Ell Goals

Edinburgh Living Lab is a city-wide collaboration whose founding partners are the City of Edinburgh Council and the University of Edinburgh.

Our goal is to bring academia, the public sector and other partners together with citizens to generate insight and innovation through collaborative, data-driven research. We aim to demonstrate the role data and technology can play in meeting the challenges of sustainable future cities, through a process of co-design with citizens, businesses and other city users.
Living Labs — What are they?

- A Research and Experimentation infrastructure
  - network of stakeholders, agreements, hardware and computational
- Co-created Learning resource
- A resource and partnerships to address challenge strategic challenges of cities, regions and industries
- Launchpad for commercialisation
Living Labs — multiple perspectives

• “a real-life test and experimentation environment where users and producers co-create innovations, often operating in a territorial context” (ENoLL)
• “should enable a ‘new way of thinking’ to understand and manage complex issues
• consciously constructed social environments in which the uncontrollable dynamics of everyday life are accepted as part of the innovation environment which enables designers and users to co-produce new products and services
• not based on single projects — it is a shared infrastructure of Common goals, People, Data and Technology embedded in real life
Data – Design - Society

Data:
Understand what is happening
Create ‘evidence’

Design:
Involve people
Prototype and test creative solutions

Society:
Understand relevance, context, implications in the bigger system
Approach

Cross-disciplinary:
• design thinking, rapid prototyping and participatory design
• sociological and ethnographic grounding for working with participants
• agile software approaches, sophisticated data analytics (not necessarily ‘big data’)
• evidence-based construal of policy issues
Approach

• **Using co-design, human-centred testing**: working ‘in the wild’ to stimulate, implement and interrogate proposals for innovation

• **Cross-sectoral**: creating dynamic partnerships of different actors for different initiatives, and encouraging a holistic approach to complex urban challenges
Stakeholder mapping

Stakeholder Map for the Traffic Citation System

Build

- Participatory design
- Community-based action
- Interventions

Learn

- Data analysis
- Policy development
- Scaling-up

Measure

- Data collection
- Testing outcomes
- Looking for value
Learning by Developing

• Promote improvements in student experience and outcomes
  • increased employability and personal development
  • deepen University links to the city
• Involve students more actively in their own learning
• Engage staff more deeply in teaching
• Link teaching and research more closely
• Support the city in addressing complex challenges (e.g. Kallioninen 2011)
Learning by Developing

**Data**: make data skills meaningful by contextualising them in a problem area

**Design**: both divergent and convergent thinking activity, embodying generative and iterative approaches

**Society**: gain practical understanding of relationship between evidence and policy, and barriers to change
Interdisciplinary, Experiential Problem-based Learning

• Setting self-directed tasks and problems – students have to define where they are going and what they work on.
• Building reflective practice
• Understand the limits of disciplinary approaches to ‘wicked’ problems
• Identifying and coping with epistemological differences, and developing trans-disciplinary perspectives.
Interdisciplinary, Experiential Problem-based Learning

• Respecting each other’s perspective, knowledge, experience and values, and learning to value their own skills
  • Bridging specialist and generalist approaches
  • ‘T-shaped’ — complement disciplinary expertise and perspective (IBM)

• Communication, team-working, negotiation

• Most of these are transferable or “meta” skills
The Messiness of Preparing Students for a Messy World

In a Living Lab
Rather than working behind the closed doors of the studio or lab, students work on messy real life challenges set by professionals in public services, for which conventional education leaves the students largely un-prepared. Students go to the streets for 2 days to gather data and generate design ideas. All ideas are expected to be iterated at least once with citizens and stakeholders.

Learning by Developing
Based on work by Raij, (2006) and Taatila and Raij (2012), our courses were designed to use an experiential and iterative learning process achieved through search and generation of solutions commonly used within Art and Design education. Students are expected to challenge existing practice.

Mixed-discipline groups: Purposeful bringing together of students with different disciplinary backgrounds
Most university education occurs within a disciplinary framework, but most work environments are multi-disciplinary, because this is what real-life problems require. We support students to work within mixed-discipline groups, where they can learn to identify and value their own contribution, and appreciate and respect the perspectives and expertise of others.

