



The University of Oxford & Blenheim Innovation Partnership

Innovation for Health and Wellbeing



BLENHEIM ESTATE
LAND

**BLENHEIM
INNOVATION
PROJECTS**

INTRODUCTION



Society is living longer and developing long term health conditions, which include mental health issues and loneliness. GP surgeries are struggling to cope when, as a nation, 20% of consultations are for matters of housing, employment and relationship breakdowns.

We believe that by joining the natural resources of our land with the health service, our woodlands, green spaces and fresh air can begin to be prescribed as the most natural of health solutions. This idea forms a key part of our ambitious land strategy.

The team at the University of Oxford also recognise the huge potential in using digital technology and the

Internet of Things (IoT) to increase 'social prescribing' and in turn minimise the strain on healthcare providers.

Combining the expertise of the University of Oxford and the green space available on the Blenheim Estate means we were able to pioneer a series of projects designed to explore how technology, specifically the IoT can contribute to a successful programme of 'social prescribing' by:

- **Conducting research with healthcare providers, patients and stakeholders**
- **Piloting a programme of 'social prescribing' on the Blenheim Estate**
- **Developing a new app to quantify and rate qualities of 'greenspace'**
- **Measuring how biodiverse a space is through sound**

What is social prescribing?

Described as "a way of linking patients in primary care with sources of support within the community to help improve their health and wellbeing." Social prescribing can address mental and physical health through activities like sports and leisure/arts activities. It can also address social determinants of health (the conditions in which people are born, grow, live, work and age) through activities more focused on social issues, education or skills development.

70% of health outcomes are determined by social factors, which means that a large proportion of chronic diseases that plague healthcare systems are preventable or can be brought into remission through lifestyle interventions. It has been recognised on a national level that increasing social prescribing would address this, but the scale-up of this form of healthcare has not happened yet – in 2017/18 there were fewer than 70,000 social prescription referrals across England.

What is the Internet of Things?

The Internet of Things (IoT) describes the network of physical objects – "things" – that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data over the internet.

IoT devices are now part of everyday life; examples of IoT devices include 'smart' home security, lighting or heating systems and wearable tech such as a FitBit.™

How can the IoT be used in healthcare?

Through the use of IoT devices, data can be captured remotely 24/7 - taking significantly less of a GP or carer's time. The types of data include:

- **Behavioural data** like step counts and sleep patterns
- **Personal health data** like heart rate and temperature
- **Environmental data** like air quality and temperature

There are a number of challenges which prevent the development of using IoT in healthcare, including education in the technology, connectivity between GPs and patients, and the lack of a "business case".

The University of Oxford undertook research into the role that technology could play in supporting social prescriptions. A team from the university held focus groups and workshops with GPs, link workers, patients and social prescribing providers to better understand why social prescription has not taken off how it should, and they found an overall lack of understanding of the technologies and the benefits of using the IoT.

Key to moving this forward, the team from the University of Oxford needed to put an IoT-assisted social prescribing programme into action – and that's where the Blenheim Estate comes in.

Emerging evidence suggests that green space, whether used for recreation or physical activity, can improve mental health and wellbeing"

Anant Jani, an Oxford Martin Fellow at the University of Oxford

Interested to know more?

Scan the QR code to watch a video about the project from Oxford University





We hope the results of this pilot scheme will signal the start of a new approach to address some of society's most pressing needs"

Roy Cox, Blenheim Estates Director

SOCIAL PRESCRIBING PILOT

Using greenspace to improve lives



Social prescribing is increasingly a government priority and as a landed estate, deep-rooted within the local community, we are uniquely placed to respond. At Blenheim Estate we are committed to facilitating social prescribing as part of our wider land strategy.

Our aim is to work with healthcare providers and other partners to provide time on the Estate as a legitimate treatment to improve physical and mental health. To pilot social prescribing we partnered with Aspire, an Oxfordshire-based charity supporting homeless and disadvantaged individuals, the Eden Project and the University of Oxford on the project which was funded by Research England.

