its students with first-class teaching, resources and employment skills, especially if it wants to attract such a high percentage of international students. A LL is a resource that will help the University of St Andrews stand out even more so than at present. Its ability to connect students with the community and gain skills and experience in the ‘real-world’ is perhaps the element that will ignite the greatest interest from potential students, thus helping to achieve this goal.

In addition to these goals, as well as those not touched upon within this report, the University has recently established a ‘Sustainability in the Curriculum’ committee. Whilst this committee is still in the early stages of its development, it is hoped it will serve as a driving force for implementing a St Andrews LL.

In summary, the University has made claims that working on SD is of the utmost importance and a key priority that must be addressed. Hence, this report argues that the St Andrews LL must acknowledge this by ensuring SD is woven through its definition and principles. However, despite these documents making extensive use of the terms ‘SD’ and ‘sustainability’, the numerous interviews conducted with academics, professional staff and students for this report indicated that there is often confusion surrounding their definition. This is also noted by the International Alliance of Research Universities (IARU, 2014) who state it is a somewhat “murky and ill-defined concept” (125). As such, it is necessary to delve deeper into the meaning and principles of SD to ensure there is absolute clarity and understanding when it comes to defining the St Andrews LL.
10. Sustainable Development (SD)

Since its emergence in the 1970s, the discipline of SD has become increasingly widespread, with individuals worldwide recognising its importance. It was defined in 1987 by the World Commission on Environment and Development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (41). It is widely accepted that to achieve the goal of SD (sustainability), three key areas must be addressed: society, the economy and the environment. These three ‘pillars’ are of equal importance, as Figure 6 indicates.

These pillars are further highlighted in the United Nation’s (UN) Sustainable Development Goals (SDGs), which came into effect in 2016. The SDGs consist of 17 goals that the UN hopes to achieve by 2030 (see Appendix 2). These goals address all three pillars of SD, highlighting that in order to move forward to a more equitable and environmentally responsible world, each pillar must be tackled. Despite this, LLs are often perceived to be ‘green’ and solely address the environmental pillar of SD. Whilst protecting and conserving the environment is undoubtedly vital, SD has a much wider scope: simply focusing on one aspect will not achieve sustainability. This is noted by Graczyk (2015), who states: “[l]arge amounts of respondents [in her study on LLs at the University of Edinburgh] believed that… LL should not be branded as ‘green’ so as not to limit its outreach” (26). This is also recognised by the UBC, who explicitly reference the “environmental, economic and societal aspects of sustainability” (UBC, no date) in their LL definition. In recognition of this, this report recommends that the St Andrews LL focus on all three pillars of SD, rather than simply aligning itself within the environmental pillar. Not only will this “initiate a shift away from the unilateral perception of sustainability in its environmental sense and expand on its social and economic dimension” (Graczyk, 2015: 17), but it will also allow every School and unit in the University to engage in the LL without feeling pressured to ‘green-wash’ their curriculum and activities. This will also fit in with the University’s desire to “act as an exemplar of sustainable development practice and to promote the principles of sustainable development at a local, regional, national and international level” (University of St Andrews, 2012: 8).
11.0 The St Andrews Living Lab

11.1 Interview feedback

Table 2 in Section 4.0 outlined a number of LL definitions and highlighted the key themes found within these definitions; namely that LL projects are practical, locally focused and involve relationships with key stakeholders. This information, combined with the comments from interviewees, helped develop the University of St Andrews LL definition and principles.

Firstly, it is important to note that there was a divergence of opinion between interviewees surrounding the term ‘LL’. Prof Phil Lightfoot (Chemistry), Dr Dharini Balasubramaniam (Computer Science) and Dr Winnie Dhaliwal (Medicine) expressed that they found the term too “clinical”. Furthermore, Dr William Vlcek (International Relations), Dr Matt Sothern (Geography), Prof John Burnside (English) and Connie Dawson (SD student) all commented that they found the term unclear and confusing. There was also the suggestion that the word “Lab” may discourage Arts students from engaging in the programme (Dr William Vlcek). In contrast, Dr Gerald Prescott (Biology), Dr Ian Smith (Economics), Zach Davis (former Director of Education SAB) and Sarah Pay (Residential Business Services (RBS)) expressed that they liked the term, with Deborah Leitch (RBS) noting that it made her think of growing and nurturing, as opposed to experimentation. Despite these initially converging opinions, once the term was explained to interviewees the vast majority went on to state that they understood it and what it encompassed. As such, it is recommended that the University adopt the term (thus ensuring consistency between universities), however it is also recommended that a more explanatory sub-heading also be adopted. Hence, this report recommends the following: The University of St Andrews Living Lab: Innovate, Integrate, Inspire.

A second key point surrounding the University’s LL definition is that it should not simply be environmentally focused. As the preceding Section explains, in order to effectively work on SD a much wider focus must be taken. This was noted by Dr John Clark (History), who stated that solely focusing on the ‘green’ element of SD may discourage students, especially Arts students, to get involved in the programme. Following from this, the University’s LL should also have a much wider scope than simply being a “practice-driven phenomenon” (Ballon and Schuurman, 2015: 1). Whilst it is important to find practical solutions for sustainability-related issues, it can be argued that the hardest, yet most important, element of SD is raising awareness of these issues and getting individuals to recognise the impact of their actions and subsequently change them. For this there is no practical element and no clear solution.
Finally, this report argues that the University’s LL should not simply focus on producing locally focused research: we must acknowledge that we live in an increasingly interconnected world. This is recognised by the University of Manchester, who, for example, have conducted research on China’s urban transport sector and smart city initiatives. Dr Gerald Prescott (Biology) and Dr Winnie Dhaliwal (Medicine) commented that having a focus on the local St Andrews area with a view to then look outwards on to a more global scale would interest more students (especially considering the diverse student body) and result in the production of globally recognised research. Focusing too much on the local was also a concern expressed by Dr Matt Sothern (Geography), who noted that many students already conduct dissertation research on the ‘Bubble’, and encouraging this may result in a claustrophobic feel to the University. Hence, this report argues that the University of St Andrews LL should not simply focus on conducting local research, but instead take a broader approach in order to recognise our globalised, interconnected world.

In many ways, it can be argued that the current view of LLs it too narrow. The St Andrews LL should aim to push past these existing boundaries in order to be a world-leading sustainability initiative. However, it is recommended that the St Andrews LL does adopt the EAUC’s ‘basket of relationships’ model, and thus focuses on developing relationships between academics, students, professional staff and external stakeholders. The following definition and principles aim to convey this information.

11.2 Definition and principles

The St Andrews Living Lab is an interdisciplinary, collaborative platform that aims to foster innovation and community engagement by addressing sustainability issues in a real-life context.

