Design Ecosystems Fellowship Report 2022

Mapping the Net Zero Transformation of Healthcare Ecosystems: The Case of NHS – University Hospital Coventry Warwick (UHCW)

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FUTURE OBSERVATORY

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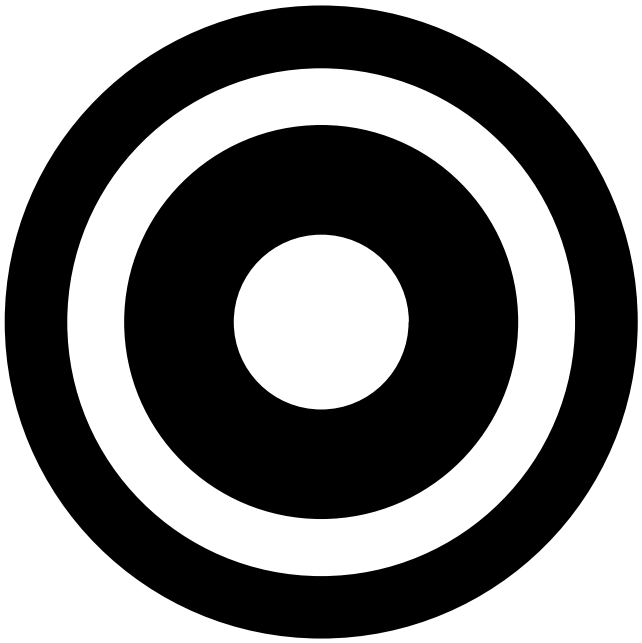
Overview

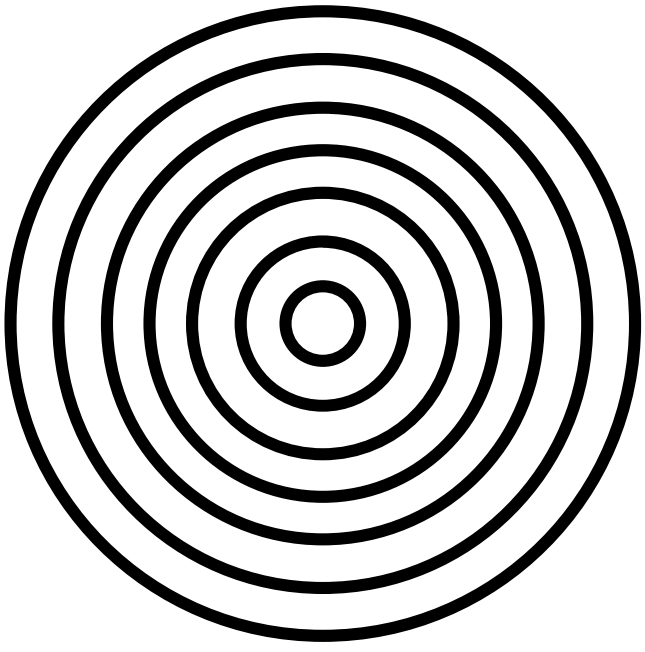
The NHS - University Hospital Coventry Warwick (UHCW – West Midlands) ecosystem is chosen for this research given its criticality, relevance and innovativeness. The UHCW is one of the five UK trusts that have been selected for the Virginia Mason Institute partnership to boost innovation and continuous improvement. Also, it was the first hospital to administer a COVID-19 vaccine in the UK. The purpose of the UHCW ecosystem is to become a national and international leader in healthcare while simultaneously achieving net zero goals. The research took place between 1st July 2022 and 15th February 2023 with a grant award of £19,747.24.

