

# HELLO, THIS IS DIGIT



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Digit is a digital twin for transparent energy use in buildings. Digit puts the power of data in the palm of your hand, helping you address the climate crisis... one building at a time.



Journal Fear and loathing at the BBC + BBC  
 + Polly Toynbee + What is gene editing?  
 G2 #MeToo creator Tarana Burke  
 + Rishi Sunak + Scott Walker

Monday  
 11 January 2021  
 15p  
 www.theguardian.com

# The Guardian

New  
 with two  
 pull-out  
 sections



**Royal College of Art leads climate action with carbon data reporting on campus with Digit**  
 Over 1000 UK universities commit to the UN Education Race to Zero, fuelling climate investment in campus carbon reporting and building decarbonisation by 2030.

Sport



# THE TEAM



Hana Sapherson  
Royal College of Art  
Architecture



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Royal College of Art  
Innovation Design Engineering  
(ADVISOR)



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Robotics Engineering  
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Alex J. Woo  
Adobe  
UX Design  
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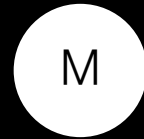


Victor van der Helm  
Security  
IT / Data / Security  
(ADVISOR)

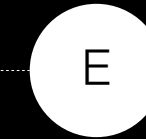
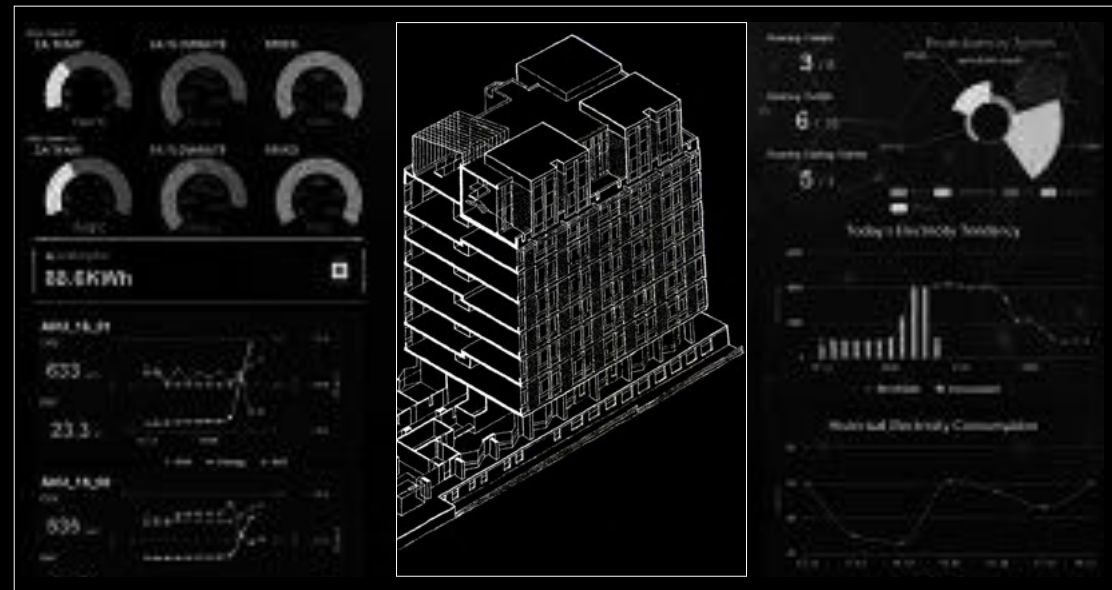
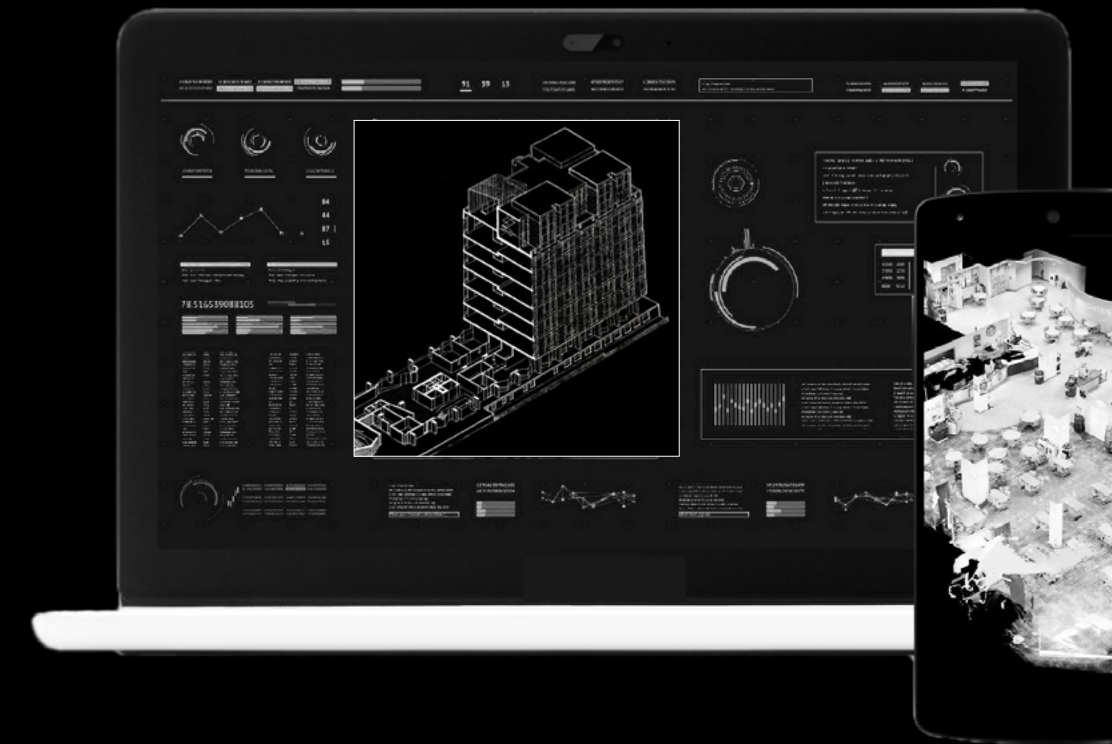


# CHALLENGE

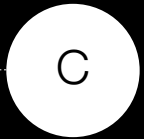
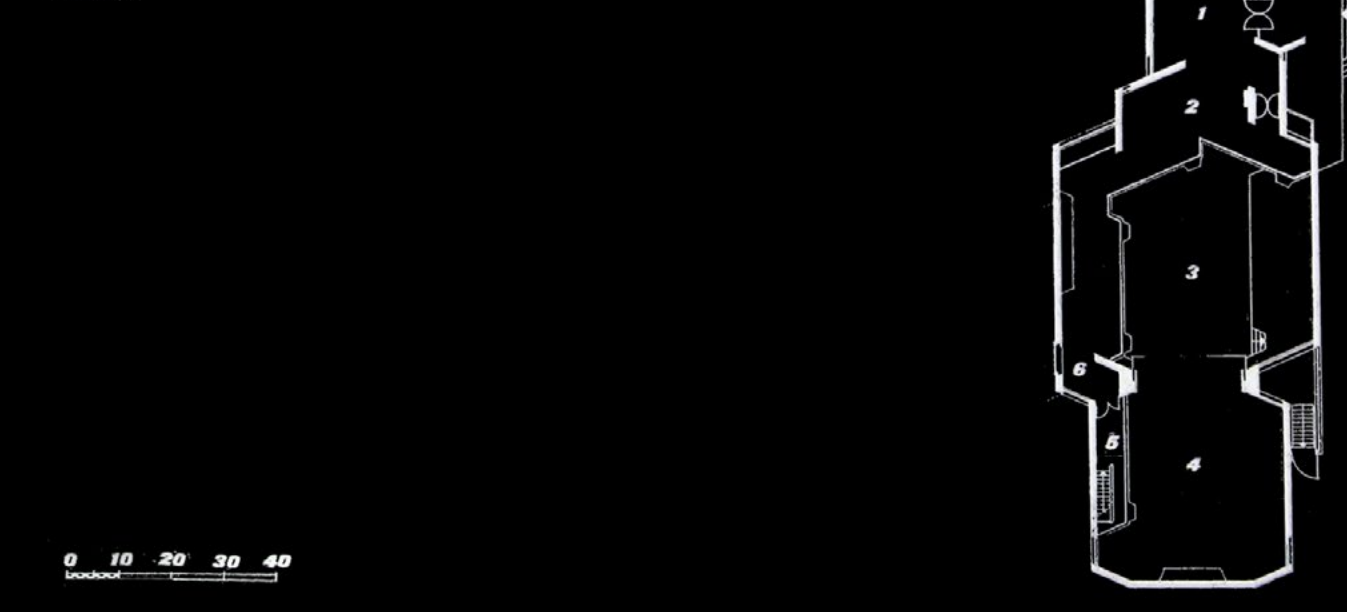
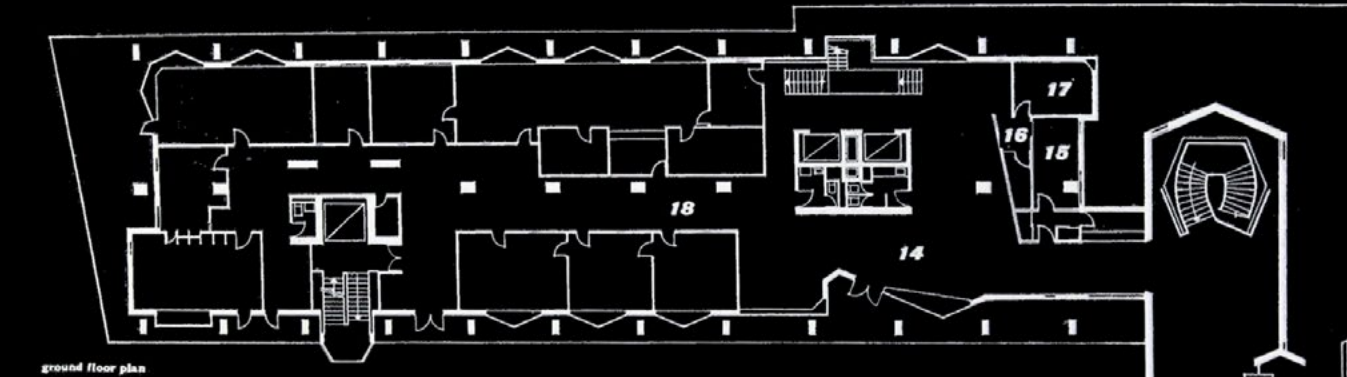
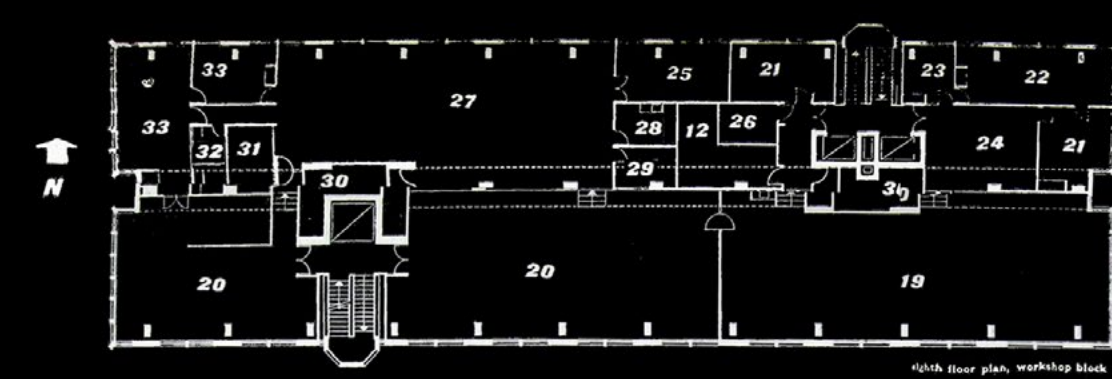
The urgency of the climate crisis and the challenge of carbon data visibility is key to accelerating behavioural change. Our built environment contributes over 40% of carbon emissions and to decarbonise our sector we must make this data visible and actionable at scale. Our USP combines existing technologies to monitor the embodied, operational and long-term predictive carbon metrics at the building scale. This is called DigitID and key metrics include MaterialID, EnergyID and CarbonID. This data will be required by law by 2025 and will provide a systematic framework for future benchmarking of whole building life cycles. Although this may seem complex, our mission is to create an intuitive interface that makes climate action in the built environment simple and transparent. The economic viability depends on the strategic use of expertise outlined in the organisational model, functioning in progressive bursts to make efficient progress.