Data and Evidence
Students engage with the world through using and creating qualitative, quantitative and machine-source data and through the search for solutions. The analysis of the data is crucial to the justification and presentation of any potential solutions to the stakeholders: this can be a challenge of design students. This requires rapid training in evidence practices and ‘data science’ - supported by a set of online tools, and participative methods, a challenge for all.

Impact
Students work with citizens, and confront the local political and economic situation through meetings and in testing: this focuses students on external goals, and the multiple dimensions of action and planning needed to ensure their ideas are communicated and acted upon.

Relational and social awareness
Most university education occurs within a disciplinary framework, but most work environments are multi-disciplinary, because this is what real-life problems require. We support students to work within mixed-discipline groups, where they can learn to identify and value their own contribution, and appreciate and respect the perspectives and expertise of others.

Based on studies of Innovation: Social Learning
We drew on Activity theory (Engeström 1986), and insights into real-life innovation processes from technology studies (Williams and Edge, Stewart and Williams) that emphasize learning by failure, doing and interacting. In this approach, the meeting of a goal, and achieving closure of a solution or completing a syllabus is second to the ‘learning achieved through the process of inquiry and intervention.

How did we and the students manage?
Dealing with administrative and space constraints
How much project scaffolding is needed? A fair bit.
Cost of mentoring
Cultural Challenges: Can the Chinese students learn to question and communicate?
Too much independence: “Tell us what we are meant to do?”
Public Engagement: Self Confidence counts more than educational experience
Can the ‘Bloom’ paradigm students switch to a generative learning approach?
“We have learnt to listen to each other’s ideas and be receptive to different viewpoints”
“Personally, I feel my learning on this course had gone beyond the scope of learning than any other course I have studied so far. In addition to the academic background knowledge and theories of design, I have improved on skills and learned how to conduct and evaluate research.”

How can we generalise this learning approach?

James Stewart, Science, Technology and Innovation, Arno Verhoeven, Design, Ewan Klein, Informatics University of Edinburgh

The Edinburgh Living Lab
The teaching was developed as part of a broader programme to develop research and innovation in “Living Lab” contexts – in this case, making both the City and the University ‘Laboratories’ for co-design, investigation and experimentation using co-design, qualitative & quantitative methods, open data, sensors and citizen software.

http://edinburghlivinglab.org/
Course offerings timeline

- **Design for Informatics MA/MSc**
  - 2014/15

- **Data, Design & Society Level 8**
  - 2015/16
  - 2016/17

- **Data, Design & the City Level 8**
  - 2017/18
  - 2018/19
Living Lab Course offerings

**Design for Informatics** (20pt, MA/MSc), Edinburgh School of Art
  - Active Travel, with Inverleith Neighbourhood Partnership (2014/15)
  - Walking in the City Centre, with City Centre Neighbourhood Partnership (2015/16)
  - Waste in the City, with CEC Waste Group (2016/17)

**Data, Design and Society** (UG, 20pt level 8), School of Informatics
  - Food and sustainability on campus (2016/17)

**Data, Design and the City** (UG, 20pt level 8), School of Political & Social Sciences
  - Reuse, Upcycling and the Circular Economy (2018/19)
Living Lab Courses: more info online

Data, Design and Society (2016/17)
https://edinburghlivinglab.github.io/dds

Data, Design and the City (2018/19)
https://edinburghlivinglab.github.io/ddc
## Generic Course Structure

<table>
<thead>
<tr>
<th>Duration</th>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3 weeks</td>
<td>Preparation</td>
<td>Introduction to the problem area and methodology</td>
</tr>
<tr>
<td>1 week</td>
<td>Design Sprint</td>
<td>Rapid dive into a specific subproblem</td>
</tr>
<tr>
<td>1-2 weeks</td>
<td>Digging Deeper</td>
<td>Reflective transition</td>
</tr>
<tr>
<td>3 weeks</td>
<td>Development</td>
<td>Flesh out design idea into a prototype / proof of concept</td>
</tr>
<tr>
<td>2 weeks</td>
<td>Reporting</td>
<td>Tell a convincing story about the solution</td>
</tr>
</tbody>
</table>

Full 2019 syllabus here [https://edinburghlivinglab.github.io/ddc/syllabus/](https://edinburghlivinglab.github.io/ddc/syllabus/)
Choosing themes and engaging with outside organisations

• We try to choose topics that are
  • accessible to students
  • have some relevance to their everyday lives
  • do not raise too many issues of ethics or data protection.