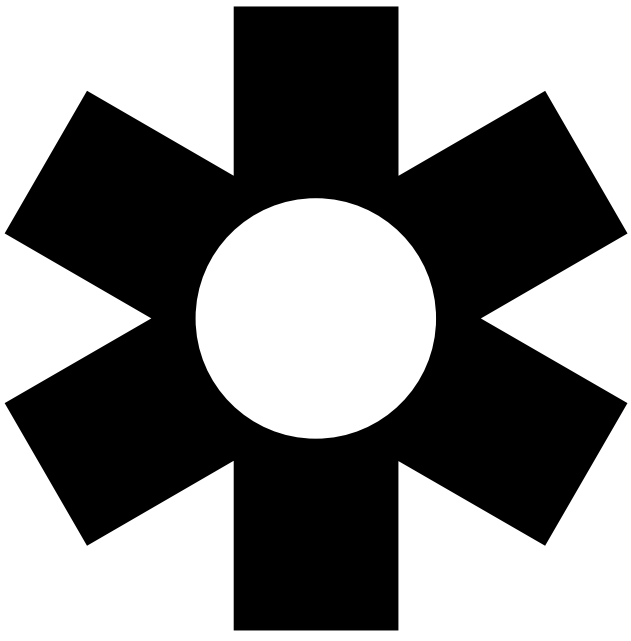
Research objectives

- Reframe the assumptions and identify root causes of unsustainability
- Catalyse innovation potential by democratising the decision-making process
- Provide a holistic view and enhanced understanding of actors, relationships, interdependencies and complementarities within the UHCW ecosystem
- Critically analyse the strengths and weaknesses of the healthcare ecosystem
- Demonstrate the opportunities and barriers for a more resilient and net zero healthcare industry
- Highlight/leverage the synergies between disciplines and diverse ecosystem actors
- Achieve a constructive dialogue and synergy between different disciplines and actors
- Allow informed-creativity and evidence-based policy making within the ecosystem
- Create an engaging platform for further improvements and discoveries



Research activity





This research was initiated in response to a need for more scientific contributions in the healthcare domain, as net zero and the circular economy were not considered to be priorities compared to other urgent/ business-as-usual performance objectives (i.e., time, quality, cost etc.). The NHS made a pledge in 2020 to become net zero by 2040, highlighting the climate emergency as a health emergency. The fundamental premise of the healthcare industry is “First, do no harm” (Latin: Primum-non-nocere), yet around 8% of the UK’s climate footprint can be attributed to the NHS (direct and indirect footprints) as the largest employer of the Europe (10% of the UK GDP with 1.4 million employees). Regarding the ecosystem in this research, the UHCW is one of the largest and most modern healthcare facilities in Europe. It has 1,100 beds, 26 operating theatres and 8,700 staff across Rugby and Coventry, serving a population of over a million people.

Given the explorative nature of this research, a mixed methodology was adopted.[1] This included an integrative literature review,[2] expert panels,[3] interviews and the coding of secondary data (i.e., the NHS reports, the UHCW Green Plan, audio visual and written material from the official social media channels and websites etc.). Since it was also a design challenge to address a practical problem, the Double Diamond[3] method was employed with divergent and convergent thinking along the four phases, that is to discover, define, develop, and deliver. The multiple data sources and the experts’ feedback were utilised at each stage of the research for triangulation. The methodological rigor was realised by using multiple criteria for assessment, such as credibility, transferability, dependability, confirmability, integrity, and generalisability (Gilbert, et al., 2010). The first two phases mostly focused on research, followed by the last two phases which shaped the ecosystem’s design (explained below):