The St Andrews Living Lab will:

1. Focus on all three pillars of sustainable development: the environment, the economy and society.
2. Address local sustainability issues, as well as those with global significance.
3. Encourage research and teaching that breaks down traditional disciplinary divides.
4. Promote improved communication, knowledge exchange and learning between academics, students, professional staff and the wider community.
It is important to note that despite some concern being raised about the term LL being misleading or confusing (see Section 11.1), it is recommended that the University of St Andrews still adopt the term. This is due to the fact it is the standard term used throughout the world, and makes communicating and collaborating with other Universities easier. Furthermore, many interviewees expressed that they understood the term after it was fully explained to them. As such, having a strong definition that clearly explains the characteristics of a LL is vital.

11.3 Methods of implementation

Relevant literature indicates that LLs can be implemented in a variety of ways. Having reviewed this literature and discussed ideas with interviewees, this report recommends the St Andrews LL consist of three key areas of implementation:

1. Academic Projects
2. Formal Extracurricular
3. Informal Extracurricular

The first key area, Academic Projects, refers to any work conducted by a student or academic that contributes to their research or degree. This includes dissertations, coursework, fieldtrips and all research papers and publications. Many of the academics interviewed for this report suggested they believed conducting LL projects through student dissertations would be the most appropriate method of implementation within their School, something which was also noted by Graczyk (2015) who conducted research on the University of Edinburgh’s LL. Dissertations give students the freedom and flexibility to focus on an area of research that is important to them, and students are also often encouraged to conduct interviews and engage with stakeholders outwith their discipline or the University entirely. As such, dissertations are an ideal way for students to engage in LL projects. However, it is important to note that smaller pieces of coursework, especially group work that encourages students to work on an issue in a collaborative manner, and modules in themselves can be classified as LL projects. Many modules within departments such as Geography, SD, and Biology, to name just a few, also run fieldtrips, thus enabling students to take their learning out of the classroom and apply it in real-world contexts. For example, Dr Gerald Prescott noted that the School of Biology run a fieldtrip to Antarctica, where students survey sea birds and mammals on a boat, and also give informative talks to tourists. Furthermore, the research of certain academics may fall under the LL banner, and as such all research papers and publications produced by these academics will be of use to the St Andrews LL.
The second key area, Formal Extracurricular, refers to projects that are not part of staff and students compulsory research, teaching or coursework, yet are still formal undertakings. These projects include internships, research institutions and groups, and resources provided by CAPOD, such as the Professional Skills Curriculum (PSC). Further information on internships and CAPOD resources can be seen in Sections 17.7 and 17.8, respectively.

The final key area of implementation is Informal Extracurricular, referring to optional activities that individuals can engage in as and when they desire, with no expectation of taking on roles of responsibility. This recommendation contrasts with that of the EAUC (2017b), who advise that LL projects be implemented in a formal manner. However, Longhurst et al (2014) recognise that “[s]tudents’ learning for and about sustainability while in higher education is not limited to the formal curriculum: wherever possible, teaching, learning and assessment should take account of informal and campus learning opportunities” (13). Dr Rehema White (SD) also noted the importance of informal extracurricular activities. One method that falls under the heading of Informal Extracurricular activities is voluntary projects. This could be through Transition, St Andrews Voluntary Service (SVS), or countless other avenues. When interviewing Jess Jones, a fourth year psychology student, she mentioned that over the next academic year she hopes to set up a programme whereby students visit dementia patients in care homes. The interactions the students have will with these individuals could help inform the dementia research currently underway in the School of Psychology and Neuroscience, whilst also providing care workers with valuable information and improving the lives of those in the care home. This voluntary programme would undoubtedly be a LL project, as it engages multiple stakeholders, uses the research skills of the University to make a real-world change, and works on the social pillar of SD. Another way of engaging students in LL projects could be through student societies. For example, during their ‘spotlight on food’ month, many student societies at the University of Cambridge organised plant-based cooking workshops to encourage students to adopt a more sustainable diet. Events such as these could be replicated in St Andrews. A huge benefit of this is that it allows students to engage in LL projects that are fun, relaxed and part of their everyday life, in turn encouraging them to be more sustainable outside of their academic studies, too.

12.0 What are the benefits?

Whilst many of the benefits of LLs have already been touched upon throughout this report, this Section aims to collate them and expand upon each further.
12.1 Reputation boost

An undeniable benefit of implementing a LL at the University of St Andrews is the reputational boost it will give the institution, as noted by the EAUC (2017a). In an increasingly competitive world, ensuring the University of St Andrews stands out and showcases its world-class research and teaching is vital. A LL can help achieve this by giving students greater access to internships and interdisciplinary learning opportunities, as well as providing them with critical problem solving, communication and employability skills. In other words, a LL can help the University achieve its goal of increasing the student population to over 10,000 by 2025, with 50 percent of those students being international (University of St Andrews, 2015).

Furthermore, a LL can help boost the reputation of the University and its students within the local community. There are, undeniably, many stereotypes surrounding what a ‘typical St Andrews’ student is like, and these stereotypes often portray a strong class divide between students and the rest of the community. Implementing a programme that fosters communication and collaboration will help break down the ‘us and them’ barriers that both students and community members may feel, in turn resulting in a changed perception of the University and its students locally.

12.2 Consolidation of information

As previously noted, the University is already engaging in much sustainability work, and has been doing so for many years. However, a number of interviewees noted that they were unaware of all the sustainability-related projects underway, and that there was sometimes a problem with losing research and resources. One academic made reference to a dissertation they once supervised on parking in St Andrews. However, as this was a number of years ago, the student had long graduated and the department no longer had a copy of the dissertation. Having a LL programme will help consolidate appropriate information into one place, in turn meaning research is not lost as students and academics come and go, and individuals can stay updated on the University’s sustainability research. Furthermore, consolidating information will help identify research “gaps, overlaps, and opportunities” for study throughout the University (EAUC, 2017a: 2).
12.3 Easier inter-university communication

Having a LL at the University will make collaborating and communicating with other universities easier and more efficient. The LL programme may highlight areas of research in St Andrews that another university is interested in, and vice versa. This can foster partnerships and knowledge exchange, in turn giving both staff and students access to additional resources and opportunities. Furthermore, this in itself is likely to attract students to the University and continue boosting its reputation.

12.4 Positive environmental impacts

The University has set itself the goal of being carbon neutral by 2025. As the University of Cambridge (2017) note, a LL can cut resource use and reduce the environmental footprint of a university. They themselves have cut their carbon emissions by 28 percent simply from implementing a more sustainable food policy (see Section 5.1) (University of Cambridge, 2017), and the University of Edinburgh also reported reduced carbon emissions as a result of their LL programme (Graczyk, 2015). With the help of a LL, the University of St Andrews can achieve environmental benefits such as these, too.