Key aims of the project:

- To improve participants' mental and physical health by providing access to the Blenheim Estate
- To prove that a social prescribing programme, which utilises Internet of Things (IoT) technology is feasible





What was done:



Planning

The team held workshops to explore areas of social need within Oxfordshire, informed by Oxfordshire's Joint Strategic Needs Assessment.

With 2,000 acres of parkland for use and a huge number of possible activities, it was important to identify the most effective programme and who to partner with for the project.

The second workshop determined, using insights from the Eden Project's existing programme, that a walking-based activity within the park and gardens in partnership with Aspire would be the best possible pilot for this project.



The Pilot

Over a six week period, a two-hour 'walk and talk' was organised once per week, exploring a different area of the park and gardens including the Churchill Memorial Garden, Queen Pool lake, and the Secret Garden.

Members of the Blenheim team came along too, sharing stories from Blenheim's history to enrich the experience. In total 11 participants attended at least one session and each session had an average of seven participants.



Collecting

The team needed to measure the impact on both physical and mental health. To collect data on physical health, the participants were given a FitBit™ to wear, which measured heart rate, step count and sleep patterns and fed results back to a database remotely.

To measure mental health and wellbeing, the participants were given a survey at the beginning and end of the pilot to provide qualitative data, and were asked to provide verbal feedback on their experiences after each session. The survey, known as the ONS4 Wellbeing Measure, asked participants to rate Life Satisfaction, Worthwhile, Happiness and Anxiety.



The Results

Overall the team has deemed the social prescribing pilot a huge success. Here are some of the key findings from the pilot:



**based on an average of steps per week across three weeks from seven participants who attended three or more sessions

*based on average ONS4 scores taken from five participants before and after the pilot programme

What the participants said:

“ This has been great for my mental health, given me more confidence and I now know it is OK not to be OK. I have enjoyed meeting people who are the same as me.”

“ This has made me more active and I now want to get out into the countryside more.”

“ Aspire has given me confidence when I was feeling overwhelmed. I understand more about myself and that I love history and buildings. I have the confidence to do things on my own, and have started a college course and want to volunteer. Aspire and particularly the walks have saved my life. I have got so much out of it, have enjoyed having the FitBit™ and it motivates me to get out more. I was treated with respect and kindness and I now know that I deserve to be treated well.”



What happens next?

This project has been hugely valuable in understanding the impact of social prescribing. Blenheim Estate, Aspire and the University of Oxford have committed to continue a program of walks and experiences within the park and will continue to capture data over the next year whilst fundraising for another, more watertight study.

Demonstrating that this programme is possible with the right partners and the right technology means it can be rolled out by other organisations. Our aim is to encourage other landowners and healthcare providers to get involved in social prescribing too.

Interested to know more?

Scan this QR code to read the full report from this study:



GREENSPACE HACK

Collating data to design smarter and healthier green spaces

Why was this project done?

When planning for long-term housing needs, planners have always looked to census data to inform their decisions – but the way we can capture data is evolving.

The team that carried out this project saw a need for planners to get on board with gathering crowdsourced data, that would allow planners to make better-informed decisions.

What is crowdsourced data?

Crowdsourced data captures information through citizen engagement, to provide more localised, individual and frequent information when compared to census data, which can become outdated quickly and is only gathered once every 10 years.

Who was involved?

Key partners for this projects include the George Institute for Global Health, UK at the University of Oxford and Oxfordshire County Council.

Key aims of this project:

To capture detailed information from local people on public greenspaces using Internet of Things (IoT) devices. This concept is described as 'crowdsourced data', an innovative, community-focused method of evidence gathering.

However, the premise of using crowdsourced data is new, and knowledge and experience is lacking in combining the approach of crowdsourcing with the technology platforms to support it, including the IoT.

The purpose of this project was to overcome these barriers by designing, building and pilot-testing a prototype of a crowdsourcing smartphone app that will enable members of a community to capture information about characteristics, perception, utilisation and provision of greenspace.