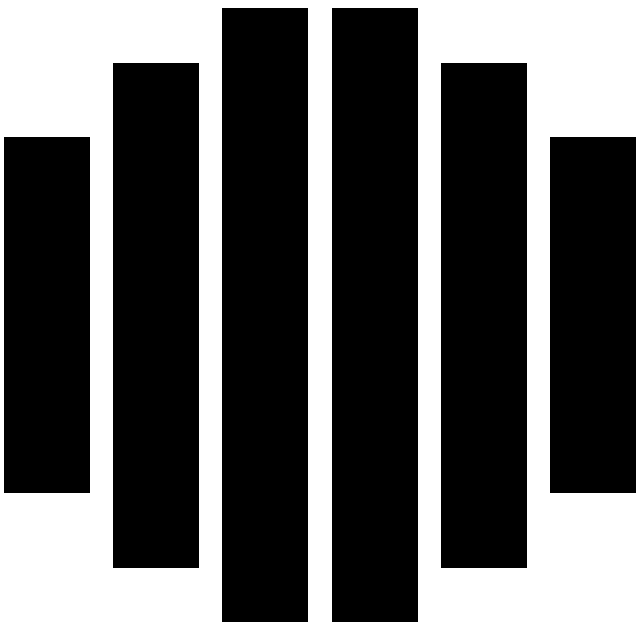
1. Discover: This phase used divergent thinking to focus on understanding the peculiarities and context specific problems of the healthcare industry /the UHCW. An integrative literature and practice review was conducted, combining service, digital and innovation ecosystems, sustainability (net zero and circular economy) and healthcare management literature. The informal interactions and interviews were conducted with the key informants, including sustainability managers, a resilience manager, facility managers, practitioners, circular economy experts, academics, a government advisor and healthcare professionals within the NHS, UHCW and private sector. The difficulty was to understand the root-causes of the unsustainability given the diversity of the perspectives, the large boundaries of the ecosystem and its complexities. Considering the ongoing polycrisis situation, it was challenging to keep key informants engaged with the topic as they were occupied with critical daily problems (e.g., strikes, staff shortage etc.) that threatened the survival of the NHS.

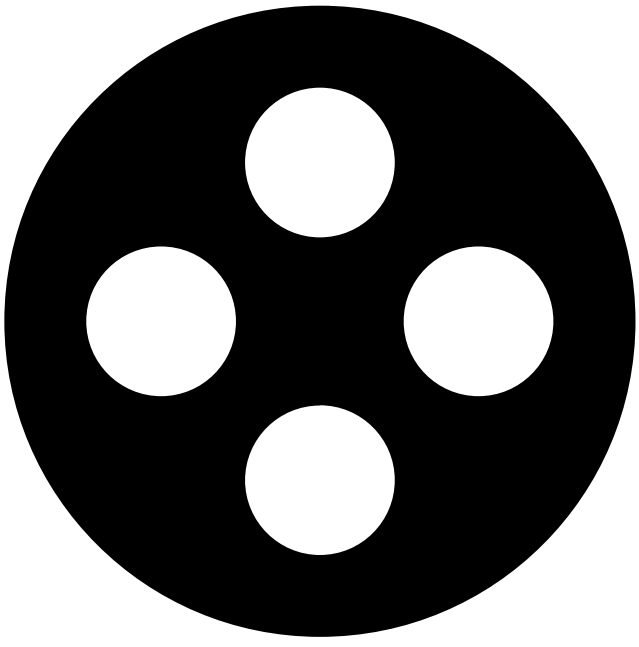
2. Define: This phase drew upon convergent thinking and exploration to define and simplify the challenge of mapping the net zero transformation in the UHCW ecosystem by identifying relevant actors, relationships, inputs, outputs and scales. During the workshops organised by Future Observatory at the Design Museum, the initial outputs were shared and discussed for visualisation.

3. Develop: This phase explored alternative designs by enabling creativity and a number of iterations to consolidate the UHCW ecosystem mappings for the net zero transformation. It was supported by a group of professional designers, including creative directors and data journalists.

4. Deliver: After developing several versions and approaches, a final concept and visualisation was selected with the designers. The final design was showcased at the Design Museum in London, and discussed with an audience of expects in the field.