12.5 Fosters innovation and creativity

A LL allows students and academics to work with a multitude of stakeholders and individuals from outside their discipline. In turn, this will foster increased innovation and creativity amongst students as they will not be so ‘boxed’ into disciplinary boundaries. Prof John Burnside (English) noted that this would be one of the key benefits a LL programme would bring to St Andrews, as disciplinary silos can often prevent individuals from addressing problems in a holistic manner.

12.6 Opportunities for students

Students are perhaps the stakeholders that will benefit the most from engaging in LL projects, receiving an almost endless number of advantages. One such benefit is that LLs “provide an opportunity for students to leave our universities better able to understand and grapple complex issues that cross several disciplines” (Price et al, 2017: 2). As Orr (2004) notes, the world cannot be segregated into separate disciplines. A LL recognises this and allows students to develop their academic skills by thinking outwith their disciplinary silos.
This is a crucial skill for students to gain in order to be “better agents of change” (EAUC, 2017a: 6) and effectively address the world’s sustainability challenges.

Additionally, LLs can help students develop their employability and personal development skills (Price et al, 2017; EAUC, 2017; University of Cambridge, 2017; IARU, 2014). Working with multiple stakeholders, improving communication skills and building confidence are all outcomes students will receive from engaging in LL projects. Gaining skills such as these will help students be successful in their career choices despite the increasingly competitive job market. All four students who were interviewed noted that they considered this to be one of the most important benefits they would receive should a LL be established at St Andrews.

A further benefit students will receive from the St Andrews LL is greater satisfaction with their degree (EAUC, 2017a). Being able to apply theory to practice and seeing the positive impact their research can have on the local community and the rest of the world will enable students to gain a deeper appreciation of their studies and understand its importance, rather than simply feeling like “passive receivers of knowledge” (Graczyk, 2015: 25). In turn, this may motivate students even more so than they are already, and as such students may receive higher grades and thus continue to push academic boundaries. This in itself will boost the University’s reputation and encourage students with the highest potential from around the world to study at the University of St Andrews.

12.7 Increases the ‘impact’ of academic research

The University of Cambridge (2017) note that a key benefit of their LL programme is that it “[c]ontributes to the impact agenda of academic research” (2). In recent years there has been increased emphasis placed on the societal impact and wider application of academic research, as noted by Dr Ralph Anderson and Dr Dawn Hollis (Classics). According to the EAUC (2017b), “[t]he living lab concept is a very good vehicle to deliver this requirement” (16).

12.8 Saves professional staff time and resources

As the EAUC (2017a) note, professional staff can expect “time and monetary savings through relevant and successful projects” (4) within LLs. Many of the professional staff interviewed for this report expressed that there were areas of sustainability they were interested in working on, yet simply did not have the time (see Section 15). For example, Sarah Pay (RBS) noted that she would like the University to transition to more environmentally friendly
cleaning products, however she was unable to find the time to research the best products available. When asked if a student conducting research on areas such as these as part of their degree or an internship would help, every member of staff interviewed expressed that this would be immensely valuable.

**12.9 Offers external stakeholders resources and support**

Local businesses and organisations may not have the funding or resources to engage in research and knowledge production, however, they may benefit significantly from the outcomes of doing so. LLs can provide assistance to these external stakeholders by engaging in research with them in a collaborative manner. The EAUC (2017a) note that as a result, LL programmes will be of significant value to the local community, encouraging stakeholders to participate in further LL projects and hence ensuring the longevity of the programme.

**12.10 Significant resources are not required**

Last, but most certainly not least, LLs can achieve all of these benefits without requiring extensive resources. As the EAUC (2017c) note, a LL “helps identify existing resources and redirects them to the right problems” (3). In other words, they do not require a significant amount of additional resources or funds to be effective. This is summarised by Millard (2011), who notes that all that is simply needed is some “reorganisation and redefining of roles” (4). Hence, there are numerous benefits to implementing a LL at the University of St Andrews, all of which can be achieved without the University investing significant resources in the programme.

**13.0 What are the barriers and how can we overcome them?**

As the preceding section indicates, there are numerous benefits to implementing a LL at the University of St Andrews. Nevertheless, existing literature shows there are certain barriers that must be considered and worked through to ensure implementation is smooth.

**13.1 Timescales**

When interviewing academics and professional staff from various institutions across the UK, Millard (2011) found that the most commonly cited concern on the behalf of professional
staff is that of diverging timescales, noting that “[t]here was the perception that academics almost work in a different time zone” to them (32). These professional staff members expressed concern due to the fact they often have “fixed and short timescales” (32), contrasting with the often lengthy research timescales academics work to. This concern was also noted by Price et al (2017), The University of Edinburgh and Graczyk (2015). Millard (2011) concludes that “It is essential therefore that at the beginning of the project that both parties agree on the major deadlines and ensure that they are realistic” (47). In other words, setting targets and an end-point for LL projects that all stakeholders agree upon can help avert this tension and simultaneously help motivate participants.

13.2 Communication

Millard (2011) notes: “universities tend to be very fractured with several faculties led by different deans which operate in very different ways” (42). Furthermore, professional staff and the units they work within, such as Student Services, Admissions and Estates, to name just a few, are also fractured entities. As a result, communication within universities is often poor. It is hoped that with the University’s newly established Sustainability in the Curriculum committee, communication throughout the University in regards to sustainability-related issues will be improved as there will be a clear channel through which to communicate.

However, communication is not simply an internal issue: there are communication divides between the University and the local community, too. Establishing a multi-stakeholder LLs team (see Section 17.1) will help resolve this by involving the local community in the University’s LL from the off-set. Furthermore, the creation of a website (see Section 17.2) that can be used as a neutral platform for all will be effective in bridging any divides, and when combined with an online form for submitting ideas (see Section 17.5), will help facilitate communication and foster dialogue exchange. Having a platform for equal, two-way dialogue exchange between the University and local community was noted as a key benefit by Prof John Burnside (English).

13.3 Cultural divides

A further concern that Millard (2011) notes relates to the idea that academics and professional staff each work using a “different language and culture” (32). Millard (2011) claims: “[p]rofessional staff may not feel that they can call on academics for help as they speak a different language and may fear that they will not understand what is being said, that they are of lesser intelligence somehow” (45). This concern is also raised by Graczyk
(2015) and Price et al (2017), who state: “[s]taff members may have different objectives… language, terminologies and communication styles” (63). Whilst it would of course be hoped that all University staff members, regardless of their role, would use appropriate language and terminology and would feel comfortable enough to ask for clarification where needed, one potential way to bridge this perceived divide would be to involve students in projects due to the fact they often operate as semi-professionals.