Greenspace *n*

A term used to describe maintained and unmaintained environmental areas including nature reserves, wilderness and urban parks



What was done:



Planning

The team held a workshop with key stakeholders from government, nonprofits and academia to design the crowdsourcing app.



Building

Next the team built the mobile crowdsourcing app to leverage local knowledge about greenspace use and access.



Testing

A pilot was conducted by commissioning crowdsourcing groups to collect data on greenspaces near them. There were 28 volunteers collecting data in 87 different locations in Oxfordshire and seven paid auditors who covered 80 greenspace locations.



Gathering

Participants gathered data on the understanding and usability of green space via the app, giving feedback on things like Access, Amenities and Aesthetics.



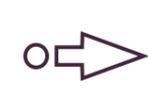
Reviewing

A post-pilot workshop was held to collect feedback on any improvements to the app as well as ideas for how the insights gathered could be used to improve the design and build of greenspaces.



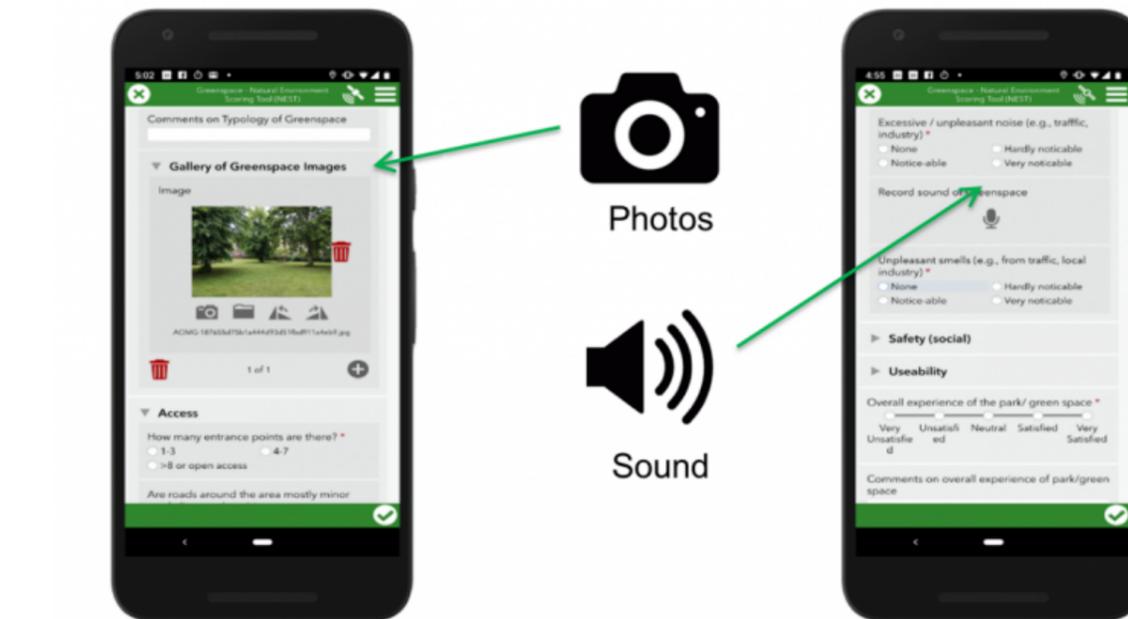
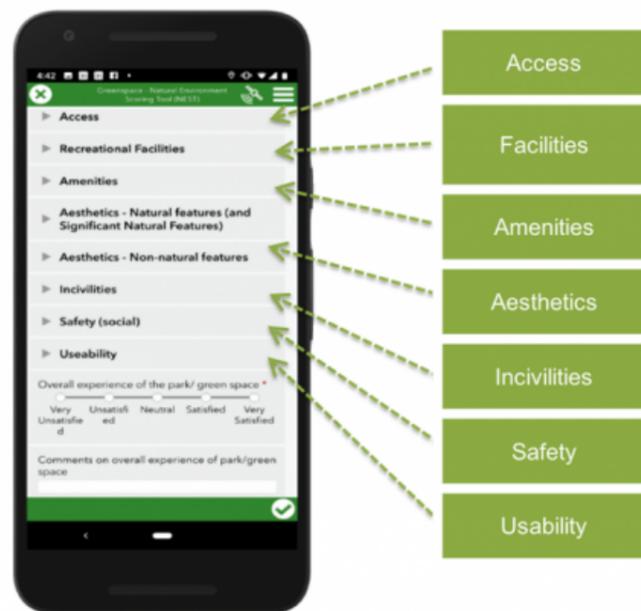
The Results