Proposed design ecosystem The NHS is not alone on its journey to net-zero





As demonstrated in Figure 1, the ecosystem of UHCW is composed of:

- Market & government (venture capital, investors, universities, NHS executive, NHS, UK government and regulatory bodies)
- Innovation ecosystems (clean energy technology, food & nutrition technology, digital health technology, new materials, circular innovation, waste technology, green technology and med tech)
- Supply ecosystems (medical equipment, non-medical equipment, construction, energy suppliers, medicines & chemicals, clothing & disposables, food & catering and gasses & inhalers)
- NHS net zero ecosystem (Macro Level: professional associations, consultancies, medical research institutions, interest groups & communities, NGOs, local councils, social enterprises, charities, architects & construction; Meso Level: insurance providers, education and training, third party health services, laboratories, maintenance & repair facilities)
- NHS service ecosystem (hospital, medical staff, non-medical staff, catering, pharmacies, travel & transport, digital health services, community care, GPs, care home & hospices, ambulance services and patients -relatives and visitors)
- Waste ecosystems (clinical waste services, general & recycling waste services, waste electrical & electronic equipment, secure IT disposal, confidential waste services, hazardous waste services, water management and managed waste services)
- Digital infrastructure (Google cloud services, Amazon cloud services, portals, platforms, apps, NHS cloud services and software as service providers)

The mapping of UHCW ecosystem provides a structure and system of actors and their relevance/relationships for the realisation of the net zero goal by 2040. The ecosystem mapping also provides a simplified and holistic modelling of the complex and real-life network of actors working together to deliver healthcare while simultaneously transforming towards net zero. By differentiating between the levels (mega-macro-meso-micro) with a multilevel approach, a certain hierarchy is established that enables organised and purposeful innovation, new ways of thinking and new ways of working to realise the co-creation potential for challenging the dominant design.

The UHCW ecosystem mapping that has been developed can be used to design and analyse innovation and service ecosystems within different contexts at different levels. For example, having applied it to our case, it was clearly understood that the local UHCW ecosystem can't achieve net zero* without the global consensus and action of the market, government, supply, innovation, health service and waste ecosystems given the current lock-ins (structural and "justifiable" inertias and routines), path dependencies and contextual complexities (non-linearity, changing dynamics incl. politics, internal behavioural aspects -e.g., red tape culture and bureaucracy- and other latent externalities). Furthermore, achieving a real net zero requires some of the actors to go beyond their potential (e.g., renewable energy) and become net positive (climate positive) to offset the footprint of certain actors which might not be able to achieve net zero due to the perceived impracticality and non-substitutability (e.g., niche medical materials, devices, consumables and interventions).

**Currently, a net zero transformation of the UHCW by 2040 is at the ambition level. This ambition needs to be translated into actionable and granular activities by the NHS for each level of the ecosystem (mega-macro-meso-micro) rather than expecting trusts to figure it out themselves (in isolation and by duplicating*

the effort). Therefore, a more structured and methodological approach is fundamental to the realisation of net zero, which was a foundational premise for this UHCW ecosystem mapping. Accordingly, it can function as a blueprint to identify the meaningful intervention points and leverages.