13.4 Lack of time

Many of the academics and professional staff members interviewed for this report expressed concern that working on LL projects would be yet another job they had to complete when their schedule is already full. However, as Cohen and Lovell (2014) note, students working on LL projects “can actually relieve some important workload items… and can provide better data and success stories to the administration and community” (10). For example, students can help professional staff members solve problems and difficulties they are having by conducting research and developing solutions that ease these problems.

14.0 Internal LL case studies

Table 6 outlines a selection of past and current projects, policies, research and teaching at the University of St Andrews that come under the LL banner. The aim of this Section is to highlight the vast array of sustainability-related work that is currently underway at the University, and further demonstrate the depth and breadth of LL programmes. Note that this is simply a preliminary case study archive and is hence not as fully developed as the archive recommended in Section 17.3.

<table>
<thead>
<tr>
<th>Project</th>
<th>School / unit</th>
<th>Project Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food waste in halls assignment</td>
<td>SD</td>
<td>As part of their coursework, first year SD students were tasked with reflecting on the matter of food waste in catered University halls. Students explored the issue in a variety of ways. For example, some weighed food waste and calculated costs, whilst others interviewed students and catering staff. The aim of this project was to conduct research that could be fed back to the University’s catering team to help them reduce food waste and its associated costs, whilst also giving students the opportunity to engage in ‘real-world’ research.</td>
</tr>
<tr>
<td>Project/Module</td>
<td>Department</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Arclight</td>
<td>Medicine</td>
<td>Dr Andrew Blaikie helped invent ‘Arclight’: a pocket-sized, low cost, solar powered ophthalmoscope that aims to help medical workers detect signs of blindness in low-income countries. It doubles as an otoscope, hence meaning it can help prevent deafness. Each Arclight costs around £1 to produce, and starting the academic year 2018/2019, all first year medical students at the University of St Andrews will receive one for free.</td>
</tr>
<tr>
<td>Ten Global Health Problems Module (MD5203)</td>
<td>Medicine</td>
<td>Dr Winnie Dhaliwal coordinates an interdisciplinary health module that is available to all students across the University. The Module focuses on the World Health Organisation’s top 10 global health problems, addressing a new area each week.</td>
</tr>
<tr>
<td>The Third Generation Project</td>
<td>International Relations</td>
<td>A research project based within the School of International Relations that aims to foster interdisciplinary discussions on human rights issues surrounding climate change.</td>
</tr>
<tr>
<td>Economics of the Environment Module (EE4405)</td>
<td>Economics</td>
<td>Dr Jim Jin coordinates a module that focuses on problems within environmental economics and the relationship between low-income and high-income countries.</td>
</tr>
<tr>
<td>Green Information Technology Module (IS5106)</td>
<td>Computer Science</td>
<td>This module forms part of the MSc Information Technology degree programme. The module touches on issues such as how technology contributes towards global emissions, but also how it has the potential to create a more sustainable future.</td>
</tr>
<tr>
<td>EcoCinema: The Nature of Film Module (FM4113)</td>
<td>Film Studies</td>
<td>The Film Studies department previously ran a module that centred on cinema’s relationship with nature. The module looked at how nature is represented in film, what role nature plays in film theory and how film can be delivered through natural materials. Whilst this module is no longer in session, Dr Tom Rice noted that the department is hoping to organise it again in the future.</td>
</tr>
<tr>
<td>3D Archaeological Reconstructions</td>
<td>Classics, Computer Science, Art History, Archaeology</td>
<td>This project brought together technology and Scottish history by creating accurate virtual reconstructions of historic sites that individuals could access over the Internet and in schools and museums. The project resulted in individuals from over 112 countries visiting the website and engaging in a breadth of Scottish history and culture.</td>
</tr>
<tr>
<td>CAPOD PSC Outreach: Madras College</td>
<td>CAPOD</td>
<td>Each year CAPOD run a series of PSC workshops with students from Madras College. Each week students participate in activities that aid their personal development. For example, they are tasked with designing an app that helps the local community in some way, writing a CV, and completing a mock interview.</td>
</tr>
<tr>
<td>Event</td>
<td>Organiser</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dementia Awareness Week 2018</td>
<td>Public Engagement, Psychology, Music</td>
<td>A series of events were organised by Public Engagement, alongside academics and students from Psychology, Neuroscience and Music, to help raise awareness of dementia. An event was organised each day, ranging from a jazz afternoon to a storytelling event and an art exhibition.</td>
</tr>
<tr>
<td>Compostable ‘plastic’ cutlery from Vegware</td>
<td>RBS</td>
<td>The University recently switched from plastic cutlery to compostable plant-based cutlery. This is now used at every catered University event, with even the ‘plastic’ wrapper the cutlery comes in being suitable for disposal in food waste bins.</td>
</tr>
<tr>
<td>Making recycled fridge magnets</td>
<td>Public Engagement</td>
<td>The Public Engagement Team recently organised an outreach even with local school children where they melted recycled milk carton lids to make anatomical fridge magnets.</td>
</tr>
<tr>
<td>The International Genetically Engineered Machine Competition (iGEM)</td>
<td>Biology</td>
<td>iGEM is an interdisciplinary competition that centres on advancing synthetic biology. Students are tasked with developing solutions for some of the world’s most pressing issues, and then presenting their findings. The University’s 2018 team consists of 19 students, and focuses on creating an in vitro system to detect the effectiveness of metabolites, which in turn could lead to the development of lead compounds for new antibiotics. To do this, the team is working on generating a system that detects cell lysis and the formation of biofilms. The team are also working on community outreach by developing lesson plans for primary school children based on microbiology.</td>
</tr>
<tr>
<td>St Andrews Green Film Festival</td>
<td>St Andrews Green Film Festival</td>
<td>Each year a committee of students work with Transition to create a weeklong film festival centring on environmental sustainability. Every evening for a week a film is shown in the Byre (encouraging members of the University and the local community alike) and followed by a presentation or discussion on the films key themes.</td>
</tr>
<tr>
<td>Greek Drama in the Community</td>
<td>Classics and the Byre Youth Theatre</td>
<td>In 2016/2017 Dr Ralph Anderson and Dr Jon Hesk (Classics) worked with a small group of students from the Byre Youth Theatre to help them create their own short piece of theatre inspired by ancient Greek tragedy. The project involved ‘academic’ briefings, question and answer sessions, brainstorming and practical workshops.</td>
</tr>
<tr>
<td>Environmental Management in Scotland Module (GG3229)</td>
<td>Geography</td>
<td>Dr Charles Warren coordinates an honours module that explores current environmental management issues in Scotland. The module primarily focuses on land and resource management and how these systems have environmental, economic and societal impacts.</td>
</tr>
</tbody>
</table>
The Statistics department are world leading in statistical ecology. They have a Centre for Research into Ecological and Environmental Modelling (CREEM) that work on issues such as the spatial modelling of wildlife populations and estimating species abundance.