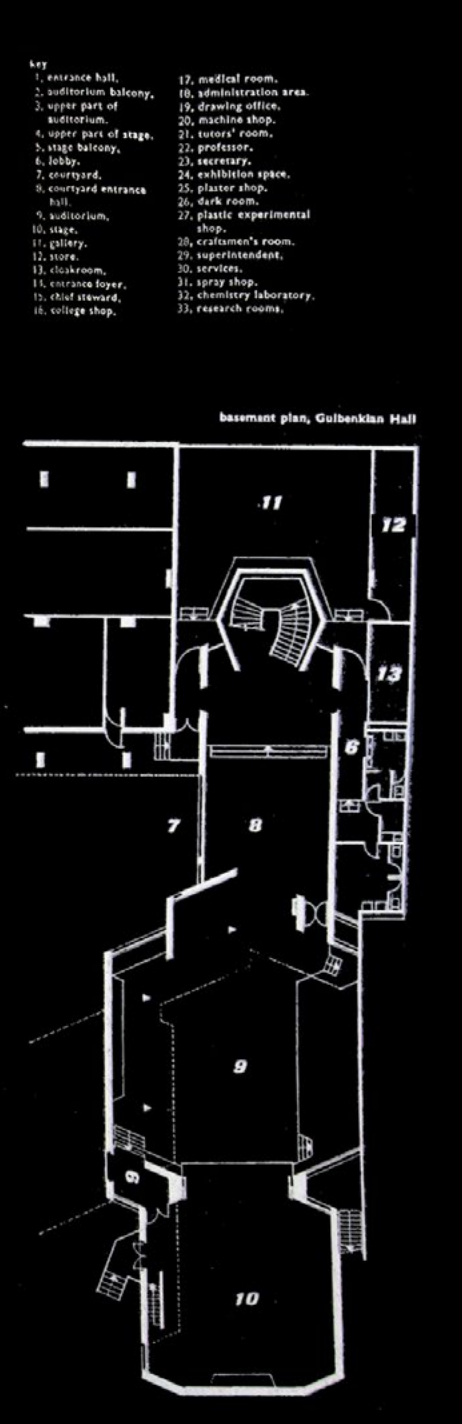
MATERIAL ID



ENERGY ID



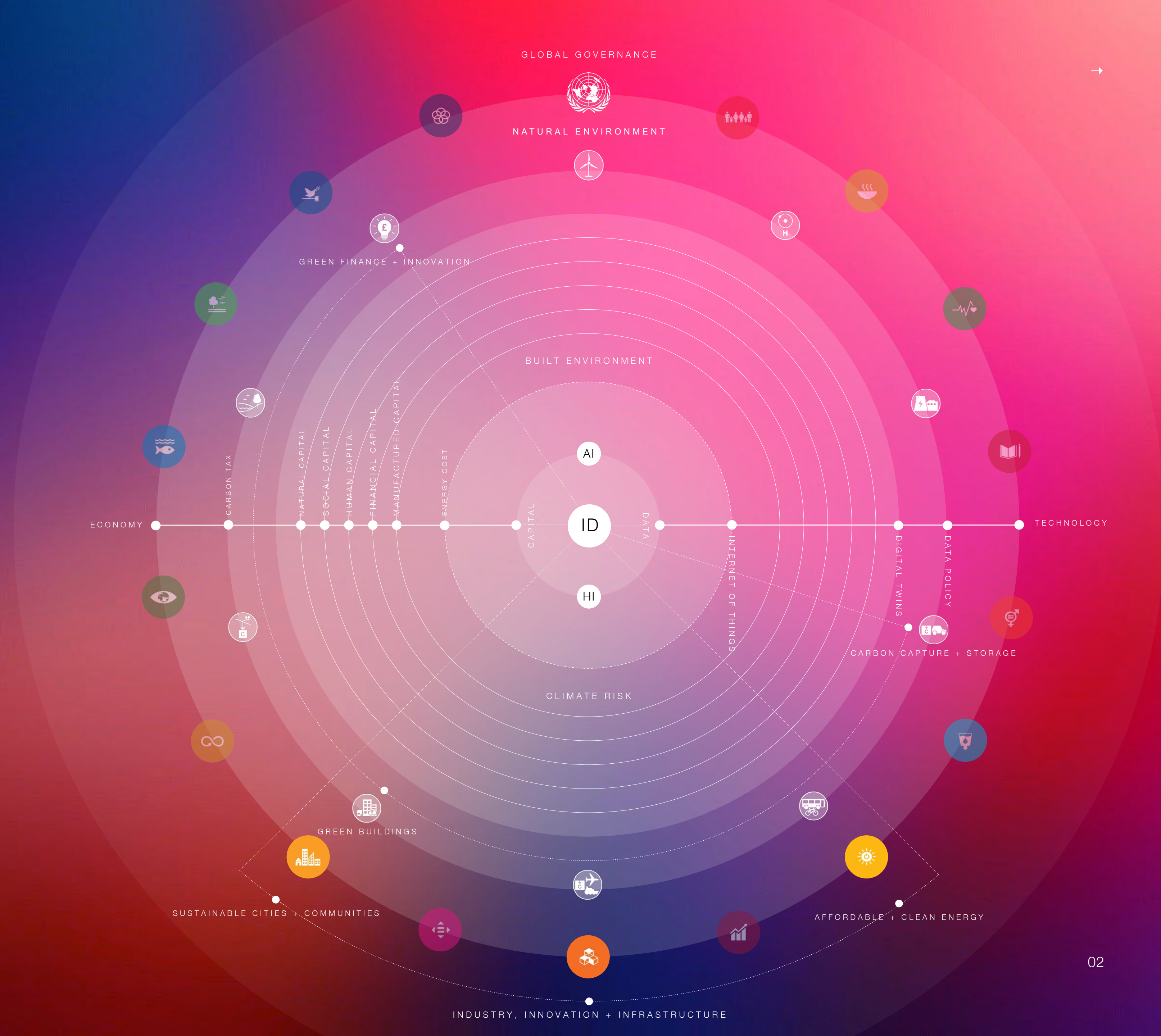
CARBON ID



- 1, entrance hall,
- 2, southern balcony,
- 3, upper part of auditorium,
- 4, upper part of stage,
- 5, stage balcony,
- 6, lobby,
- 7, courtyard,
- 8, courtyard entrance hall,
- 9, auditorium,
- 10, stage,
- 11, gallery,
- 12, store,
- 13, classroom,
- 14, cinema foyer,
- 15, chief steward,
- 16, college shop,
- 17, medical room,
- 18, administrative area,
- 19, drawing office,
- 20, machine shop,
- 21, professor's room,
- 22, secretary,
- 23, exhibition space,
- 24, exhibition space,
- 25, plaster shop,
- 26, dark room,
- 27, plastic experimental shop,
- 28, craftsman's room,
- 29, superintendant,
- 30, service,
- 31, spray shop,
- 32, chemistry laboratory,
- 33, research room.

# OUR MISSION

Energy in buildings and cities is one of the largest polluting industries globally, contributing to around 40% of global emissions. Our mission is to address the urgency of the climate crises by creating a hybrid device and platform that integrates a series of existing technologies such as digital twins in a unique way to make carbon and energy data in buildings more visible and actionable at scale. We are focused on key UN Sustainable Development Goals and the UK's Ten Point Plan for a green industrial revolution. The design strategy is situated within the Five Capitals Model and frames the project within the wider realms of economy, ethics, carbon, governance and technology.





# WHY DIGIT?

Royal College of Art

37,500 SQM

£68M



The Darwin Building

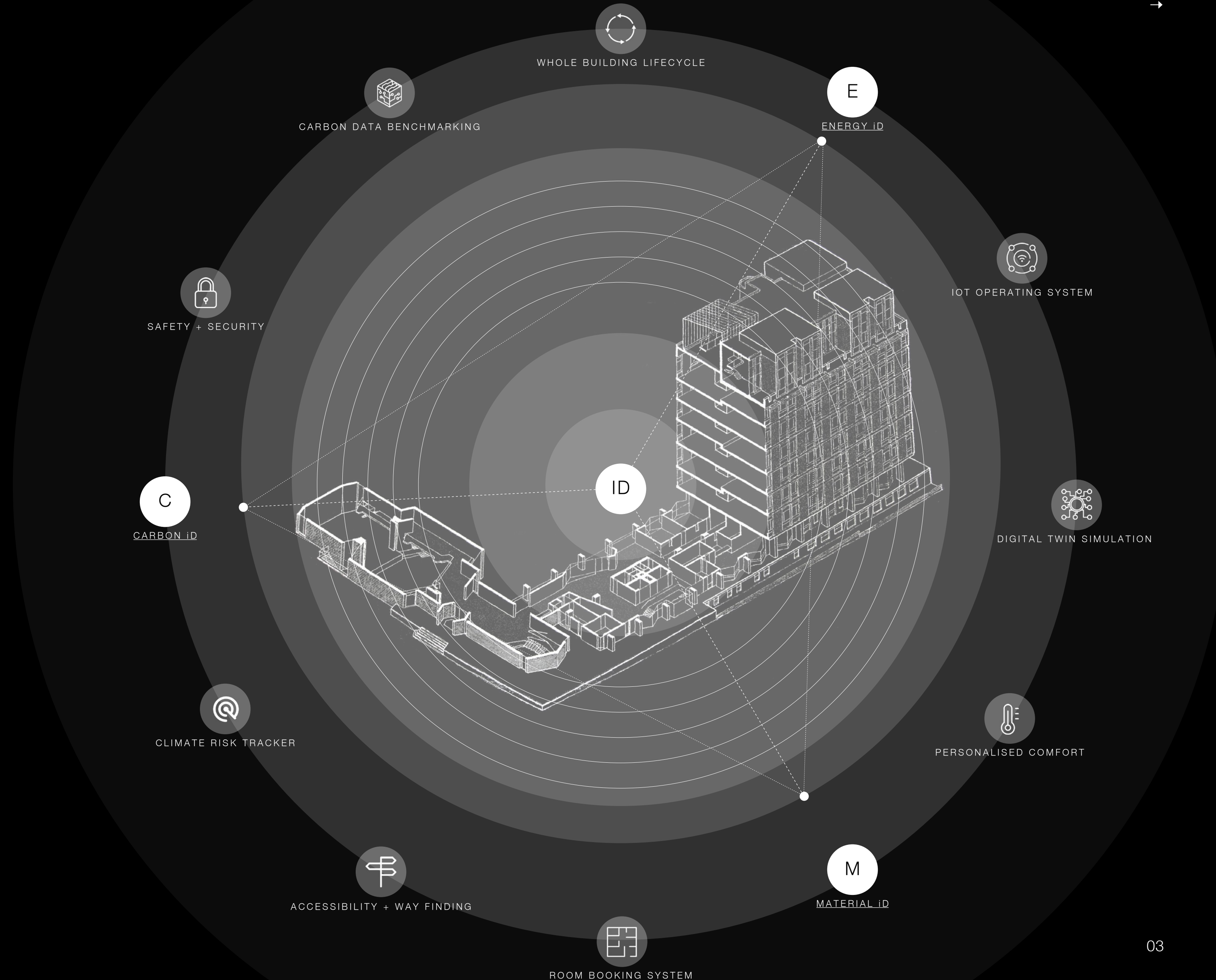
Digit is an innovative digital twin device for building and living smarter. The largest environmental impact we each have is from our everyday energy use in our buildings. Digit empowers each of us to take control of our building's carbon footprint, to reduce energy cost, energy use and transition to an ethical and more sustainable future.

USP = Embodied + Operational Carbon Data  
(CarbonID / EnergyID / MaterialID)



A project by  
Hana Sapherson

Supported by  
Raphael Channer, Peter Town & Beth Hughes



# OUR MARKET

+1086\* UNIVERSITIES SIGNED UP

Royal College of Art

37,500 SQM

£68M

University of the Arts London

70,800 SQM

£335M

Imperial College London

124,900 SQM

£120M



The Darwin Building



Battersea Campus



New Battersea Campus



Camberwell College of Arts



Central Saint Martins



Chelsea College of Arts



Charing Cross Hospital



Chelsea + Westminster Campus



The Hammersmith Campus



White City Campus



The Stevens Building



Jaw Mews



London College of Communication



London College of Fashion



Wimbledon College of Arts



North West London Hospital



Royal Brompton Campus



Silwood Park Campus



Centre for Creative Computing



Exhibition Road Campus



St. Mary's Campus



White City Campus



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\*Signatures for the UN Education Race to Zero 2021



# OUR USERS

Educational institutions in the UK and globally have a key responsibility to set precedents for campus decarbonisation by 2030. Our market research exposed the reality that there is currently no integrated system that building owners can use to monitor all of the metrics needed to meet their climate commitments. Digit will launch into the university building sector and work alongside the UN Education Race to Zero, with over 1000 campuses already signed up. There is a clear demand and market viability which links existing siloed data streams, funding streams and social networks that are already in place and can expand into larger identified sectors at the five year milestone.