The team demonstrated the tool was capable of capturing very detailed information of various types of greenspaces and this data will help the County Council to identify local greenspaces that would need further improvement and maintenance.



The Future

The data collected from this project will be used as a basis for green infrastructure assessment and will allow future design and planning processes to meet the health and wellbeing objectives of the Healthy New Town scheme.



The smartphone app in action



The project team successfully demonstrated the feasibility of co-developing a crowdsourcing tool with local governments through their partnership with Oxfordshire County Council, who are maintaining the crowdsourcing tool now that the project has ended. Any data collected using this tool will be shared publicly.

Interested to know more?

Scan this QR code to read the full report from this study



NATURE SENSING

Measuring biodiversity of greenspaces through sound



Building on the success of the Greenspace Hack project, the University of Oxford embarked on a second project known as Nature Sensing - which Blenheim Estate were proud partners in. This project leveraged the data from the Greenspace Hack project to specifically focus on measuring biodiversity through sound, using sensors via the Internet of Things (IoT) to understand how 'green' a space is by the sound it makes, and the resulting benefits to wellbeing.

What is biodiversity?

Defined as "the variety of life in a particular habitat or ecosystem," biodiversity is commonly measured through extensive surveys, but for this project it was measured through sound.

Why is it important?

It's been proven that 'greater biodiversity in natural spaces could provide restorative health benefits' (Wood et al., 2019). By understanding how biodiverse an area

is, we can begin to measure its impact on the wellbeing of those who visit it, and draw a correlation between the two.

Who was involved?

Key partners for this project include the University of Oxford, Oxfordshire County Council, Newcastle University and Open Acoustic devices.

Key aims of the project:

- To prove that biodiversity can be measured through sound using an IoT solution
- To demonstrate this capturing this data is affordable and accurate, making it easier for local governments to incorporate biodiversity into planning and design of greenspaces



The findings from this research will further prove how important nature and access to greenspaces is for all of us"

David Green, Head of Innovation at Blenheim





How did we do it?



Research

The team started the project by extensively researching previous studies that explored the relationship between biodiversity and health, analysing the results and identifying trends.



Installation

The team installed AudioMoths created by the University of Oxford, which detect sound within greenspaces via the IoT.

The devices were placed at various locations on the Blenheim Estate to record its natural soundscape – the noises made by nearby plants and animals.



Recording

The devices recorded over a two-week period in Summer 2020 in two key areas: by the lake and in a more secluded area within High Park.

The AudioMoths measured two types of data:

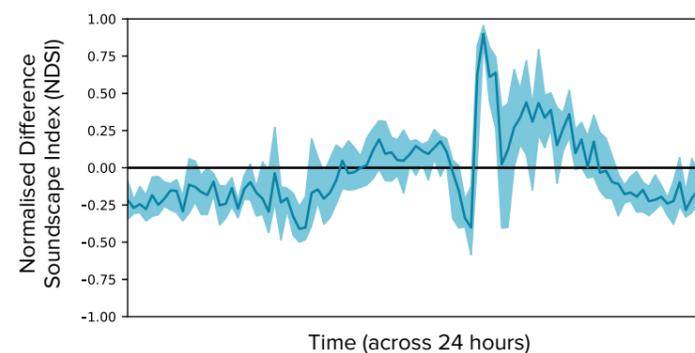
Acoustic energy: this represents the level of noise within a recording

Normalised Difference Soundscape Index (NDSI): this measures the ratio of biotic noise (sounds made by nature) to anthropogenic noise (sounds made by humans including vehicles) and uses frequency bands to define each, on a scale between -1.0 and +1.0.