Students residing in Deans Court took part in a challenge that aimed to encourage individuals to make use of their food waste bins. For every food waste bag that was produced, a marble was placed into a container. This served as a visual representation and aimed to encourage students to continue recycling their food waste.

Dr Tim Stojanovic coordinates a module that focuses on questioning the effectiveness of current governance for sustainability. The module focuses on complex societal problems that require collaboration from multiple stakeholders. Students develop skills that enable them to assess ‘good’ governance and are taught to question how governance systems can be reformed and lead to a more sustainable future.

<table>
<thead>
<tr>
<th>Name</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steven McKay and Mark Nixon (Catering Team)</td>
<td>The Catering Team would like a student to look into the practicalities of food waste. In proportion to its population, St Andrews has high food wastage. The Catering Team are interested not only in how the local food waste cycle can be more ‘green’, but also how it can be more commercially viable. Thus far, work has concentrated on the downstream problem, however the Team would like a student to research the upstream problem, behaviour change, so to establish how both the chef and the consumer can think and act in the same way.</td>
</tr>
<tr>
<td>Sarah Pay (Operations Manager, RBS)</td>
<td>Sarah Pay would like a student to explore how the University can be more environmentally sustainable with tourism. The University obtained its Green Tourism award a number of years ago, however since then has not strived to make any more positive changes. As such, a student researching how green tourism is continually evolving would be of great help to the RBS team.</td>
</tr>
</tbody>
</table>

15.0 Future LL project ideas

Many of the professional staff interviewed for this report highlighted a problem within their unit that they would like to see a student develop into a research project and help find solutions for. Table 7 briefly touches on these problems, thus highlighting the desire that already exists for a LL programme to be established at the University.
16.0 Internship outcomes

There numerous findings and outcomes that have resulted from this six-week long internship that will help work towards implementing a successful LL at the University of St Andrews. Perhaps the most important of them all is the creation of a specific University of St Andrews LL definition. This definition is the first building block for implementing the University’s LL. Having a clear and usable definition will prevent any potential confusion surrounding the term, and as such hopefully result in a smooth uptake. It is important to also note that this definition should not be fixed permanently: as the LL takes shape and develops over time it will continuously evolve, and it is important that, if necessary, this definition evolves with it.

A second key outcome is the recommendations for implementation, listed in Section 17.0. These recommendations are based on the 29 interviews that were conducted and research into LL programmes at other universities, and are all put forward with the intention of creating a world-class LL for the students and staff at the University and local community members alike.

A third outcome is the rough beginnings of a case study archive (see Section 14.0 ), as recommended in Section 17.3. The hope is that this archive is continuously expanded upon, so that what starts as a small set of examples evolves into a hub of resources and information.

Whilst these outcomes are undeniably valuable, the following recommendations are absolutely vital in ensuring the successful implementation of the University’s LL programme.
17.0 Recommendations

17.1 Gradual implementation

The first, and arguably most important, recommendation is that the University should not try to implement a full-blown, large-scale LL immediately. Time should be given for academics and students to get used to the term and what it entails. This gradual implementation will allow individuals to engage in the LL of their own choosing, rather than it appearing as something that has been forced upon them. This report suggests three avenues for how a LL could be implemented at the University of St Andrews:

1. Through the Proctor’s Office (see Section 17.1.1)
2. Through the Estates unit (see Section 17.1.2)
3. Through the Public Engagement team (see Section 17.1.3)

Note, there is no specific timeframe for implementation through any of these avenues, as developments should occur as a result of the University and the community being ready and willing, rather than a restrictive timetable. Furthermore, it is up to the University and those within the Proctor’s Office, Estates unit or Public Engagement team as to whether new LL roles are created or there is simply a redefining or roles and responsibilities.

I suggest three stages of implementation within each avenue, with a ‘Stage 0’ prerequisite for each. These stages are outlined below, and specific recommendations made within each are further expanded upon.

17.1.1 Implementation through the Proctor’s Office

Implementation of a LL through the Proctor’s Office is recommended as the most appropriate method for a variety of reasons. The Estates unit have been trying to establish a LL at the University for some time, with limited success. One of the issues noted was that Estates are considered to be entirely separate from the academic side of the University, in turn making implementation through this avenue difficult. Implementation through the Proctor’s Office, however, will garner the attention of academics and students, and hence is more likely to result in the successful establishment of a LL. That is to say, by giving academics ownership of the project, it is hoped they will be motivated to engage in it. This was noted by both Dr Katherine Ellsworth-Krebs (SD) and Prof John Burnside (English).
Stage 0: Presenting to the Proctor’s Office

A newly formed Sustainability in the Curriculum committee will be meeting in early September 2018 for the first time. This report and its findings will be presented at the meeting, with a view for the Committee to then take forward the LL ideas to the Proctor’s Office. This will hopefully result in support for a LL to be established at the University, and an agreement for it to be eventually based from within the Proctor’s Office.

Stage 1: Introduction to the LL

The purpose of this stage is to gather the attention of individuals and develop understanding of the term LL and what the project can offer each stakeholder. To achieve this, a multi-stakeholder team should be put together to build on the work of this report and rollout the first stage of implementation, as was done at the University of Manchester. This recommendation is based on Zen’s (2017) claim that a combination of stakeholders in one committee will strengthen the LL. This team will hopefully increase awareness of the LL and engagement amongst all stakeholders. Furthermore, this will make the project seem less centralised and enforced upon individuals, and more something that is being established by them, for them. This is noted by Zen (2017), who states: “[c]o-design and co-implementation will increase the sense of belonging LLL [living learning laboratory] project” (10). It is recommended that the team consist of the following stakeholders:

- 2 academics
- 2 students
- 2 professional staff members
- 2 community members

The academics, students and professional staff members should be from different disciplines and units of the University, ensuring there is a mix of individuals from both arts and sciences. It is recommended a staff member from within the Estates unit is one of the professional staff members due to the fact Estates have done previous work on establishing a LL at the University.

This report recommends one of the community members be from Fife Council. This is due to the fact a local councillor can present everyday, practical problems that will result in ‘real-world’, tangible solutions being implemented. Additionally, the council will have good knowledge on local problems and what local community members want from the LL.
Furthermore, it is recommended the second community member be from the Byre Theatre. The Byre is a space that is used frequently by members and non-members of the University alike. As such, it would be immensely valuable to have strong ties with a venue that has such a diverse outreach. This could be especially useful in encouraging members of the local community to engage in the LL. In addition, having access to a multi-purpose venue like the Byre for shows, exhibitions, and presentations will be very useful in encouraging individuals to engage in such activities and share their LL project findings with a wide audience.