ACL Essex (Adult Community Learning Essex)	United Kingdom	2050	Plan										
Aberystwyth University	United Kingdom	2030	Coming Soon										Publish
Ada, National College for Digital Skills	United Kingdom	2030	Coming Soon										Publish
Anglia Ruskin University	United Kingdom	2045	Coming Soon			Plan							Publish
Arts University Bournemouth	United Kingdom	2030	Coming Soon			Plan							Publish
Ayrshire College	United Kingdom	2045	Coming Soon			Plan							Publish
BCA (Berkshire College of Agriculture)	United Kingdom	2030	2025			Plan							Publish
Barnsley College	United Kingdom	2045	2030			Plan							Publish
Bath College	United Kingdom	2030	2030										Publish
Bath Spa University	United Kingdom	2030	Our interim target was 50% against 2008 by 2020.			Plan							Publish
Blackburn College	United Kingdom	2050	Plan			Plan							Publish
Bordars College	United Kingdom	2045	Coming Soon			Plan							Publish
Bournemouth University	United Kingdom	2030	Coming Soon			Plan							Publish
Bridgend College	United Kingdom	2040	Coming Soon			Plan							Publish
Brighton Hove and Sussex Sixth Form College (BHASVIC)	United Kingdom	2030	Coming Soon			Plan							Publish
Brunel University London	United Kingdom	2040	Coming Soon										Publish
Buckinghamshire New University	United Kingdom	2030	Coming Soon										Publish
Cambridge Regional College	United Kingdom	2050	Coming Soon			Plan							Publish
Canterbury Christ Church University	United Kingdom	2030	Coming Soon			Plan							Publish
Cardiff University	United Kingdom	2030	Coming Soon										Publish
Central Bedfordshire College	United Kingdom	2050	Coming Soon										Publish
Central Students' Union	United Kingdom	2030	Coming Soon										Publish
Chelmsford College	United Kingdom	2040	2030			Plan							Publish
Cheshire College - South & West	United Kingdom	2035	Coming Soon			Plan							Publish
Christ Church Students' Union - Canterbury	United Kingdom	2030	Coming Soon			Plan							Publish
City of Bristol College	United Kingdom	2030	Coming Soon			Plan							Publish
City of Glasgow College	United Kingdom	2040	Coming Soon			Plan							Publish
Cranfield University	United Kingdom	2030	Coming Soon										Publish
Craven College	United Kingdom	2030	Coming Soon			Plan							Publish
DN Colleges Group	United Kingdom	2030	Coming Soon										Publish
De Montfort University	United Kingdom	2025	Coming Soon			Plan							Publish
Dumfries and Galloway College	United Kingdom	2030	Coming Soon										Publish
Dundee and Angus College	United Kingdom	2030	Coming Soon										Publish
EKO Group	United Kingdom	2030	Coming Soon										Publish
EUROPEAN INTERNATIONAL SCHOOL OF BUSINESS AND MANAGEMENT	United Kingdom	2025	2025			Plan							Publish
East Coast College	United Kingdom	2030	Coming Soon										Publish
Edinburgh College	United Kingdom	2030	Coming Soon			Plan							Publish
Edinburgh Napier Student Association	United Kingdom	2030	Coming Soon			Plan							Publish
Edinburgh Napier University	United Kingdom	2030	Coming Soon			Plan							Publish
Energy Safety Research Institute	United Kingdom	2040	Coming Soon										Publish
Fareham College	United Kingdom	2030	Coming Soon			Plan							Publish
Fife College	United Kingdom	2045	Coming Soon										Publish
Forth Valley College	United Kingdom	2040	Coming Soon										Publish
Glasgow Caledonian University	United Kingdom	2050	Coming Soon										Publish
Glasgow Clyde College	United Kingdom	2040	2030			Plan							Publish
Gloucestershire College	United Kingdom	2040	Coming Soon										Publish
Goldsmiths, University of London	United Kingdom	2025	Coming Soon										Publish
Greater Brighton Metropolitan College	United Kingdom	2050	Coming Soon										Publish
Hadlow College	United Kingdom	2050	Coming Soon										Publish
Harper Adams University	United Kingdom	2030	Coming Soon										Publish
Harrowgate College	United Kingdom	2030	Coming Soon										Publish
Heart of Worcestershire College	United Kingdom	2030	Coming Soon										Publish
Hereford College of Arts	United Kingdom	2030	Coming Soon										Publish
Heriot-Watt University	United Kingdom	2030	2030			Plan							Publish
Inverness College UHI	United Kingdom	2040	Coming Soon			Plan							Publish
Keele University	United Kingdom	2030	Coming Soon										Publish
King's College London	United Kingdom	2025	Coming Soon										Publish
Lancaster University	United Kingdom	2035	Coming Soon			Plan							Publish
Leicester College	United Kingdom	2030	2025			Plan							Publish
Liverpool John Moores University	United Kingdom	2030	Coming Soon										Publish
London School of Economics and Political Science	United Kingdom	2030	2030 for our scope 1 & 2 emissions - 2050 for scope 3			Coming Soon							Publish
Manchester Metropolitan University	United Kingdom	2038	Coming Soon			Plan							Publish
Middlesex University	United Kingdom	2040	Coming Soon										Publish
Moulton College	United Kingdom	2030	Coming Soon										Publish
Nelson & Colne College	United Kingdom	2050	Coming out soon			Plan							Publish
New City College	United Kingdom	2030	Coming Soon										Publish
New College Lanarkshire	United Kingdom	2042	Coming Soon										Publish
Newcastle University	United Kingdom	2040	Coming Soon										Publish
North East Scotland College	United Kingdom	2045	Coming Soon										Publish
North Highland College	United Kingdom	2050	Coming Soon										Publish
Nottingham Trent University	United Kingdom	2040	Coming Soon			Plan							Publish
Oxford Brookes University	United Kingdom	2040	2030			Plan							Publish
Plymouth Marjon University	United Kingdom	2030	Coming Soon										Publish
Queen Margaret University, Edinburgh	United Kingdom	2045	Coming Soon			Plan							Publish
Queen Mary, University of London	United Kingdom	2050	Coming Soon			Plan							Publish
Robert Gordon University	United Kingdom	2045	Coming Soon			Plan							Publish
Royal Agricultural University	United Kingdom	2050	Coming Soon										Publish
Royal Veterinary College	United Kingdom	2050	Coming Soon										Publish
Royal Veterinary College Student's Union	United Kingdom	2030	2030			Coming Soon							Publish
Royal Welsh College of Music and Drama	United Kingdom	2040	2030										Publish
SFUO	United Kingdom	2040	Coming Soon										Publish
Sahlgrenska University	United Kingdom	2040	Coming Soon										Publish
Sheffield Hallam University	United Kingdom	2030	2030			Plan							Publish
Shetland UHI	United Kingdom	2045	Coming Soon										Publish
Solent University, Southampton	United Kingdom	2030	Coming Soon										Publish
South Essex College of Further and Higher Education	United Kingdom	2050	Coming Soon			Coming Soon							Publish
South Lanarkshire College	United Kingdom	2030	Coming Soon			Plan							Publish
Sparsholt College Group	United Kingdom	2040	Coming Soon										Publish
Staffordshire University	United Kingdom	2050	Coming Soon			Plan							Publish
Swansea University	United Kingdom	2040	Coming Soon										Publish
The Education Training Collective	United Kingdom	2050	Coming Soon										Publish
The Glasgow School of Art	United Kingdom	Coming Soon	Coming Soon										Publish
The Isle of Wight College	United Kingdom	2050	Coming Soon			Plan							Publish
The London Institute of Banking & Finance	United Kingdom	2030	Coming Soon										Publish
The Royal Central School of Speech and Drama	United Kingdom	2030	Coming Soon										Publish
The Students' Union at UWE	United Kingdom	2030	Coming Soon										Publish
The University of Edinburgh	United Kingdom	2040	Coming Soon										Publish
The University of Manchester	United Kingdom	2038	2038 for scopes 1&2, scope 3 goals to be set			Coming Soon							Publish
The University of Nottingham	United Kingdom	2040	2030			Plan							Publish
The University of Sheffield	United Kingdom	Net-zero in scope 1 and 2 emissions by 2030 and net-zero in scope 3 emissions by 2038.											Publish
Coming Soon	Plan												Publish
The University of Surrey	United Kingdom	2030	2025			Plan							Publish
University College London	United Kingdom	2030	Coming Soon										Publish
University of Aberdeen	United Kingdom	2040	Coming Soon										Publish
University of Bath	United Kingdom	2040	Coming Soon										Publish
University of Birmingham	United Kingdom	2045	Coming Soon										Publish
University of Bristol	United Kingdom	2030	Coming Soon			Plan							Publish
University of Cambridge	United Kingdom	2038	Coming Soon										Publish
University of Dundee	United Kingdom	2030	Coming Soon										Publish
University of East Anglia	United Kingdom	2050	Coming Soon										Publish
University of East London	United Kingdom	2030	Coming Soon										Publish
University of Exeter	United Kingdom	2050	Coming Soon			Plan							Publish
University of Glasgow	United Kingdom	2030	Coming Soon										Publish
University of Gloucestershire	United Kingdom	2030	2030			Plan							Publish
University of Greenwich	United Kingdom	2030	Coming Soon										Publish
University of Hertfordshire	United Kingdom	2050	2030										Publish
University of Hull	United Kingdom	2027	Coming Soon			Plan							Publish
University of Kent	United Kingdom	2040	Coming Soon										Publish
University of Leeds	United Kingdom	2030	Coming Soon										Publish
University of Lincoln	United Kingdom	2040	Coming Soon										Publish
University of Liverpool	United Kingdom	2035	Coming Soon			Plan							Publish
University of Northampton	United Kingdom	2050	2030										Publish
University of Oxford	United Kingdom	2035	Coming Soon			Plan							Publish
University of Plymouth	United Kingdom	Net zero by 2025 (for scope 1 & 2 emissions)	Coming Soon										Publish
University of Portsmouth	United Kingdom	2030	Coming Soon										Publish
University of Reading	United Kingdom	2030	Coming Soon			Plan							Publish
University of Salford	United Kingdom	2038	Coming Soon			Plan							Publish
University of Southampton	United Kingdom	2030	Coming Soon			Plan							Publish
University of St Andrews	United Kingdom	2035	Coming Soon										Publish
University of Stirling	United Kingdom	2050	Coming Soon										Publish
University of Strathclyde	United Kingdom	2040	Coming Soon										Publish
University of Warwick	United Kingdom	2050	Coming Soon			Plan							Publish
University of West London	United Kingdom	2030	Coming Soon										Publish
University of Winchester	United Kingdom	Coming Soon	Coming Soon										Publish



# UNIVERSITY OF OXFORD



Oxford University's Environmental Sustainability Strategy was approved by Council on 15 March 2021. The strategy sets two ambitious targets: to achieve net zero carbon and to achieve biodiversity net gain, both by 2035

The strategy focuses on these ten priority areas:

- Research** - Increase research and engagement in environmental sustainability.
- Curriculum** - Offer all students the opportunity to study environmental sustainability, either within or outside the examined curriculum.
- Carbon emissions from University buildings** - Reduce carbon emissions related to our energy consumption to a minimal level.
- Biodiversity** - Identify and address the University's principal biodiversity impacts through its operations and supply chain, and enhance biodiversity on the University's estate.
- Sustainable food** - Reduce the carbon emissions and biodiversity impact of our food.
- Sustainable resource use** - Reduce the environmental impacts of our consumption and supply chain.
- International travel** - Reduce aviation emissions from University staff and student travel and offset the balance of emissions.
- Local travel** - Limit transport emissions by reducing the need to travel, encouraging walking, cycling and the use of public transport and managing the demand to travel by car.
- Investments** - Ensure that the University, as an investor, is part of the solution to climate change and biodiversity loss.
- Learning from the pandemic** - Build on the experience of the pandemic and the potential shift to more environmentally sustainable working practices.

The strategy is underpinned by the following four 'enablers':

- Governance** - Embedding environmental sustainability in the University's governance and decision making;
  - The Environmental Sustainability Subcommittee, established in 2021 as a subcommittee of the Planning and Resource Allocation Committee (PRAC), is chaired by Dr David Prout, Pro-Vice-Chancellor (Planning and Resources) and has representatives from across the University and student body. The Subcommittee holds overall responsibility for environmental sustainability at the University.
- Reporting** - Developing a system of annual reporting of carbon emissions and biodiversity impact within the first twelve months, which will be published in the University of Oxford's Annual Review and financial accounts;
- Funding** - Establishing the Oxford Sustainability Fund, making £200 million available for sustainability initiatives over the next 15 years, to finance the programme of action required to reach net zero carbon and biodiversity net gain by 2035;
- Offsetting** - Establishing a policy to guide our use of carbon offsetting and biodiversity offsetting.

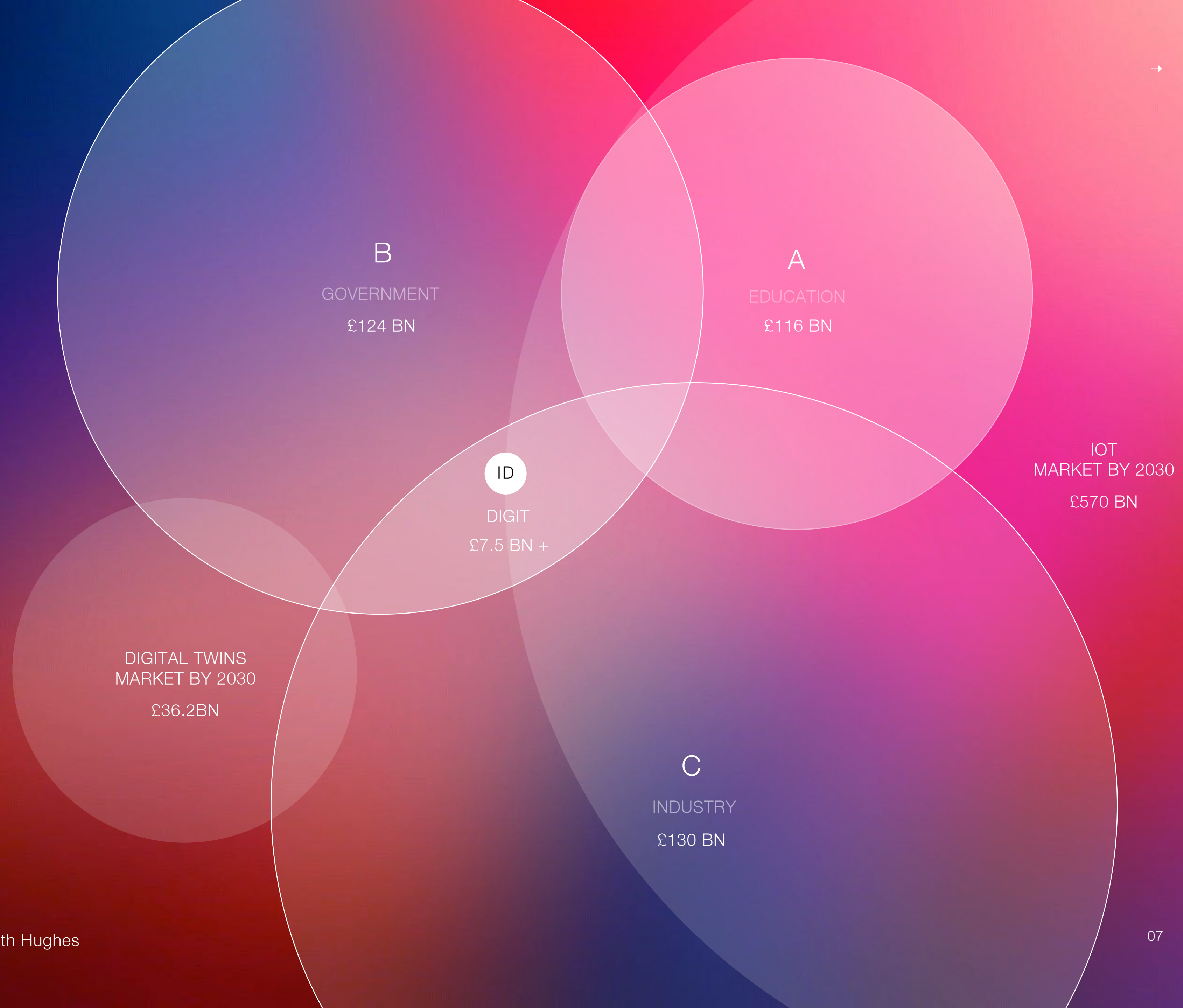


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# SCALABILITY

For the sake of lean and sustainable growth, we are aiming to develop the product in the education space in the short-term with the scalability strategy aiming to grow into other sectors such as government and industry after research and development has progressed to a healthy stage. 1086 universities and schools have already signed up to the UN Education Race to Zero agenda. This strategy also means that the product development can begin immediately with partners at both the Royal College of Art and Imperial College London. This would be a great opportunity for the estates of the Royal College of Art, the worlds leading design university, to set by example in decarbonising their built assets.



# LEAN MODEL

## 1. Customer Segments + Early Adopters

Target customers and users will begin with early adopters in the university, colleges and schools segment. With over 1050 educational institutions signed up for the UN Education Race to Zero initiative, there is a huge market potential for de-carbonising educational buildings and providing ongoing carbon data monitoring and sharing so that universities can share strategies and learn in this process together. Educational institutions are therefore a smart first sector choice as they are leading by example with sustainability strategies and pledges and have networks already set-up to support this business model and allow it to grow and expand onto a digital twin platform. The early adopters will set a benchmark precedent on decarbonisation building strategies and monitoring techniques that other institutions can follow and sign-up for both the physical monitoring system on-site as well as remote carbon data tracking on the digital platform remotely, becoming a tool for education by design.

## 2. The Problem

- A. Carbon Data, Metrics & Transparency
- B. Decarbonisation of the Built Environment
- C. Decarbonisation Behavioural Shifts in Education

## 3. Unique Value Proposition

Carbon data modelling and digital twins are becoming the top of the agenda for many companies with a large portfolio of buildings. This information is vital for companies to report their environmental impacts and carbon emissions which is now law in many companies and countries. By progressing R+D in a lean and specific market sector, education, the business model offers unique value in that it provides for over 1050 institutions already signed up to the Education Race to Zero and provides a learning platform to de-carbonise universities quickly and efficiently. Most other carbon monitoring devices exist at the very large scale company level or the very small domestic client, which is why this business model is unique and is a huge opportunity to put the tools and skill sets in the hands of the institutions leading discussion and passing down knowledge on decarbonisation, becoming an educational tool in itself.