• Are sponsored by existing partners involved in innovation and outreach

• Are relevant to a broader policy agenda
How to support learning

• Replacing the traditional disciplinary “scaffolding” with other types of support
  • e.g. Double Diamond driven phases and deadlines; specific activities that have to be delivered
• Reflective exercises to help student think about their own engagement, how they cope with team working etc
• Mentoring of groups
PTAS Project (2014-16)

• Audit of interdisciplinary / learning-by-developing teaching initiatives in the University of Edinburgh

• Addressing barriers to interdisciplinary teaching and learning

• Developing (mainly digital) resources and expertise to underpin wider adoption of problem-based learning

• Report here: http://www.docs.hss.ed.ac.uk/iad/Learning_teaching/Academic_teaching/PTAS/Outputs/PTAS_Report_Verhoeven.pdf
From PG to UG

• Motivated in part by experience of running 1-week hackathons within Informatics — UG1 largest group of participants

• Benefits:
  • Contact with real-world problems and datasets
  • Interacting with non-academic problem holders
  • Spurs creativity and engagement

• Challenges
  • Poor understanding of user-centred design
  • Too short to establish interdisciplinary working
  • Too short for meaningful testing
Data, Design and Society
Level 8, 20 pt

Project-based Learning
Students as researchers
Teams of 4-5 students
Challenge: Food & Sustainability on campus
DDS project example: Trayless Dining

• Proposal: removing trays from the student dining hall will reduce food waste as well as bringing other environmental benefits

• More info
  
  
  http://juljoseph33.github.io/DDS/

• Example slides from project
Food for 4,000
Is being used to feed 2000 Students

25–30 KG
Worth of food wasted, per night, in previous years

10–15 KG
Wasted, per night, in 2015
PD Images}

With Trays
Data, Design and the City (DDC): Successes

• High motivation for most of the class
  • Sense of independence
  • Chance to follow their interests
  • Learning to work in a team
  • Reflecting and acting on their learning and teamwork
  • Finding out how complex the real world is
  • A chance not to work from books

• Outside speakers keen to see students engaged in their interests
• Engaging for teachers
• Original ideas being developed
• Some data sets created
DDC: Complaints and Challenges

• Not enough time spent on discussing readings
• Outside speakers introduce new topics too late in the course
• Teams freezing their project topic too early
• Tensions within teams
• Hard for team members to meet outside class due to different timetabling constraints
• Too much material for one course
• Idealism vs. inertia. E.g. could not talk to key stakeholders; unfulfilled expectations of being able to make change.
Intrinsic delivery challenges

• How to spend class time – teaching or supporting group work?
• When to bring in outside speakers?
• What ‘background’ reading and teaching to do – e.g. critical mapping, urbanism, “data”?
• How much theory to introduce, and what?
• Teaching and developing “skills” – what is crucial (ethics etc), how much support?
• Ensuring participation
• Problem teams and individuals (e.g., not contributing fully, etc)
• Studio-based activities — hard for some students, plus lack of studio-type teaching spaces

Mitigations:
• Providing supplementary material (video, exercises)
• Customisation for each theme from a set of pre-prepared material
Institutional Issues

Supportive

• Increasing focus on employability, student satisfaction
• Growing investment in local engagement

Challenging

• Disciplines and colleges are still silos for most teaching
• Resourcing model always favours ‘retreat to the core’; resistance to teaching interdisciplinary skills
• Top-down teaching initiatives connect weakly to actual practice
• Timetabling and space (studio) allocation
• How to follow up and support students who have developed good ideas
• Scalability and cost