This team will initially be in charge of rolling-out the LL by getting people to take notice of the programme and responding to any recommendations. One of the first tasks that should be undertaken is establishing a LL email address. This will provide a point of contact for individuals interested in finding out more about the LL and how to conduct a project. It also provides a centralised point from which staff and students can be contacted should, for example, new opportunities arise.

A second key task this team should undertake is setting up a Moodle page for all staff and students. This page should be the first place individuals look to for information on the University’s LL. It is recommended that the following information be made available through this platform:

- A LL ‘handbook’ document (see Section 17.4)
- An external case studies document (see Part 2)
- An internal case studies document (see Section 14.0)
- A LL ‘project ideas’ document (see Section 17.6)
- The LL email address

In addition to having internal LL resources, it is important to also have external LL resources. As such, the team should ensure the Environment Team and Transition’s websites are up-to-date. However, it is recognised that external stakeholders may not be aware of these two units within the University, and as such may not look on their websites. Hence, the team should work on developing a tab on the University’s main website. This website gathers a much higher footfall, and as such will enable external stakeholders to find information on the University’s LL much easier.

Furthermore, there are a range of activities this team could conduct in order to determine the needs and wants of individuals. For example, they could run student surveys in order to assess how prepared students feel for the ‘real-world’ or how much they value interdisciplinary research skills. The team could also develop the first ‘project ideas’
document that is recommended in Section 17.6, before then circulating it around Schools and departments as a pilot study. A further valuable task this team should undertake is continuing to archive case study examples: the more developed the archive is, the more students and staff will see the diversity of the LL and the opportunities it presents for them. Finally, this team should continuously set goals and make recommendations for the future development of the University’s LL.

**Stage 2: Scaling up LLs**

After the initial introduction phase, there should be a ‘scaling up’ phase of development. More responsibility should be taken on by the Proctor’s Office and less by the multi-stakeholder team. In other words, this can be seen as a hand-over stage. Note that the multi-stakeholder team should still continue to work on developing the LL alongside the Proctor’s Office, as having diverse opinions from various stakeholders is key. However, it is important for there to be a centralised LL base rather than simply a team of individuals who will be constantly changing as, for example, students graduate and academics come and go from the University.

During this phase of development, the LL tab on the University’s website should be continuously updated and expanded. Consideration should also be given as to whether the LL would benefit from having its own website rather than simply a section on the University’s site, as has been done by the University of Manchester.

It is recommended that strong ties with CAPOD be established during this Stage. For example, developing LL workshops for staff and PSC workshops for students to enable them to engage more in the LL programme (see Section 17.8). Additionally, attention should be directed towards developing a LL internship scheme, as Section 17.7 expands upon.

**Stage 3: Embedding LLs**

The final stage of development should result in the Proctor’s Office being fully in charge of the LL. A well-developed, easy to use website (or tab on the University’s main website) with information for all stakeholders and a case study archive should be in place. This website should also have a form that individuals can complete and submit when they have a research idea or problem they want help solving (see Section 17.5).

Strong communication channels between the Proctor’s Office and all academic Schools and professional units should be fully established to ensure each individual is aware of the
projects available, how to complete a project, and the benefits the LL brings to the University and wider community. Moreover, Moodle resources, the case study archive, and the ‘project ideas’ document should be continuously updated and monitored.

This final Stage will result in a LL that is integrated throughout every aspect of the University and the St Andrews community. It will provide every stakeholder with a platform upon which they can explore areas of research that are of interest to them, whilst simultaneously aiding the University’s operations and working on issues that are vitally important in moving towards a more sustainable future.

17.1.2 Implementation through Estates

The vast majority of LLs in higher education are based through university estates units. This has shown to be successful in many universities, and as such the following avenue may also be successful at the University of St Andrews. However, it is important to note that the University of St Andrews is significantly smaller than the other universities mentioned throughout this report, and as such implementation through the Proctor’s Office is recommended before implementation through the Estates unit.

The above Stages are mostly the same, with the following differences:

**Stage 0:**
Support from the Proctor’s office will be secured for a LL to be established at the University, with a view that there will eventually be a new LLs sub-unit within the Estates unit.

**Stage 1:**
The multi-stakeholder team will coordinate with the Environment Team and Transition, rather than the Proctor’s Office.

**Stage 2:**
A new position within the Environment Team or Transition will be created that will specifically focus on scaling-up the LL and developing its website. Alternatively, there will be a redefining of existing roles.

**Stage 3:**
A new LLs unit within Estates will be formed to ensure all information is accurate and up-to-date, and the LL evolves with the changing needs and desires of key stakeholders.
17.1.3 Implementation through Public Engagement

A further potential unit that could oversee the University’s LL programme is Public Engagement. Public Engagement is already doing much work that comes under the LL banner due to their focus on multi-stakeholder engagement. As such it makes sense for the two to be headed by the same team and share resources. Public Engagement also have strong ties with academics due to their focus on research, and therefore will hopefully be able to encourage uptake amongst academic staff. Again, each Stage will mostly be the same, with the following differences:

**Stage 0:** Support from the Proctor’s office will be secured for a LL to be established at the University, with a view that it will eventually be a fully integrated part of the Public Engagement team.

**Stage 1:** The multi-stakeholder team will coordinate with Public Engagement, rather than the Proctor’s Office or the Environment Team.

**Stage 2:** A new position within Public Engagement will be created that will specifically focus on scaling-up the LL and developing its website. Alternatively, there will be a redefining of existing roles.

**Stage 3:** The LL will be fully integrated as part of Public Engagement, ensuring all information is accurate and up-to-date, and the LL evolves with the changing needs and desires of key stakeholders.

17.2 Establish an online presence

One of the most important elements the University’s LL must have is a strong online presence. As previously mentioned, this could be either as a tab on the University’s main site (as the University of Cambridge, University of Edinburgh, and UBC have) or as a separate website entirely (as the University of Manchester has). For the vast majority of people, the Internet is the first place one looks when they want to find out more information on something. Hence, ensuring there is up-to-date information online about projects and opportunities is vital in ensuring the LL is successfully implemented.
17.3 Develop a case study archive

When presented with the suggestion of an online, searchable archive of past LL case studies, the vast majority of interviewees claimed that this would be an immensely valuable resource for both staff and students. Such a resource has been developed by the University of Edinburgh, University of Manchester, and UBC. This archive will allow students to gain ideas from past studies, and also see what research has already been done so to build on it.