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## 4. The Solution

As climate change and carbon emissions continue to dominate global headlines, it has never been more important to accurately report embodied carbon and operational energy-use in buildings. As a sector contributing to over 40% of global emissions, the opportunity exists to enable clients to gain more clarity and responsibility in managing their decarbonisation transition.

## 5. Channels

Internal academic channels will be utilised within our existing institutional environment, beginning with very specific channels that allow for R+D before expanding to larger commercial applications. Customer marketing and sales will therefore not be a top priority as this system will be a very bespoke and hi-tech integration starting with very few particular channels and avoiding mass market channels for the first two years.

## 6. Revenue Streams

- A. One time start-up cost for selected clients including physical set-up, laser scanning, sensor installation.
- B. Ongoing subscription model for data/knowledge sharing and learning between institutions
- C. Ongoing subscription model for digital platform access

## 7. Cost Structure

- A. Fixed costs include branding, salary, hiring of laser camera equipment and sensors.
- B. Variable costs include extent of digital interface code and development for hosting, running training workshops and data storage

## 8. Key Metrics

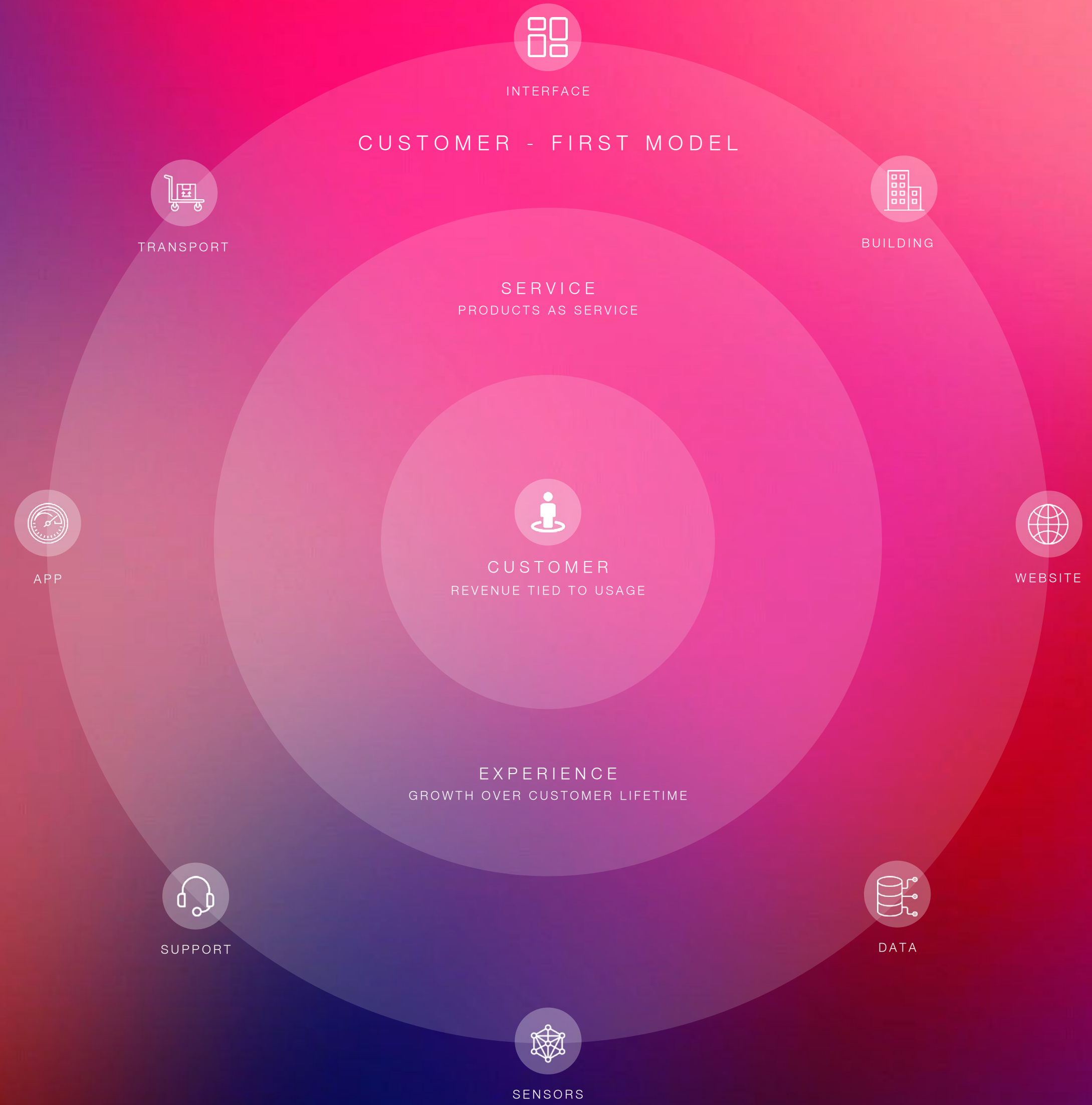
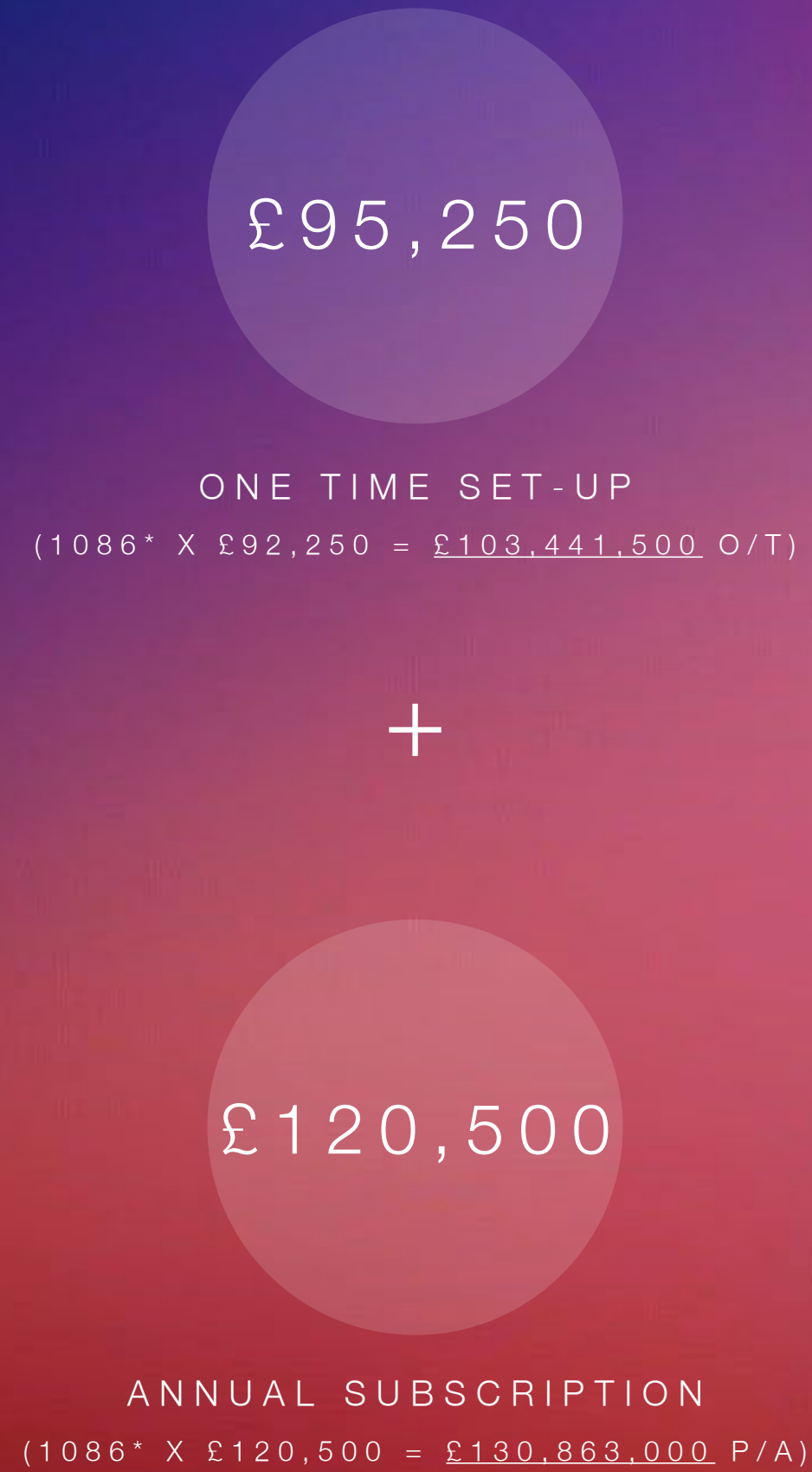
- A. Built environment accounts for over 40% of global carbon emissions
- B. 1050 educational institutions already signed up for the UN education race to zero initiative (RCA and Imperial not on this list should lead the way)
- C. Digital Twins and Decarbonisation are both sectors which are expected to more than treble within the next ten years
- D. Accurate data monitoring and transparency are key to benchmark accurate carbon targets

## 9. Unfair Advantage

The business model is unique in that it relies on building close client relationships and provides an urgent service within the institution it was created. As the company proposes working alongside educational institutions to begin, this provides an unfair advantage as there will be a close knit relationship and a beneficial model for both parties from the beginning of the process. This also means that through academic links and institutional requirements to monitor building's carbon footprints, the business can evolve naturally across multiple campuses and universities. Existing alternatives include Virtual Management Systems (VMS), Early Stage Building Management Digital Twins and the UN Education Race to Zero Toolkits.

# FINANCES

Digit's financial model is a hybrid of two systems. The first is the one time set-up of building surveying, sensor and monitoring installation to track building performance long-term. The second is the customer-first model with ongoing platform access and annual subscription fee with access to accurate data, knowledge sharing and forecasting performance benchmarking of other buildings. The financial model will be able to grow healthily, with the revenue tied to customer usage and growth over the customer lifetime. For the first 18 months, £150,000 investment is required for the product development. In the first 3 years, the business model will focus on developing the digital platform and physical sensors. This will run parallel to our customer centric user testing and R&D. Digit will gain a healthy long term revenue stream from the subscription model, as well as income from the installation. Our financial strategy references university budgets to make accurate annual projections according to the building age, typology and area of each campus.



# ALLIANCES

We have outlined our alliances and market competitors in the IOT and digital twin space. Digit's USP addresses the audience's pain not addressed by competitors with no current system monitors all three elements; carbonID, energyID and materialID long-term. Digit's alliances include Royal College of Art, Imperial College London and Central Saint Martins. Royal College of Art currently occupies is 22,724sqm of net usable square metres of estate, and this will increase to 37,500 through an estates strategy working to a 10 year time frame. At the 5 year milestone, expansion can begin into larger identified sectors such as the domestic space and industrial buildings. Digit can take advantage of partnerships with mature technology platforms to accelerate development, exchanging licensing privileges for mitigation of liability and risk. Digit IP is pending potential copyright, trademark and patent development and our milestone timeline indicates our key stages in the Terra Carta competition leading up to 2030.



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NETATMO



SMART HOME



SMART INDUSTRY



SMART BUILDINGS



# MILESTONES



# THANK YOU

In response to the Terra Carta competition, we believe Digit promotes a precedental business model for green finance and innovation within our largest collective polluting sector, energy use in buildings.

With people and planet central to our core values, Digit puts the power of data in the palm of your hands, helping us all address the climate crisis one building at a time.

With special thanks to Raphael Channer, Peter Town, Beth Hughes, Johnny Golding, Nick de Leon and everyone else involved with Terra Carta who supported our work and inspired us with their knowledge and wisdom.



# REFERENCES





Journal Fear and loathing at the BBC + Ben  
+ Polly Toynbee + What is gene editing?  
G2 #MeToo creator Tarana Burke  
+ Rishi Sunak + Scott Walker

Monday  
11 January 2021  
10p (UK)  
www.theguardian.com

# The Guardian

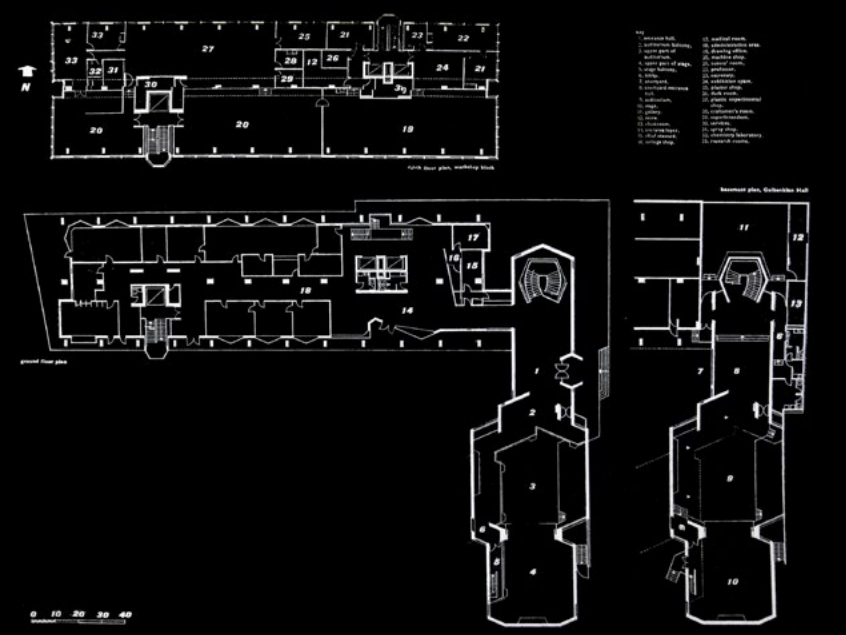
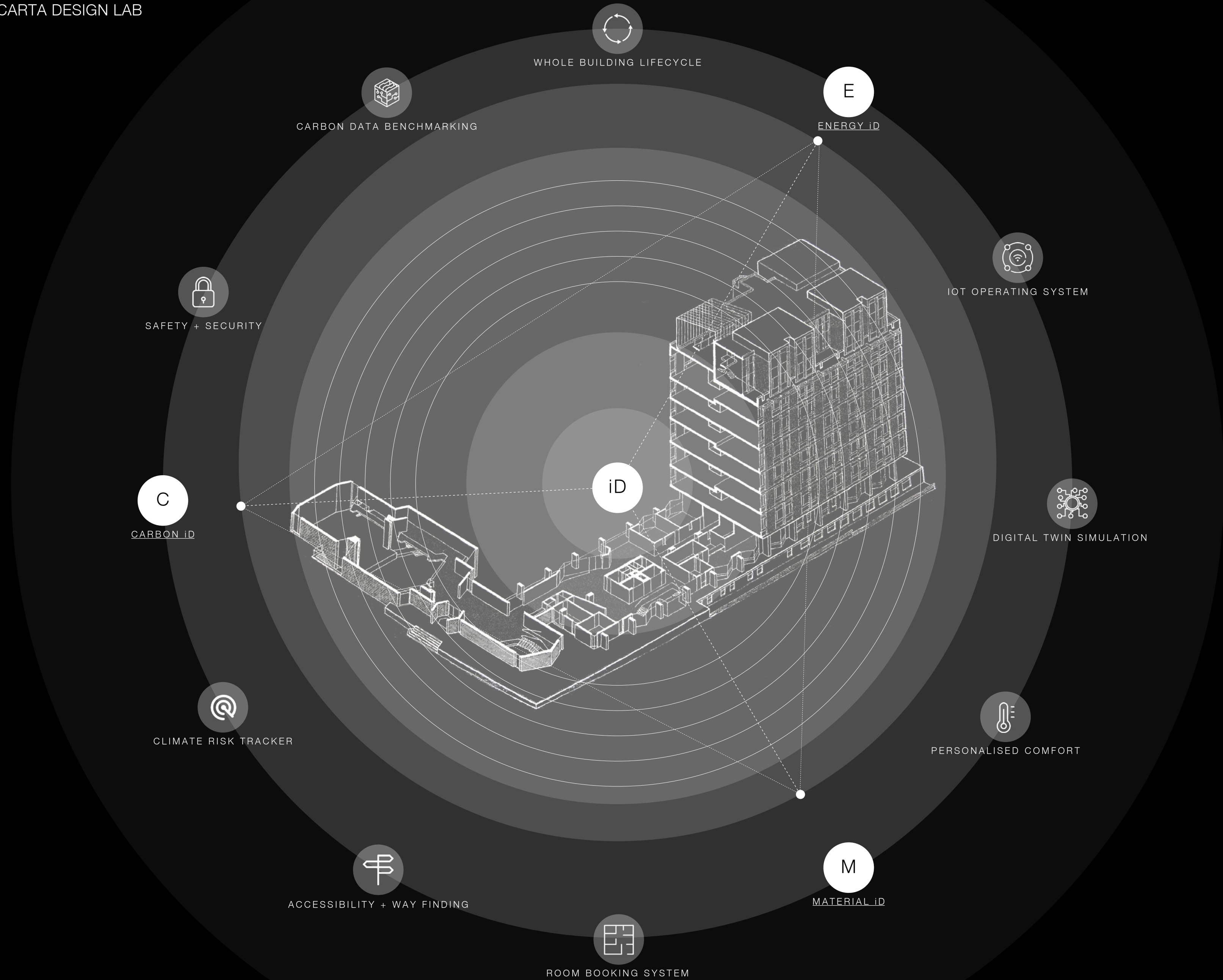
New  
with two  
pull-out  
pages