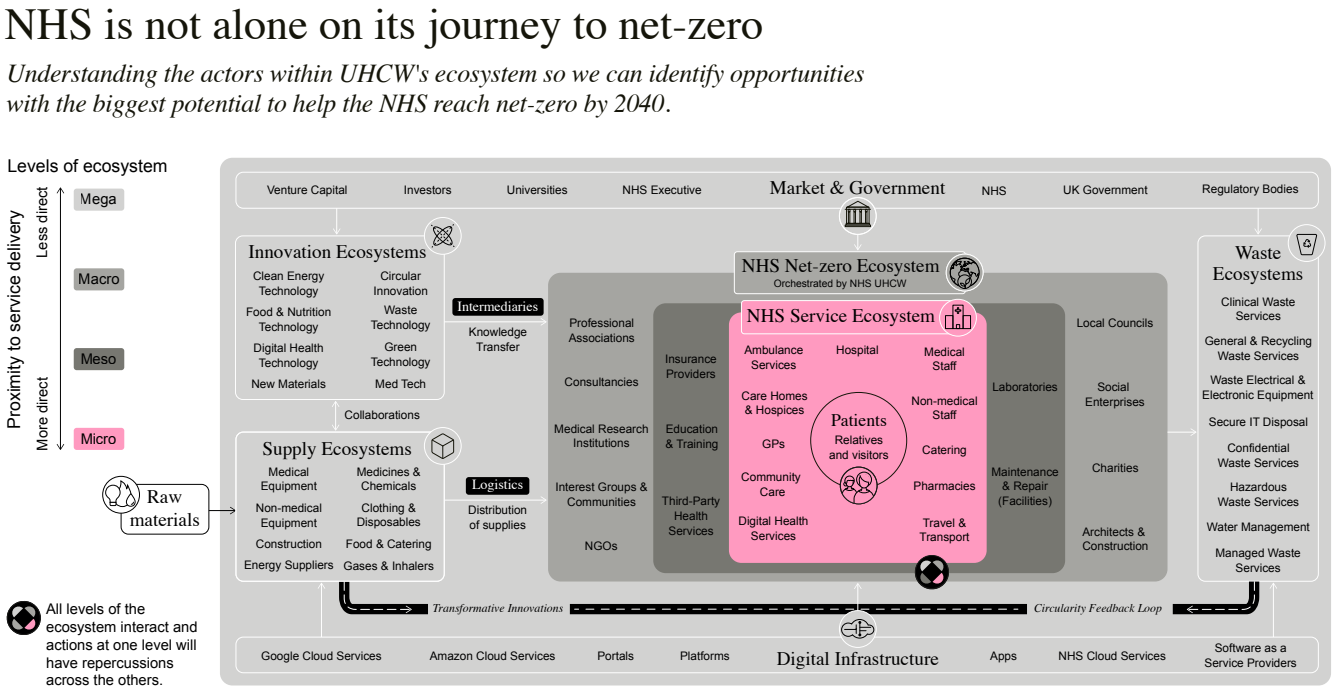


Figure 1. The mapping of the UHCW net zero ecosystem transformation

Design is a core element in the UHCW net zero transformation ecosystem, since the root causes of unsustainability are strongly linked to a dominant extractive design paradigm (as a norm since the first launch of NHS). Alternatively, regenerative and purposeful circular design encompasses different types of innovation, including product, process, business model, organisational and systems innovations that can enable change and co-existence with nature. Net zero should be perceived as an embedded norm by all the actors in any kind of activity/practice/standard rather than being an external criterion to comply with. Accordingly, upstream ecosystem design interventions would yield higher impact with less input and effort.

Target outcomes and priority action areas

The target outcomes of this work focuses on ensuring a holistic understanding and realisation of the net zero transformation in healthcare ecosystems, and the associated challenges. To prevent the net zero pledge being a “zero-sum game” (one actor’s gain -emission reduction- is equivalent to another’s loss) and a “planning fallacy” (optimism bias, wishful thinking and bystander effect that might lead to faulty reasoning, incorrect predictions, and underestimation due to the tendency of neglecting the past experiences and patterns that the overall data present), the NHS should establish a level specific (i.e., micro-meso-macro-mega)

and periodical sanity-check mechanisms and remain reflexive and critical to avoid bounded rationality by focusing on the optimal rather than the satisfactory.