Every student interviewed (four in total) noted that an archive would be useful in helping them develop dissertation ideas. Dr Tom Rice (Film Studies) also touched on this, stating that he believed an archive would “inspire” students, as well as ensuring their research does not simply disappear from University as they graduate (or as staff take on teaching positions at other Institutions). Furthermore, many professional staff members noted that an archive would be of value to them, with Mark Nixon and Steven McKay (Catering Team) commenting that it would be useful for keeping a record of their past policies and actions, and Deborah Leitch (RBS) noting that it would be a good way to highlight and gain recognition for the positive sustainability work the University is undertaking.

When developing the archive, it is important to ensure each case study is reported in the same way so it ensure consistency and ease of use. This report recommends that the archive include the following information:

- Project title
- Author(s)
- Summary (around 800 characters max)
- School / department the project was produced by
- Contact details for further information
- Themes (optional)

UBC have a ‘themes’ section within their SEEDS Sustainability Library, as Figure 3 above shows. Whilst it is not essential the University of St Andrews adopt such a feature, it should be noted that doing so would be an undeniable benefit. It allows individuals to clearly see what areas of SD each project worked on, and as such will be helpful for students looking for dissertation or research ideas. Hence, this report recommends that the University of St Andrews LL archive adopt a ‘themes’ tab. One suggestion for this would be to simply use the 17 SDGs as the themes (see Appendix 2) as these are easy to understand and cover the key areas of SD.
17.4 Produce a LL handbook

This report recommends that a LL handbook be produced and made available on the LL website and Moodle page. This handbook should be a concise document that aims to ensure individuals fully understand what a LL is and why one was implemented at the University of St Andrews. Prof Phil Lightfoot (Chemistry), Dr Dharini Balasubramaniam (Computer Science), and Dr Ralph Anderson and Dr Dawn Hollis (Classics) all noted that this document would be especially useful for staff who struggling to understand how SD relates to their research and teaching. It is recommended that it have the following features:

- The LL definition and principles
- A brief explanation of the benefits a LL brings to the University
- 3-5 external case study examples
- 3-5 internal case study examples
- The LL email and website address

17.5 Develop an online ‘ideas form’

Many of those interviewed for this report indicated that they believed it would be valuable to have an online ‘ideas form’ where people could submit research ideas or ask for help with a problem. In particular, Alina Loth noted that the Public Engagement team often receive requests from academics and students with public engagement project ideas, and a form for them to submit these ideas may encourage yet more individuals to come forward. This form would be part of the LL website, and hence would be open to all stakeholders. Prof John Burnside (English) noted that having a form open to everyone would encourage two-way communication and prevent the local community from feeling they have no voice. This form would be a quick and easy way for individuals to request research assistance. Submissions should be handled by whoever is in charge of the LL programme, who will then produce a ‘project ideas’ document (see Section 17.6 below) with each request.

17.6 Develop a ‘project ideas’ document

As Section 7.0 indicates, the University of Manchester has an online document titled ‘Applied Sustainability Projects’. This document lists various LL project ideas that have been set by the University and local charities, organisations and NGOs. The document simply provides a brief description of each project idea, and students are then able to take this initial starting point and develop their own research study. This can be for a large piece of
work, such as a dissertation, or a small piece of coursework, the only requirement being that students inform the LL coordinator when they are conducting a project. Figure 2 above gives an example of how this document is laid-out.

This report recommends that the University of St Andrews create a similar project document for students. It is recommended that this document be produced from the submissions from the ‘ideas form’ mentioned above, and published online and/or on the LL Moodle page. One suggestion made by both Dr Dharini Balasubramaniam (Computer Science) and Dr John Clark (History) is that this document be filtered for each School, or that every project have a section that states which disciplines would be suitable. This would prevent students being presented with project ideas that are unsuitable for their degree discipline, thus ensuring academic standards are maintained. It is also recommended that it be emailed to all dissertation coordinators at the beginning of Semester 2 each year, who can then subsequently email the document to their students, thus ensuring every student is aware of the opportunities available.

17.7 Develop an interdisciplinary internship scheme

As the University of Cambridge has illustrated, having a LL summer internship scheme is a highly effective way of engaging students in sustainability-related issues, whilst also giving them the opportunity to enhance their personal development and engage in an area of research of interest to them. As such, developing a similar scheme is a key recommendation put forward for the University of St Andrews LL.

The specific internships should be designed by the LL coordinator and advertised both online and through the University’s careers service. It is recommended that St Andrews initially start with one summer internship and in subsequent years build up to around three, adapting the scheme with recommendations from previous years as necessary.

Upon speaking with many academics and students, it was found that the idea of an interdisciplinary group internship was most appealing. Interviewees were asked whether they thought an internship scheme that allowed groups of around five students, each from different departments, to work on one issue in a collaborative manner would interest students and be of value to them. The overwhelming response to this was that such a scheme would be very useful, allowing students to escape their disciplinary “pigeonholes” (Orr, 2004: 94) and also develop skills such as teamwork and communication. Dr Gerald Prescott (Biology) stated that he believes interdisciplinary learning is one of the most
valuable things students can be exposed to; Prof John Burnside (English) noted that such a scheme would make Arts students feel they had just as much to add to sustainability projects as ‘hard science’ students do; Dr John Clark commented that such a scheme would be the most valuable element of a future LL programme by encouraging individuals to engage in research outside of the worries of coursework and grades; and Dr William Vlcek (International Relations) stated that such an internship would yield rich perspectives and results by highlighting the different angles research can be approached from. Students Emma Gray (Neuroscience), Jess Jones (Psychology) and Connie Dawson (SD) noted such a scheme would interest them as it would improve their employability skills and thus make their CVs stand out.

Furthermore, an internship scheme such as this would help the University achieve their aim of continuing to “expand internship opportunities... [and] embed employability skills in the curriculum wherever possible” (University of St Andrews, 2015: 7).

17.8 Collaborate with CAPOD

When speaking with Cat Wilson from CAPOD, she suggested that developing PSC workshops inspired by the LL ethos would be of benefit to both staff and students. For example, a sister workshop to the Being a Green Employee workshop could be developed. Cat also stated that CAPOD would be interested in developing workshops for postgraduate students and academics on how they can integrate a LL ethos throughout their research and teaching. This relates to a comment made by Mhairi Stewart and Alina Loth (Public Engagement), who stated that they would like to see all PhD students undertake some form of training in public engagement so to create the next generation of engaged researchers. A training portfolio for Public Engagement with Research launched in collaboration with CAPOD this year, and will be the first step in making training and support available to everyone. One suggestion is that information on the University’s LL is integrated within this training portfolio.

17.9 Create a LL logo

The Edinburgh LL has its own logo, as shown in Figure 6. Taking inspiration from this, developing a specific University of St Andrews logo and ‘branding’ the LL may help with uptake of the programme.