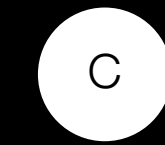


## Royal College of Art leads climate action with carbon data reporting on campus with Digit

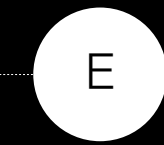
Over 1000 UK universities commit to the UN Education Race to Zero, fuelling climate investment in campus carbon reporting and building decarbonisation by 2030.

## Sport

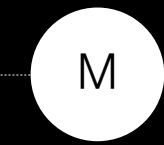




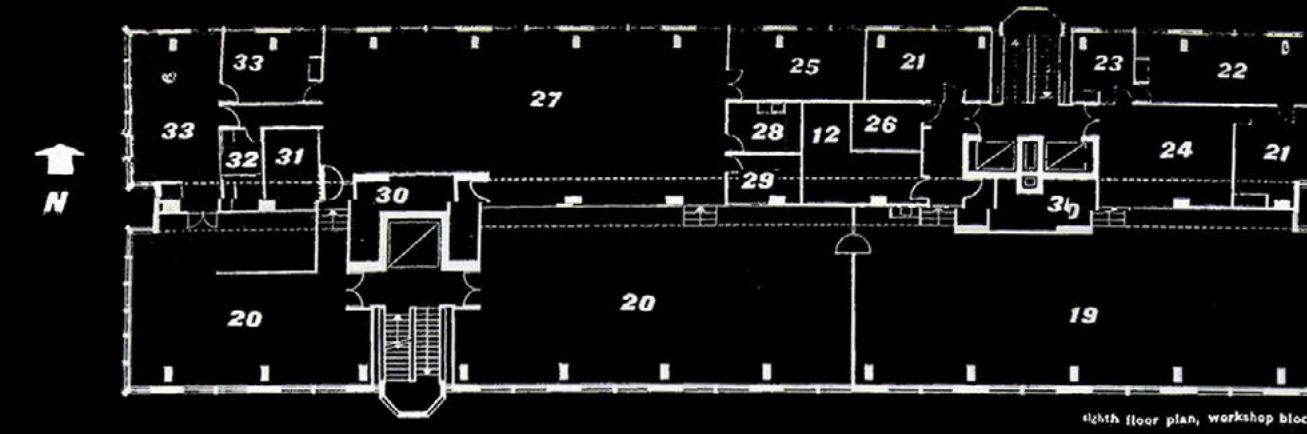
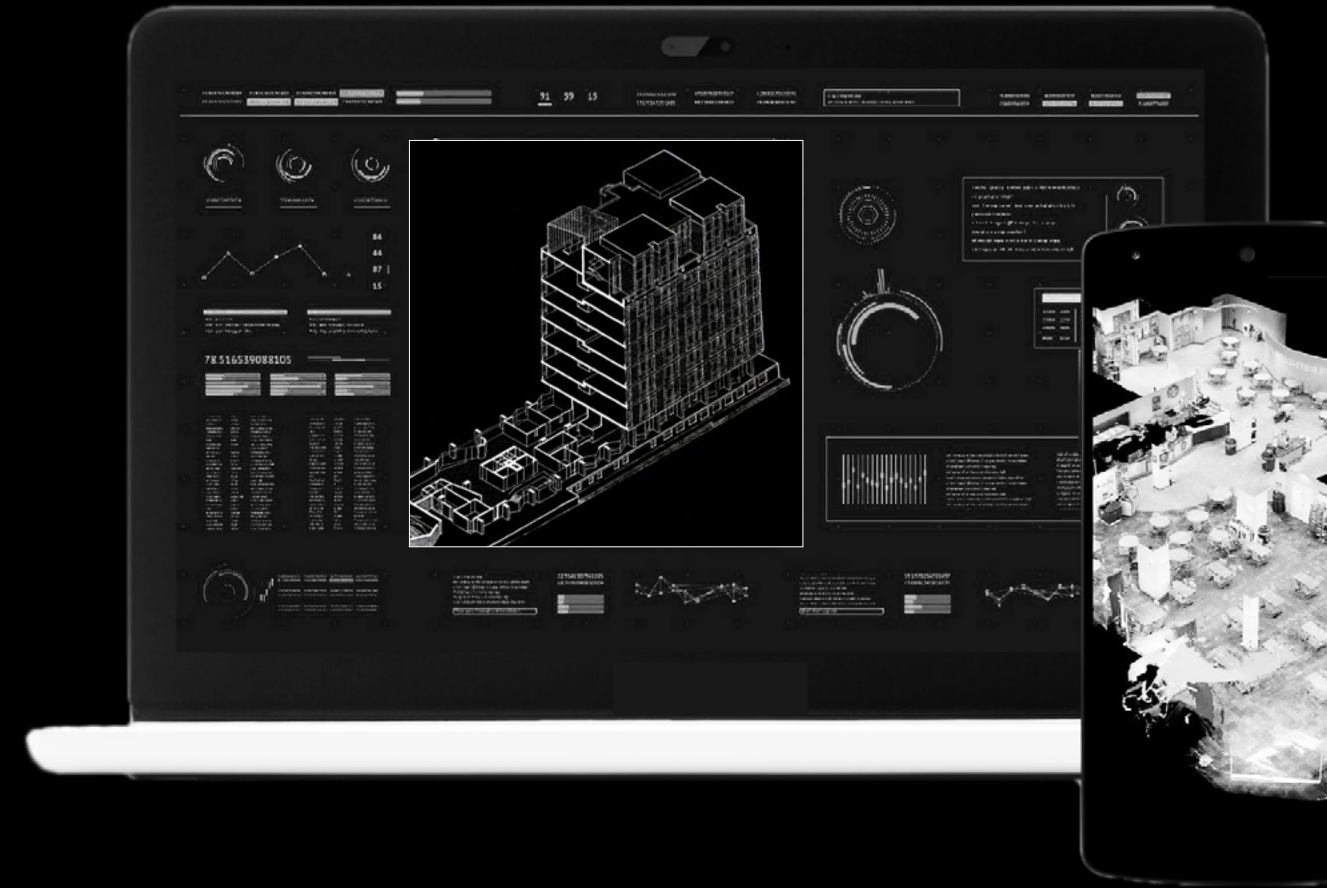
CARBON ID



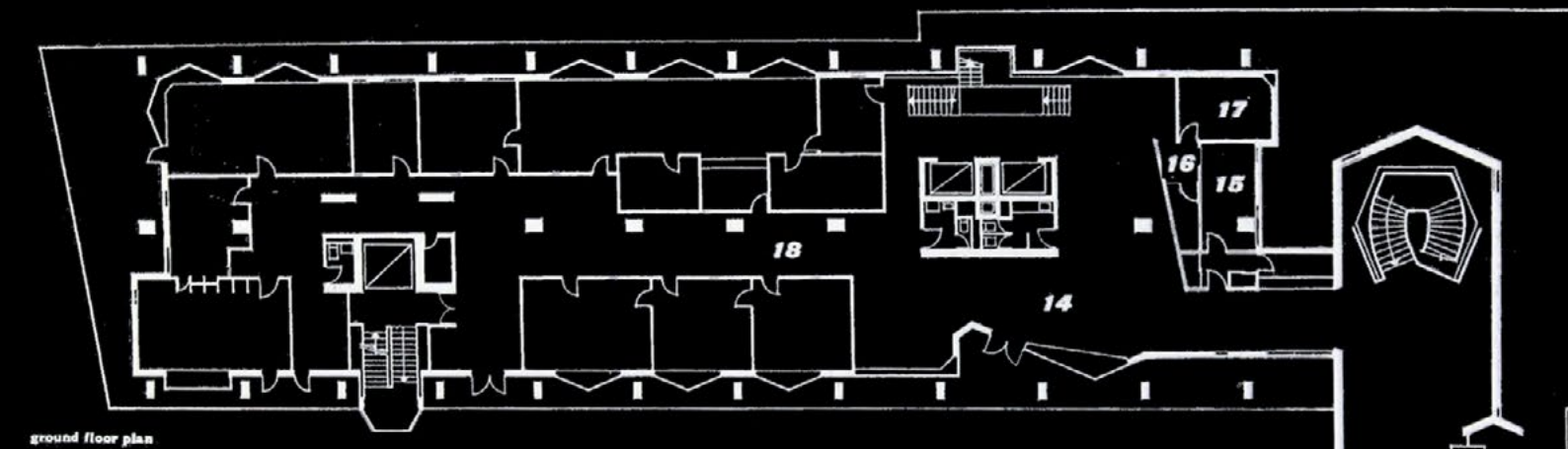
ENERGY ID



MATERIAL ID



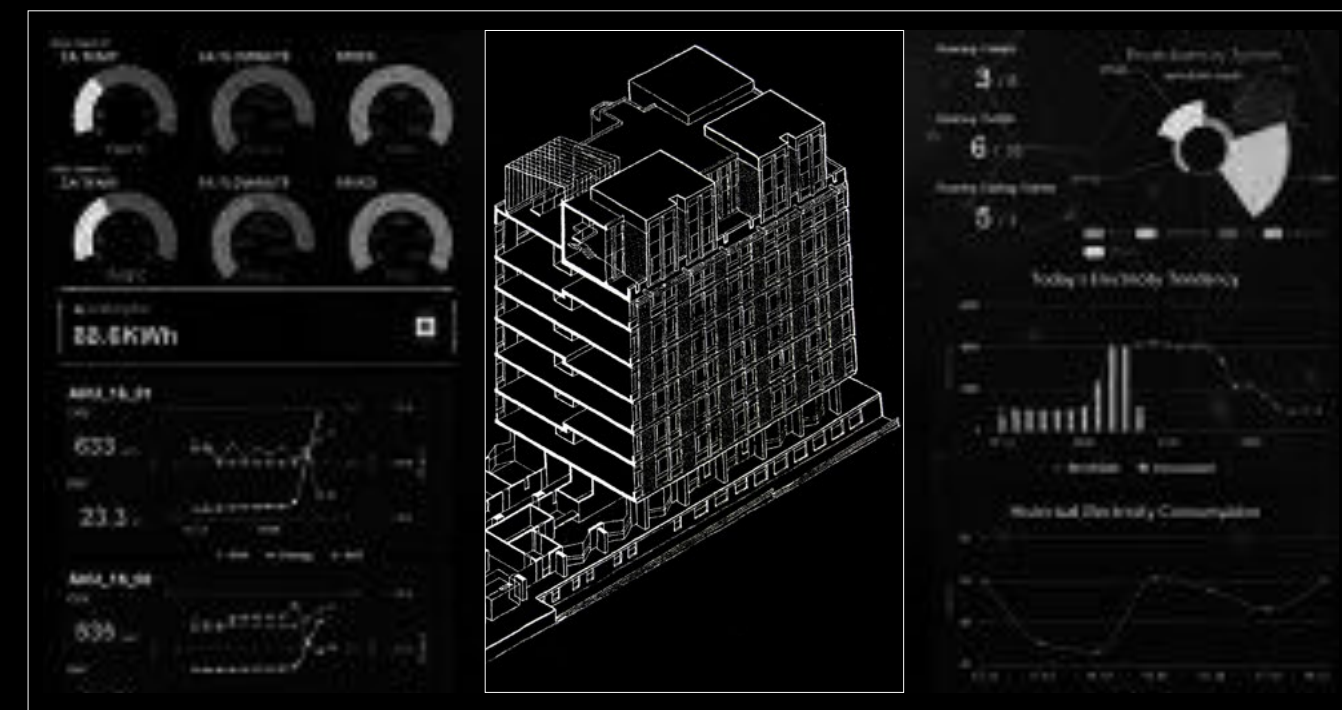
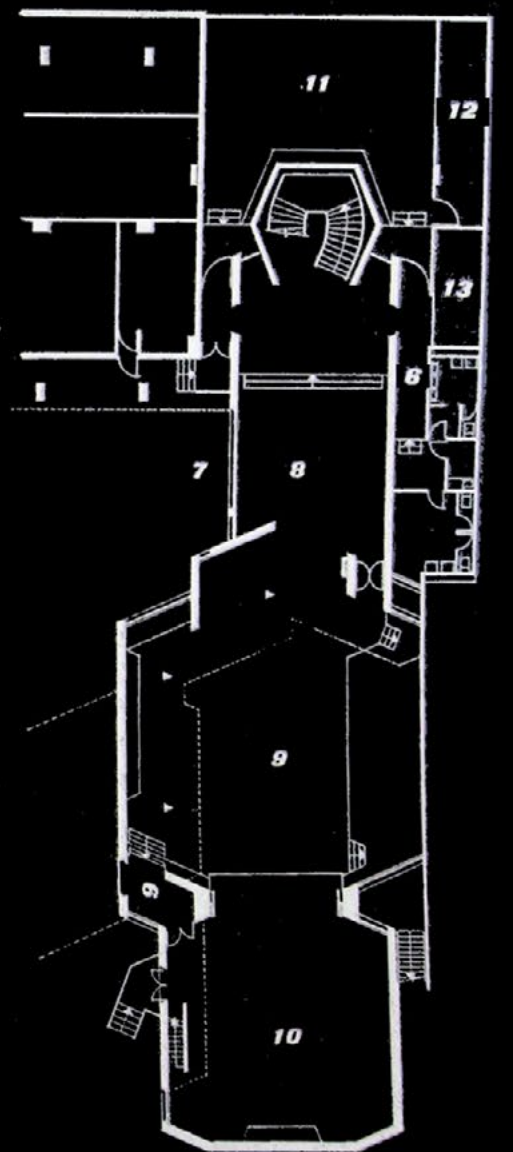
4th floor plan, workshop block