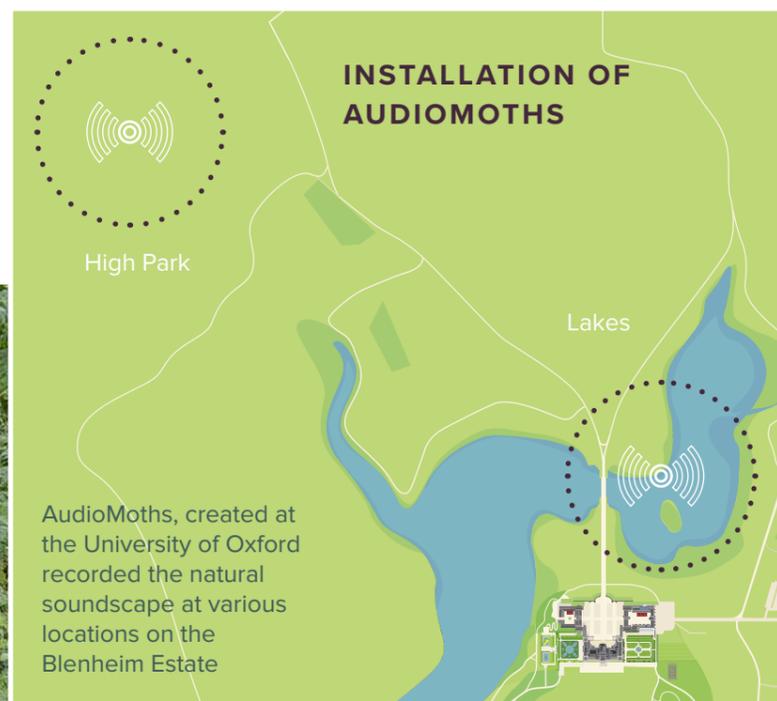
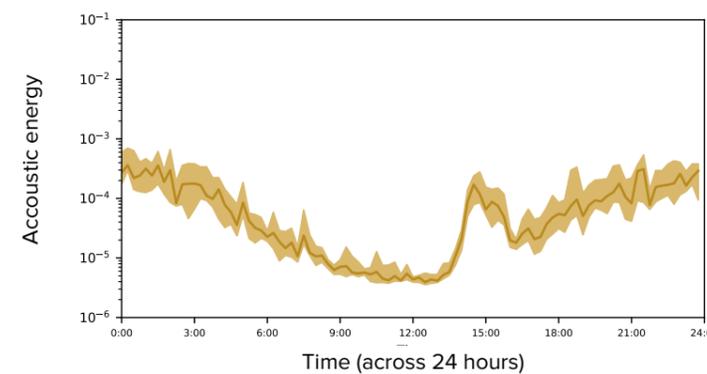


The Results

This graph tracks the acoustic energy and NDSI from an Audiomoth placed by the lakeside on an average weekday.



NDSI : a measure of 'naturalness of a space' with 1 being very natural and -1 being very unnatural



What did we find out?

From the results it was determined that NDSI is the best at measuring biodiversity, because it allows us to see what type of noise we are hearing, not just how much.

Overall this project has shown us that measuring biodiversity through sound is feasible, and while there are many other factors to truly determine an area's biodiversity, this method of data capture is certainly helpful to understand this.

The model used for this project has proven that this method can be carried out by councils, planners and healthcare providers to improve existing communities, offer better access to greenspaces, and create new communities sensitively.

Interested to know more?

Scan this QR code to read the full report of this project:





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Key partners:

University of Oxford

Aspire

Eden Project

Research England

George Institute for Global Health, UK at the University of Oxford

Oxfordshire County Council

Newcastle University

Open Acoustic devices