Figure 8: The Edinburgh LL Logo (Available at: http://edinburghlivinglab.org/about/)
17.10 Disperse information via multiple channels

The multiple interviews that were conducted highlighted that there is no single internal platform that would be most effective for dispersing information about the University’s LL. Whilst many Schools use Moodle as their main source of information, many others prefer MMS or email. As such, it is recommended that LL resources initially be placed on Moodle, but that staff and students are also informed via email. Once the LL website is fully established, the most effective means of dispersing internal resources may be through a section on this site that requires one’s University login details for access.

17.11 Create a LL Sabbatical Officer role

A final (optional) recommendation is to have a LL SAB officer. This would allow students to be fully involved in the organisation of the LL programme, despite it being headed from within the Proctor’s Office, Estates or Public Engagement team. A Sab officer could take on roles of responsibility such as ensuring the case study archive is up to date, and consolidating all research ideas submitted via the online ‘ideas form’ (see Section 17.5) into the ‘project ideas’ document (see Section 17.6). Having a SAB officer may also mean the University does not have to create a specific LL role within the Proctor’s Office, Estates or Public Engagement team, and instead will simply have to incorporate minor LL tasks into already-existing roles. If a LL SAB role is to be created, it is recommended that the role come into force during Stage 3 of implementation (see Section 17.1), once students and staff are aware more of the University’s LL programme.

18.0 Conclusion

This report concludes that implementing a LL at the University of St Andrews will result in countless benefits to students, staff and local community members alike, whilst simultaneously showcasing and further encouraging the world-class research and teaching the University is famous for. Having conducted extensive research into LL theory and programmes in place at other universities, in addition to having gathered multiple staff and student opinions from across the University, this report has put forward a number of recommendations to ensure the successful implementation of a LL programme.

Arguably the most important outcome from this report is the specific University of St Andrews LL definition, which states it is an interdisciplin ary, collaborative platform that aims
to foster innovation and community engagement by addressing sustainability issues in a real-life context. The report also recommends that the St Andrews LL focus on all three pillars of SD, ensuring the University continues progressing towards an even more environmentally, socially and economically sustainable future. A further key recommendation made was that the LL focus on global as well as local research, thus recognising the interconnected nature of the world and the internationally diverse University body, whilst simultaneously conducting research that will improve the lives of the community and ensure the University’s operates in a smooth, efficient manner.

In summary, implementing a LL at the University of St Andrews will allow the University to achieve its future sustainability goals, attract an even higher number of students from across the world, and make a ‘real-world’ difference on both a local and global scale. In other words, a LL at the University of St Andrews will innovate, integrate and inspire its staff, students and surrounding community.
19.0 References


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### 20. Appendices

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
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<tbody>
<tr>
<td>Dr Ian Smith</td>
<td>Associate Dean of the Faculties of Arts and Divinity (at time of interview was Economics DoT)</td>
</tr>
<tr>
<td>Dr Gerald Prescott</td>
<td>Biology DoT</td>
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<tr>
<td>Dr Philip Lightfoot</td>
<td>Chemistry DoT</td>
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<tr>
<td>Dr Ralph Anderson</td>
<td>Classics DoT</td>
</tr>
<tr>
<td>Dr Dawn Hollis</td>
<td>Classics, Research Fellow</td>
</tr>
<tr>
<td>Dr Dharini Balasubramaniam</td>
<td>Computer Science DoT</td>
</tr>
<tr>
<td>Prof John Burnside</td>
<td>English, Senior Lecturer and School Environment Officer</td>
</tr>
<tr>
<td>Dr Tom Rice</td>
<td>Film Studies acting DoT</td>
</tr>
<tr>
<td>Dr Matthew Sothern</td>
<td>Geography and SD DoT</td>
</tr>
<tr>
<td>Dr Katherine Ellsworth-Krebs</td>
<td>SD, Lecturer</td>
</tr>
<tr>
<td>Dr Rehema White</td>
<td>SD, Lecturer</td>
</tr>
<tr>
<td>Name</td>
<td>Position/Department</td>
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<tr>
<td>Dr John Clark</td>
<td>History, Senior Lecturer</td>
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<tr>
<td>Dr William Vlcek</td>
<td>International Relations DoT</td>
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<tr>
<td>Dr Shona Russell</td>
<td>Management, Senior Lecturer</td>
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<tr>
<td>Dr Winnie Dhalwal</td>
<td>Medicine, Associate Lecturer</td>
</tr>
<tr>
<td>Dr Antonia Wilmot-Smith</td>
<td>Mathematics and Statistics DoT</td>
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<tr>
<td>Dr Jane Pettegree</td>
<td>Music Centre DoT</td>
</tr>
<tr>
<td>Catriona Wilson</td>
<td>CAPOD, Head of Student Development</td>
</tr>
<tr>
<td>Mhairi Stewart</td>
<td>Head of Public Engagement</td>
</tr>
<tr>
<td>Alina Loth</td>
<td>Public Engagement Officer for Science</td>
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<tr>
<td>Alistair Macleod</td>
<td>Transition Project Manager</td>
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<tr>
<td>Deborah Leitch</td>
<td>Retail Café Manager</td>
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<td>Sarah Pay</td>
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<td>Steven McKay</td>
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<td>Jess Jones</td>
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<tr>
<td>Emma Gray</td>
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<tr>
<td>Harris LaTeef</td>
<td>History Student</td>
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<tr>
<td>Connie Dawson</td>
<td>SD Student</td>
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**Appendix 1:** List of Interviewees

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<tr>
<th>SDG 1</th>
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<tbody>
<tr>
<td>SDG 2</td>
<td>Zero Hunger</td>
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<tr>
<td>SDG 3</td>
<td>Good Health and Well-Being</td>
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<td>SDG 4</td>
<td>Quality Education</td>
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<td>SDG 5</td>
<td>Gender Equality</td>
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<td>SDG 6</td>
<td>Clean Water and Sanitation</td>
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<td>SDG 7</td>
<td>Affordable and Clean Energy</td>
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<td>SDG 8</td>
<td>Decent Work and Economic Growth</td>
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<td>SDG 9</td>
<td>Industry, Innovation and Infrastructure</td>
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<tr>
<th>SDG 10</th>
<th>Reduced Inequalities</th>
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<tr>
<td>SDG 11</td>
<td>Sustainable Cities and Communities</td>
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<td>SDG 12</td>
<td>Responsible Consumption and Production</td>
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<td>SDG 13</td>
<td>Climate Action</td>
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<td>SDG 14</td>
<td>Life Below Water</td>
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<td>SDG 15</td>
<td>Life on Land</td>
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<tr>
<td>SDG 16</td>
<td>Peace, Justice and Strong Institutions</td>
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<tr>
<td>SDG 17</td>
<td>Partnerships for the Goals</td>
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**Appendix 2:** The UN’s Sustainable Development Goals