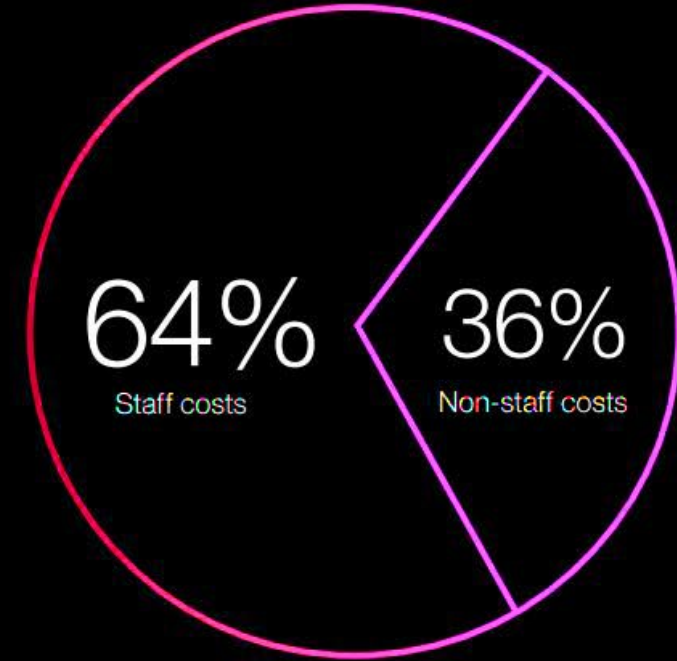
ground floor plan

- 1. entrance hall,
- 2. auditorium balcony,
- 3. upper part of auditorium,
- 4. upper part of stage,
- 5. stage balcony,
- 6. lobby,
- 7. courtyard,
- 8. courtyard entrance hall,
- 9. auditorium,
- 10. stage,
- 11. gallery,
- 12. store,
- 13. cloakroom,
- 14. entrance foyer,
- 15. chief steward,
- 16. college shop,
- 17. medical room,
- 18. administration area,
- 19. drawing office,
- 20. machine shop,
- 21. tutors' room,
- 22. professor,
- 23. secretary,
- 24. exhibition space,
- 25. plaster shop,
- 26. dark room,
- 27. plastic experimental shop,
- 28. costume's room,
- 29. superintendent,
- 30. servants,
- 31. spray shop,
- 32. chemistry laboratory,
- 33. research rooms.

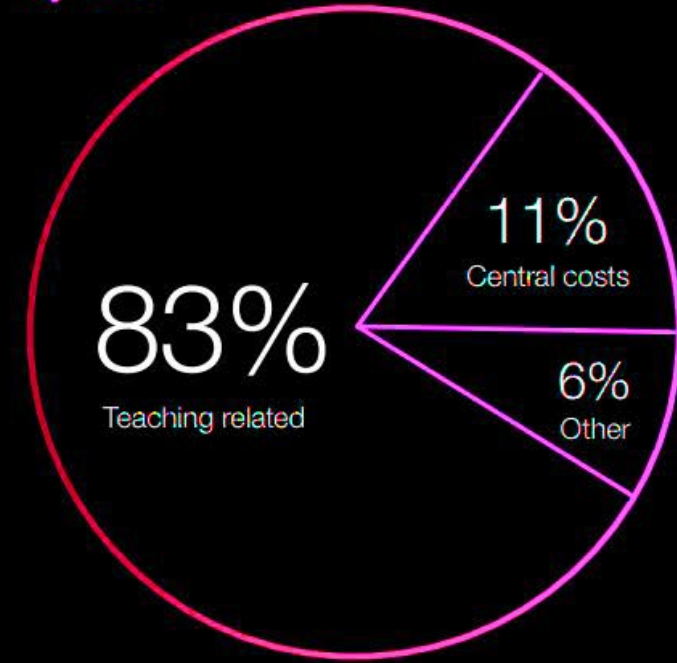
basement plan, Guibenkan Hall



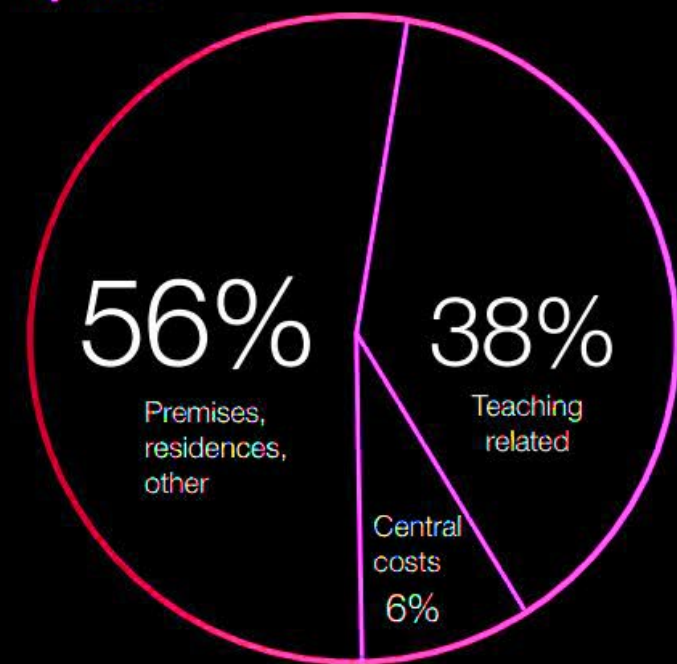
How costs split between staff and other costs



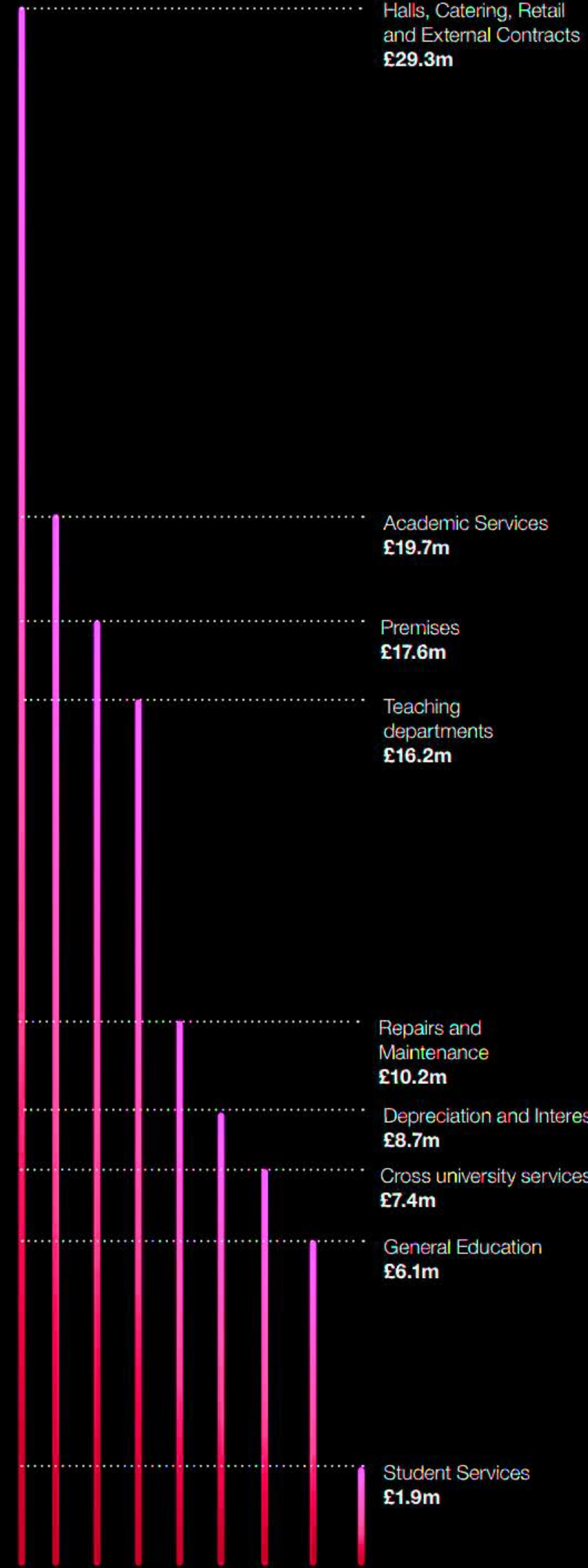
Staff costs by area



Non-staff costs by area



Non-staff costs by category



Financial Review

Staff costs by category

71%

College-based staff:  
 Teaching £63m  
 Technical £18m  
 Research £7m  
 Administration £22m  
 Short courses and other £39m

29%

Cross-University staff

Total Income

Total Expenditure

Operating Surplus

£335.5m - £327.1m = £8.4m

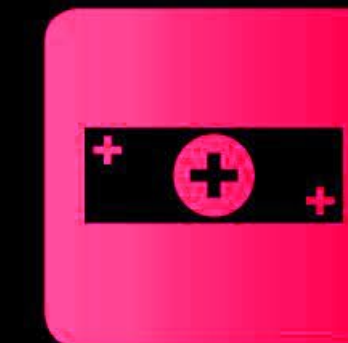
Why does the university make an operating surplus?



To ensure UAL's activities remain financially sustainable in the long term



To ensure UAL can replace and refurbish its buildings and equipment



To guard against events that might damage UAL's financial health

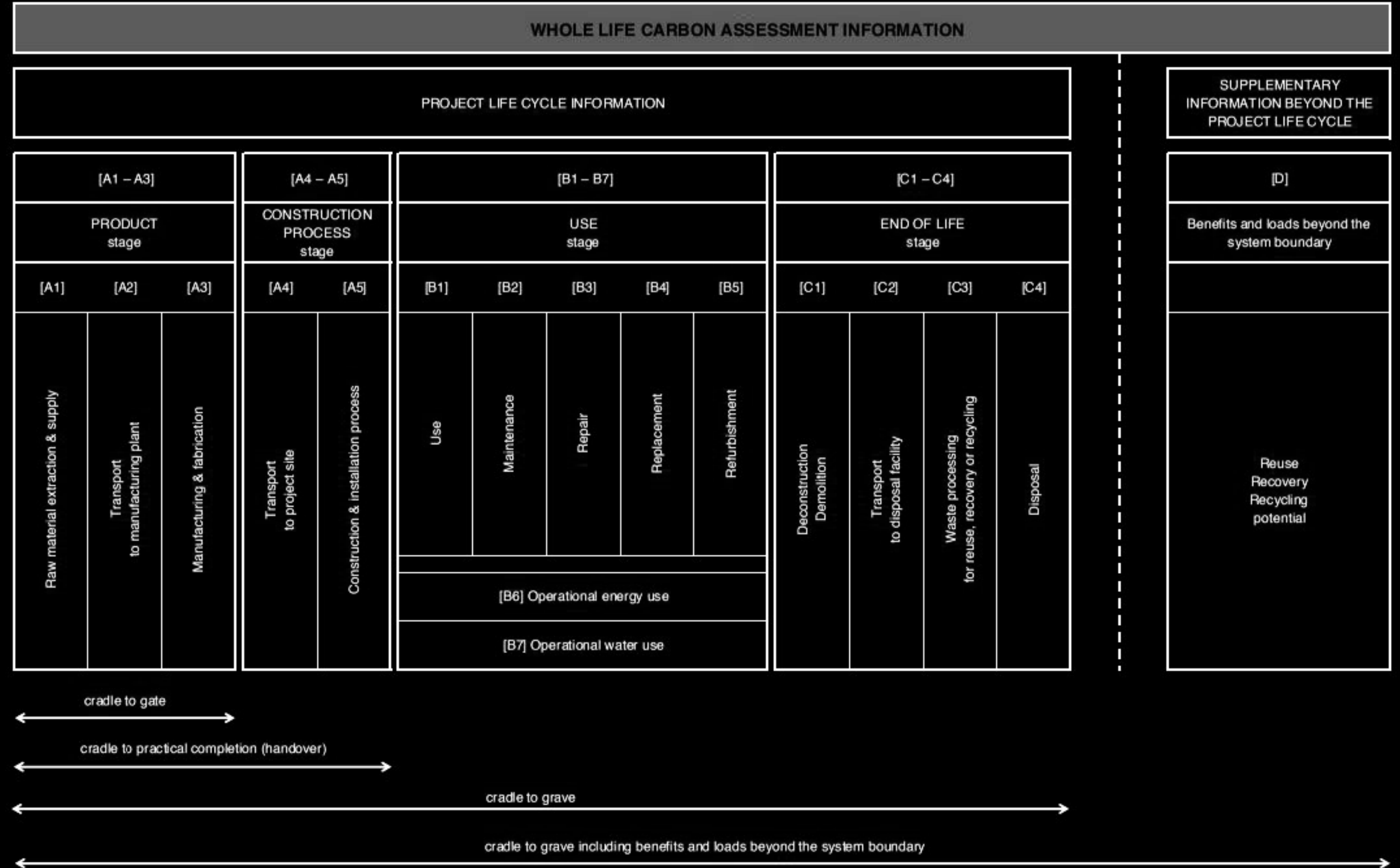
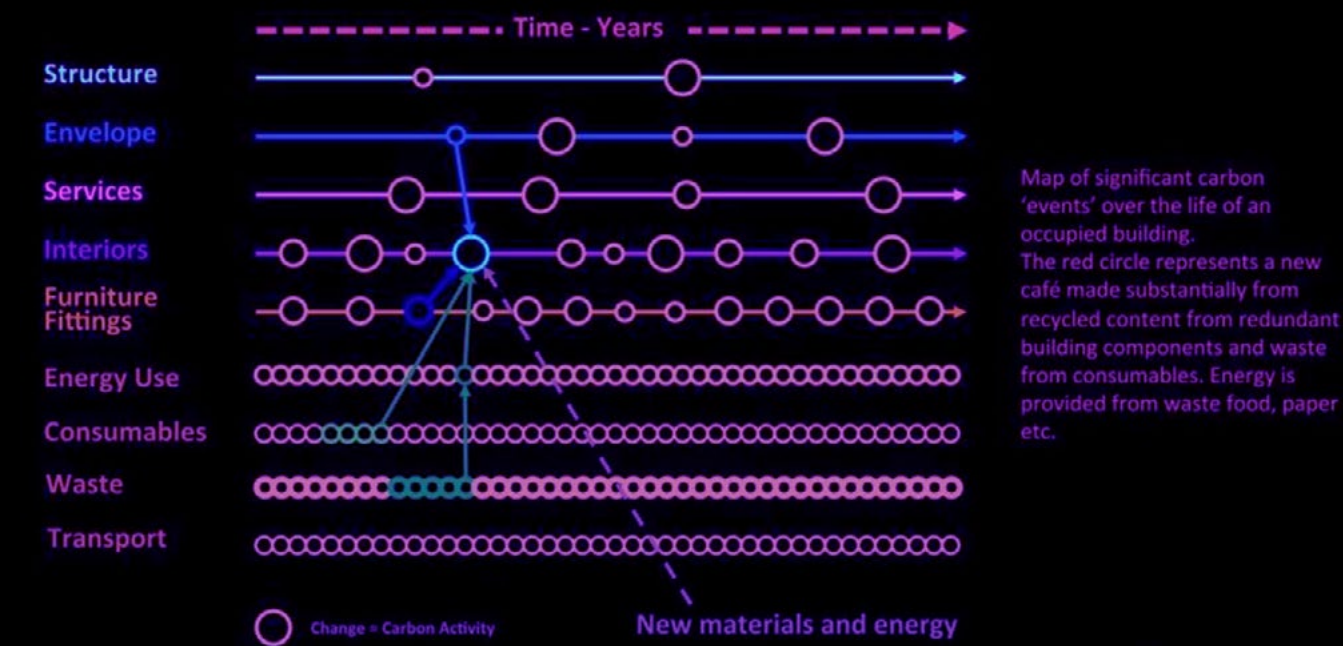


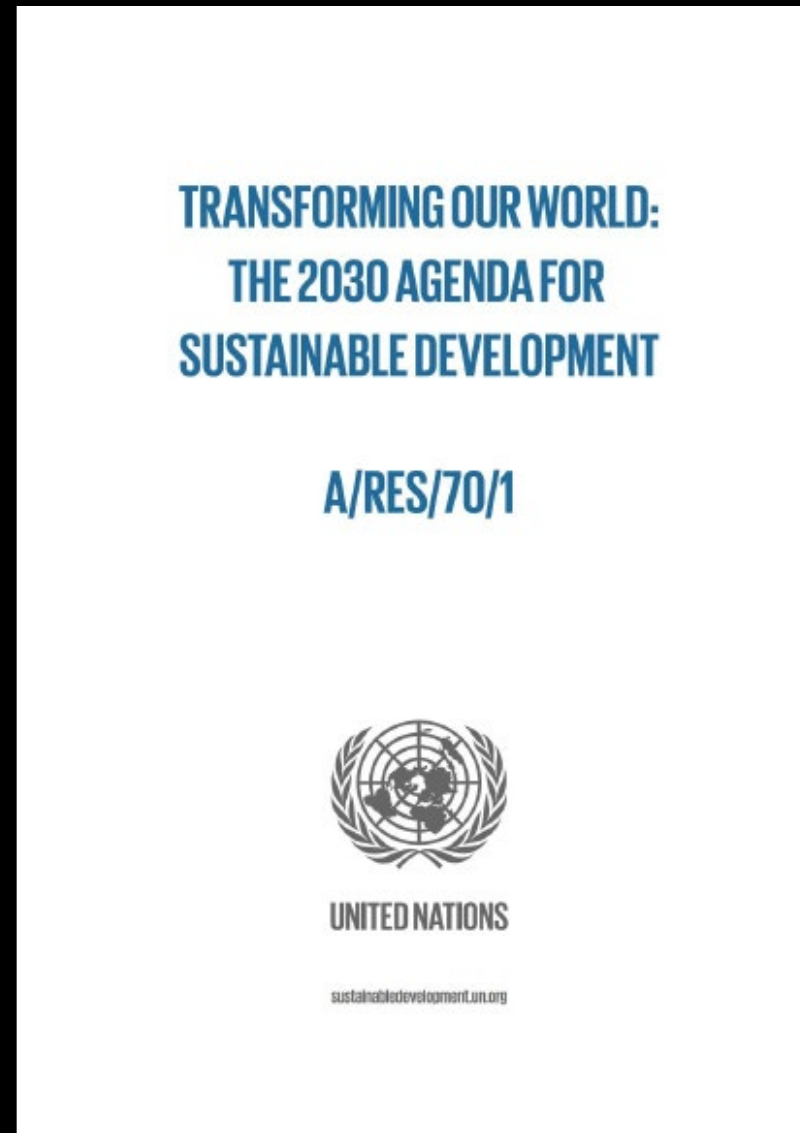
To invest in the facilities we need to deliver the academic strategy

Whole life carbon assessment for the built environment

3.2.4 Life cycle stages – overview

Whole life thinking involves considering all life cycle stages of a project, from raw material extraction, product manufacturing, transport and installation on site through to the operation, maintenance and eventual material disposal. This section refers to EN 15978; 7.4. It also considers the future potential for recovery, reuse and/or recycling. EN 15978 introduces a modular approach to a built asset's life cycle, breaking it down into different stages, as shown in Figure 2.





1  
NO POVERTY  
No Poverty

2  
ZERO HUNGER  
Zero Hunger

3  
GOOD HEALTH AND WELL-BEING  
Good Health and Well-Being

4  
QUALITY EDUCATION  
Quality Education

5  
GENDER EQUALITY  
Gender Equality

6  
CLEAN WATER AND SANITATION  
Clean Water and Sanitation

7  
AFFORDABLE AND CLEAN ENERGY  
Affordable and Clean Energy

8  
DECENT WORK AND ECONOMIC GROWTH  
Decent Work and Economic Growth

9  
INDUSTRY, INNOVATION AND INFRASTRUCTURE  
Industry, Innovation and Infrastructure

10  
REDUCED INEQUALITIES  
Reduced Inequalities

11  
SUSTAINABLE CITIES AND COMMUNITIES  
Sustainable Cities and Communities

12  
RESPONSIBLE CONSUMPTION AND PRODUCTION  
Responsible Consumption and Production

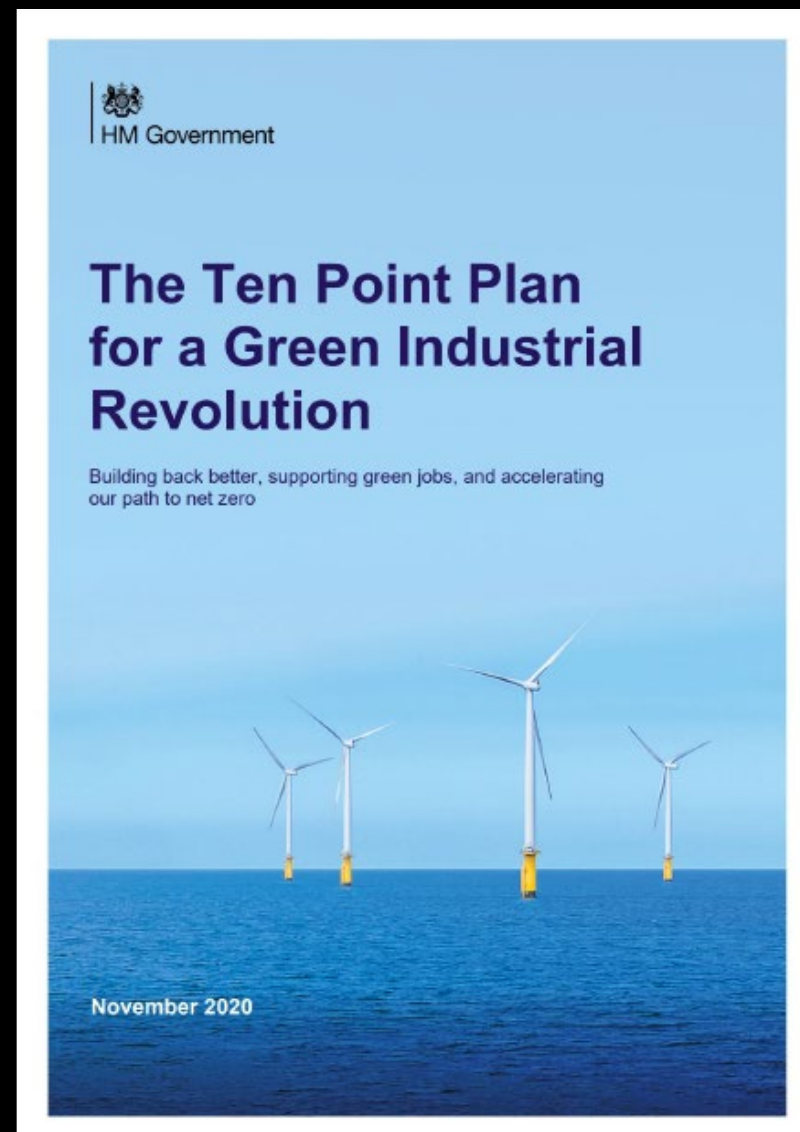
13  
CLIMATE ACTION  
Climate Action

14  
LIFE BELOW WATER  
Life Below Water

15  
LIFE ON LAND  
Life on Land

16  
PEACE, JUSTICE AND STRONG INSTITUTIONS  
Peace, Justice and Strong Institutions

17  
PARTNERSHIPS FOR THE GOALS  
Partnerships for the Goals



1

**ADVANCING OFFSHORE WIND**

Offshore wind is a critical source of renewable energy for our growing economy, with the UK already leading the world. By 2030 we plan to quadruple our offshore wind capacity so as to generate more power than all our homes use today, backing new innovations to make the most of this proven technology and investing to bring new jobs and growth to our ports and coastal regions.

2

**DRIVING THE GROWTH OF LOW CARBON HYDROGEN**

Hydrogen is the lightest, simplest and most abundant chemical element in the universe. It could provide a clean source of fuel and heat for our homes, transport and industry. The UK already has world-leading electrolyser companies, and unparalleled carbon capture and storage sites that we can maximise. Working with industry the UK is aiming for 5GW of low carbon hydrogen production capacity by 2030. Hubs where renewable energy, CCUS and hydrogen congregate will put our industrial 'SuperPlaces' at the forefront of technological development. We are also pioneering hydrogen heating trials, starting with a Hydrogen Neighbourhood and scaling up to a potential Hydrogen Town before the end of this decade.

3

**DELIVERING NEW AND ADVANCED NUCLEAR POWER**

Our electricity system will grow and could double in size by 2050 as demand for low-carbon electricity in sectors like heat and transport rises. Nuclear power provides a reliable source of low-carbon electricity. We are pursuing large-scale nuclear, whilst also looking to the future of nuclear power in the UK through further investment in Small Modular Reactors and Advanced Modular Reactors.

4

**ACCELERATING THE SHIFT TO ZERO EMISSION VEHICLES**

Zero emission vehicles can be our most visible incarnation of our ability to simultaneously create jobs, strengthen British industry, cut emissions, and continue travelling. From 2030 we will end the sale of new petrol and diesel cars and vans, 10 years earlier than planned. However, we will allow the sale of hybrid cars and vans that can drive a significant distance with no carbon coming out of the tailpipe until 2035. The accompanying support package of £2.8 billion demonstrates our continued faith in British car manufacturing as the backbone of UK industry in the West Midlands, Wales and the North, bringing jobs and investment back into the UK whilst simultaneously reducing greenhouse gas emissions and improving the air we breathe.

5

**GREEN PUBLIC TRANSPORT, CYCLING AND WALKING**

As well as decarbonising private vehicles, we must increase the share of journeys taken by public transport, cycling and walking. We will therefore accelerate the transition to more active and sustainable transport by investing in rail and bus services, and in measures to help pedestrians and cyclists. We will fund thousands of zero-emission buses and give our towns and cities cycle lanes worthy of Holland. This will improve the air we breathe and increase both mental and physical health, as well as reduce emissions.

6

**JET ZERO AND GREEN SHIPS**

We will position the UK at the forefront of aviation and maritime technology to push forward low carbon travel and build on UK strengths. By taking immediate steps to drive the uptake of sustainable aviation fuels, investments in R&D to develop zero-emission aircraft and developing the infrastructure of the future at our airports and seaports – we will make the UK the home of green ships and planes. Internationally, we will continue to lead efforts to find solutions to global aviation and maritime emissions, including using our COP Presidency to develop a sector-led goal.

7

**GREENER BUILDINGS**

We will put our homes, workplaces, schools and hospitals at the heart of our green economic recovery, supporting 50,000 jobs and building new supply chains and factories in the UK. Making our buildings more energy efficient and moving away from fossil fuel boilers will help make people's homes warm and comfortable, whilst keeping bills low. We will go with the grain of behaviour, and set a clear path that sees the gradual move away from fossil fuel boilers over the next fifteen years as individuals replace their appliances and are offered a lower carbon, more efficient alternative.

8

**INVESTING IN CARBON CAPTURE, USAGE AND STORAGE**

Carbon Capture, Usage & Storage (CCUS) will be an exciting new industry to capture the carbon we continue to emit and revitalise the birthplaces of the first Industrial Revolution. Our ambition is to capture 10Mt of carbon dioxide a year by 2030, the equivalent of four million cars' worth of annual emissions. We will invest up to £1 billion to support the establishment of CCUS in four industrial clusters, creating 'SuperPlaces' in areas such as the North East, the Humber, North West, Scotland and Wales. We will bring forward details in 2021 of a revenue mechanism to bring through private sector investment into industrial carbon capture and hydrogen projects via our new business models to support these projects.

9

**PROTECTING OUR NATURAL ENVIRONMENT**

The natural environment is one of the most important and effective solutions we have for capturing and sequestering carbon long-term. We will safeguard our cherished landscapes, restore habitats for wildlife in order to combat biodiversity loss and adapt to climate change, all whilst creating green jobs.

10

**GREEN FINANCE AND INNOVATION**

Unleashing innovation and developing new sources of finance are fundamental for further developing the green technologies for net zero. We have committed to raising total R&D investment to 2.4% of GDP by 2027 and in July 2020 published the UK Research and Development Roadmap. The next phase of green innovation will help bring down the cost of the net zero transition, nurture the development of better products and new business models, and influence consumer behaviour.

# TERRA CARTA

*For Nature, People & Planet*

1

**CREATING SUSTAINABLE INDUSTRIES**

We have an incredible opportunity to re-imagine and create entirely new sustainable industries, products, services and supply chains while in parallel helping to transition existing systems to a more sustainable trajectory. We must now put Nature, People & Planet at the heart of global value creation.

2

**DEFAULT SUSTAINABLE**

This means embedding genuine sustainability in our business models, analysis, decisions and actions. In other words, put simply, we need to put Nature, and the protection of Nature's capital – from which we draw an annual return – at the heart of how we operate. It also means further defining and developing the discipline and framework of sustainable markets and sustainable industries

3

**THE POWER OF CONSUMERS**

With consumers controlling an estimated 60% of global GDP, people around the world have the power to drive the transformation to sustainable markets. Yet, we cannot expect consumers to make sustainable choices if these choices are not clearly laid before them. As consumers increasingly demand sustainable products, they deserve to be told more about product life cycles, supply chains and production methods. For a transition to take place, being socially and environmentally conscious cannot only be for those who can afford it. If all the true costs are taken into account, including the cost to Nature, being socially and environmentally responsible should be the least expensive option because it leaves the smallest footprint behind. We must communicate better with consumers about the sustainability of the goods, services and investments we offer.

4

**ACCELERATE & ALIGN INDUSTRY ROADMAPS**

It is time for businesses, industries, investors and countries alike to design and implement how they will decarbonize and transition to net zero while restoring and protecting Natural Capital. Moving together, with clear roadmaps, will create efficiencies and economies of scale that will allow us to leapfrog our collective progress and accelerate our transition. Using a 'future of industry and future of economy' approach, each of the main sectors of the economy, together with the global financial institutions, institutional investors and asset managers, need to outline publicly accessible roadmaps that identify the steps to net zero along with plans for the protection and restoration of Natural Capital and biodiversity. After all, we know that it is not a lack of capital that is impeding our progress, but how we deploy it

5

**GAME CHANGERS AND BARRIERS**

We need to identify, showcase and invest in the game-changing technologies and solutions that are emerging around the world. To accelerate, we must also identify the barriers to progress, be it policy, regulation, infrastructure, investment or the wider enabling environment. It is only by seeking out and addressing these game changers and barriers that we will be able to make tangible progress.

6

**SUSTAINABLE INVESTING AT SCALE**

On every pressing issue we face, there are solutions that are not just available, but increasingly cost effective. At the same time there are trillions of dollars in sovereign wealth funds, pension funds, insurance, and asset portfolios looking for investible and sustainable projects with good long-term value and rates of return. There are two broad dimensions to sustainable investing at scale: 1) Asset owner/Asset manager commitment to investing strategically to recognize companies that are making the transformation according to the company roadmap and 2) Developing new sources of funding for sustainable activities. This requires not only showcasing high potential investments, but that we reimagine mandates, financial analysis, structuring and models of return. Access to finance and innovation are key to bringing sustainable markets from niche to norm.

7

**NATURE, THE REAL ENGINE OF OUR ECONOMY**

Climate change, land-use, food production and human health are all deeply interconnected. Transforming the land sector towards more sustainable practices could contribute an estimated 30% of the global mitigation needed by 2050 to deliver on the 1.5°C target. By any measure Nature's contribution to the global economy is significant and some estimates hold it at greater than annual global G.D.P., estimated at \$87.79 Trillion in 2019. Building conservation and Nature-based solutions into our asset base and supply chains can, therefore, offer significant economic growth opportunities for countries and businesses alike – including in areas such as the circular bioeconomy, ecotourism and green public infrastructure. It is time to define the benefits we derive from the Natural world and account for Natural Capital on companies' balance sheets. Without this, firms cannot tell the true value of their asset base, nor how damaging their operations may be.

8

**CREATE MARKET INCENTIVES**

What is incentivized happens. We must reverse perverse subsidies and improve incentives for sustainable alternatives. To achieve scale within sustainable markets we must not be afraid to adapt our long-standing incentive structures if we are to reap the benefits afforded by a more sustainable world. Re-orientating economic subsidies, financial incentives and regulations can have a dramatic and transformative effect on our market systems. It is time to level the playing field and to think about how we properly deploy taxes, policies and regulation in a way that catalyses sustainable markets.

9

**ADOPT COMMON METRICS AND STANDARDS**

An increasing number of corporations are adopting ESG methodologies and highlighting their SDG-aligned investments. However, it is time to move to unified metrics, global standards and mandatory disclosure. There is a movement toward convergence of existing global standards among the standards setters and that is important. Industry has emerged as an important voice in this convergence movement, including through the World Economic Forum's International Business Council's Stakeholder Capitalism Common Metrics. Developing a single global standard for non-financial ESG reporting, which includes reporting on sustainability, will accelerate the ability of people to trust that the goods and services they buy are socially, environmentally and ethically produced. Through new technologies we have the ability to tag, track and trace supply chains in unprecedented ways – so it is time to make this level of transparency the norm.

10

**GREEN FINANCE AND INNOVATION**

We must urgently invest in STEM, innovation and R&D at scale with a focus on sustainable solutions, alternatives and industries. Whether it is AI, or indeed nuclear fusion, 3-D printing, energy storage, electric transportation, carbon capture, renewables or biotech; we are on the verge of catalytic breakthroughs that will alter our view of what is possible – and profitable – within the framework of a sustainable future. To move forward, we must acknowledge that sustainability and profitability are no longer mutually exclusive. Effective solutions must ensure that sustainable technologies and alternatives are competitively priced.



## RAPHAEL CHANNEL AND PETER TOWN

COULD THIS BE USED TO HELP GOVERNMENTS, COMPANIES OR INSTITUTIONS MONITOR AND MEET SET CLIMATE TARGETS?  
 PATENT AND IP  
 WHAT ARE THE SOCIAL / ECONOMIC / LABOUR / JOB BENEFITS?  
 DIAGRAM OF PROCESS AND FORM  
 MARKET RESEARCHERS AND COMPETITORS DIAGRAM / REACH THROUGH CHANNELS  
 REDUCE WHOLE LIFE CARBON OF BUILDINGS  
 ANONYMISED DATA / URGENCY OF TRANSPARENCY  
 GOVERNMENT MANDATE AND PLAN PUBLISHED FOR DATA COLLECTION  
 INDEPENDENT PARTY, ANALYSIS  
 ELEMENTS OF MAINTENANCE AND CARE / INTERGENERATIONAL DESIGN  
 WHAT ARE THE BENEFITS?  
 BEHAVIOURAL CHANGE AT THE RESIDENTIAL / CORPORATE / GOVERNMENT LEVEL?  
 SPECIFY EXACT SCALE OF INTERVENTION  
 MAKE CLEAR USING ONLY EXISTING TECHNOLOGIES IN NEW WAYS  
 SPEED TO MARKET  
 RESEARCH BUSINESS MODELS  
 WHO WOULD HAVE THE AGENCY?  
 TENANTS / LEASEHOLDERS / FREEHOLDERS / LANDLORDS / OWNERS  
 WHO WOULD BENEFIT?  
 HOW TO INCENTIVISE?

## STEVE EVERHARD

THE LEAN BUSINESS MODEL CANVAS > PAINS AND GAINS > SMART METER  
 DIAGRAM FOR MAKING BUSINESS MODEL / HAZARD AND RISK CHANNELS  
 COMMUNITY INTEREST COMPANY / GREEN HOMES GRANT / MATERIAL ENDURANCE  
 LICENSING MODEL > DIGITAL TWIN OF ENERGY IN BUILDINGS > CARBON TRACKING  
 TOP THREE PROBLEMS > CARBON METRICS REPORTING / TRANSPARENCY / BEHAVIOUR / DECARBONISING BUILDINGS AND ENERGY / WHOLE LIFE CARBON / POST-OCCUPANCY

## [ACCURATE CO2 REPORTING INCLUDING CARBON COSTING]

AS CLIMATE CHANGE AND CARBON EMISSIONS CONTINUE TO DOMINATE HEADLINES, IT HAS NEVER BEEN MORE IMPORTANT TO ACCURATELY REPORT YOUR SITE / BUILDING CO2, INCLUDING CARBON COST.

AS PART OF THE VMS (VIRTUAL MANAGEMENT SOLUTION), YOU RECEIVE CLEAR AND CONCISE CO2 REPORTING FOR ANYONE ACCESSING SITE, BUILDING CONTROL, POST-OCCUPANCY.

THIS INFORMATION IS VITAL IN COMPANIES REPORTING THEIR ENVIRONMENTAL IMPACTS AND GREENHOUSE GAS EMISSIONS WHICH IS NOW LAW FOR MANY LARGE COMPANIES.

## SIR BRIAN HOSKINS

MIND THE GAP PRESENTATION  
 CONTRIBUTION TO ROYAL COMMISSION REPORT 2000 - 2008  
 MAUNA LOA HAWAII 1957 280PPM - 420 PPM MORE THAN 50% WARMER THAN PREVIOUS 1000 YEARS  
 METHANE RISK  
 THAMES BARRIER DESIGNED FOR 2M LEVEL SEA RISE FLOODING RISK  
 CLIMATE MITIGATION > REDUCE STRESS > REDUCE POTENTIAL CONFLICT  
 CLIMATE CHANGE ACT 2008 CHAPTER 2  
 CCRA CLIMATE CHANGE RISK ASSESSMENT  
 JULIAN KING > THERESA MAY POLICY >  
 NATIONAL ADAPTION PLAN  
 THE CCC.ORG.UK  
 REALITY OF THE SECOND HALF OF THE CENTURY (MIGRATION / CONFLICT / ENV RISK)  
 30 YEARS OF AWARENESS > RESPONSIBILITY  
 INTERGENERATIONAL THINKING  
 INTERVENTION OVER INVENTION / PROCESS OVER PRODUCT  
 TECHNO FIXES SUCH AS BATTERIES > INFLUENCE OF NEW TECH ON BEHAVIOURAL CHANGE AND PSYCHOLOGICAL IMPACT  
 NEW POLICY TO HELP POOR COUNTRIES LEAPFROG WITH TECH TO LEVEL UP  
 RESPONSIBILITY AT INDIVIDUAL LEVEL / CITIZEN / GOVERNMENT / CONSUMER  
 UK WORST BUILDING ENERGY EFFICIENCY IN EUROPE

## BARONESS BROWN

[NET ZERO IS NOT ENOUGH]  
 SIGNIFICANCE OF MONITORING / DATA COLLECTION  
 ARTICLE 6. ACCOUNTING METRICS  
 SCOPE 3 EMISSIONS / 60% BEHAVIOURAL CHANGE POPULATION INVOLVEMENT  
 CARBON CREDITS > NATURE BASED SOLUTIONS > US \$50 PER PERSON? ETHICS?  
 DASGUPTA REVIEW - ECONOMICS OF BIODIVERSITY  
 OFFSETTING / INSETTING / COMPLEX CARBON SUPPLY CHAINS  
 THE INVENTION OF NATURE - HUMBOLT  
 INTERNAL IPCC MORE CONCERNED WITH GEOENGINEERING THAN CLIMATE CHANGE  
 WEATHER EFFECTS ON RENEWABLE / FUTURE INFRASTRUCTURE RESILIENCE  
 MAKING HOMES RESILIENT TO CHANGING CLIMATE  
 GREEN HOMES GRANT / COMMUNITY INTEREST COMPANY  
 EMBODIED AND OPERATIONAL CARBON FOR ENERGY IN BUILDINGS  
 THE CARBON TRUST / CLIMATE CHANGE COMMITTEE  
 BIOENERGY CAPTURE AND STORAGE (BECCS)  
 15% ELECTRIC TODAY > 70% ELECTRIC BY 2050  
 18% FOREST AND WOODLAND COVER IN UK LOWEST IN EUROPE  
 [EXAMPLES OF 30 YEAR PROGRESS IN HISTORY] LARGEST ENDEAVOUR  
 HOMES FIT FOR ALL / GREEN HOMES BILL  
 2008 CLIMATE CHANGE ACT

## SEAN CARNEY, BENEDICT SHEPPARD AND NICK DE LEON

HOW TO MEASURE THE FOUR P'S PROFIT, PEOPLE, PLANET, PURPOSE

WHAT IS THE HIERARCHY OF THESE?

ACCURATE MEASURE > METRICS > TRANSPARENCY > ETHICAL BEHAVIOUR

IF YOU'RE NOT ACCOUNTABLE YOU DON'T COUNT

INTERVENTION OVER INVENTION

THINK ABOUT BEFORE LIFE AND END OF LIFE WHOLE LIFECYCLE

DESIGNING PRODUCTS AND MATERIALS FOR MULTIPLE USES, THIRD LIFE

JOHN MADOR LINKEDIN?

THE AGENCY OF DESIGNERS

THE FIVE CAPITALS MODEL

PRODUCT COST OF CLEAN-UP / GOVERNMENT / EDUCATION

HELLO, THANK YOU FOR YOUR PRESENTATION. AS AN ARCHITECTURE STUDENT I'M INTERESTED IN DECARBONISATION OF THE BUILT ENVIRONMENT, A SECTOR WHICH CONTRIBUTES TO ALMOST 40% OF GLOBAL CARBON EMISSIONS. I HAVE TWO QUESTIONS:

FOR SEAN - IT IS INTERESTING TO HEAR ABOUT PHILIPS 100% RENEWABLE ENERGY IN BUILDINGS STRATEGY. IN REGARDS TO ETHICS AND RESPONSIBILITY I WONDER WHAT CHALLENGES ARE YOU MOST CONCERNED WITH IN LEADING THE RACE TO ZERO? (CIRCULAR ECONOMY, SUPPLY CHAINS, LOGISTICS)

FOR BEN - WITHIN THE FRAMEWORK OF THE FIVE CAPITALS MODEL THAT PRIMARILY VALUES NATURAL CAPITAL, I WONDER IF YOU THINK THAT THERE IS A HIERARCHY WITHIN THE FOUR PS THAT YOU MENTION - PERHAPS PEOPLE AND PLANET FIRST ABOVE PURPOSE AND PROFIT?