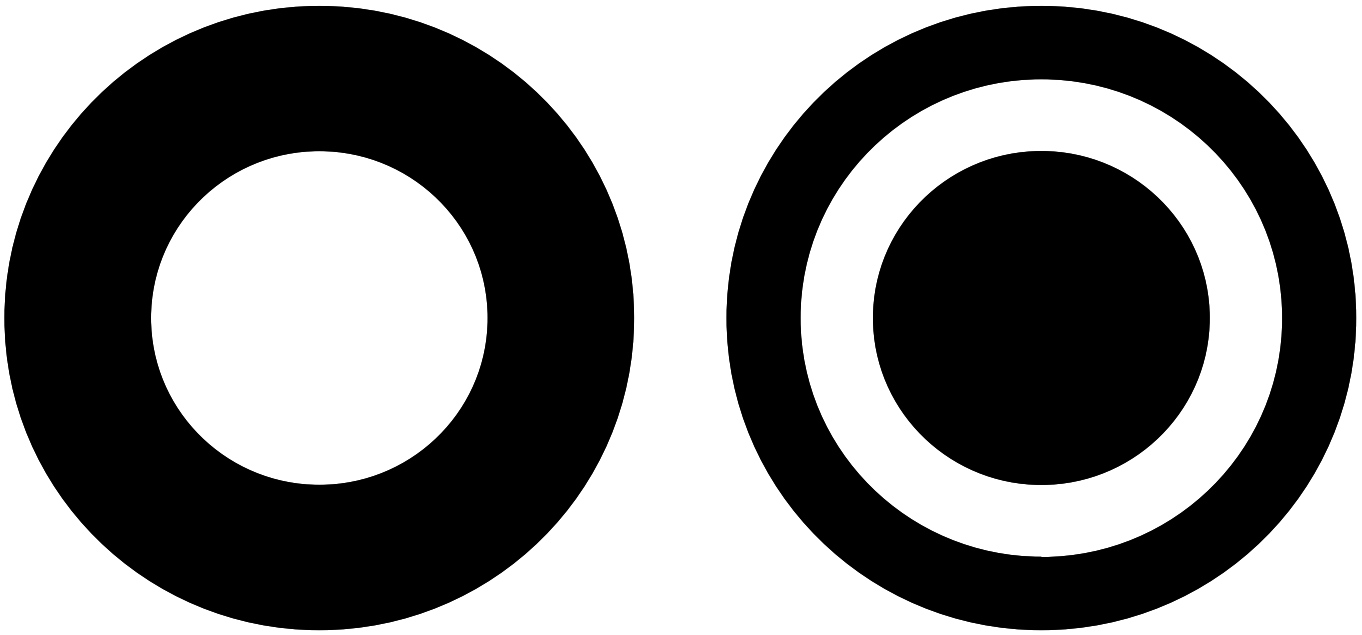
Beyond the existing partnerships, there is need for strong, well-coordinated, visible and open collaborations. and more knowledge transfers with transformational leadership between the UHCW and national/international universities/institutes from diverse disciplines*.This will facilitate and expedite the net zero transformation by upskilling and leveraging the learnings from success stories and failures.

**In particular, the relevance of social sciences (including the philosophy discipline: metaphysics, epistemology, rationality, and axiology) to life sciences can be utilised at different levels. The medical, nursing, midwifery, health, and pharmacy schools can integrate the sustainability teaching (with equal emphasis) to the curriculum with clear relevance to the rest of the practices and teachings. The transfer of knowledge from distant disciplines (incl. social sciences) and industries to healthcare practice and theory remains as an untapped potential that can be achieved in long term.*

Suggested actions

1. From integration to purposeful and effective orchestration: Beyond the integration of actors, an effective and purposeful orchestration is needed to make sure all the actors are committed and aligned with their actions towards the same direction to realise net zero. Given the limited capacity and finite resources of the NHS to have the visibility of such large ecosystems, the formation of a new auxiliary net zero orchestrator can be instrumental.
2. From internally focused innovation to externally focused innovation: The direction of innovation in the UHCW should transition from an internal to an external focus, as leveraging the skills and capabilities of ecosystem partners, transferring/adopting the existing solutions/ideas and creating a sharing culture would lead to amplification of the outcomes and prevent duplication of work.
3. From inertia to momentum: The UHCW (and the NHS as a collection of trusts) are large ecosystems in a highly regulated, bureaucratic and volatile landscape. The volume factor could stagnate a change or transformation, yet it can also be leveraged by means of exerting influence on the actors (e.g., suppliers and contractors) for a positive change such as net zero.
4. From trade-offs to synergies: Finite resources, time and limited capabilities and capacity are the reality of the net zero transformation. An informed strategy focusing on high impact, low resource interventions (e.g., bypassing or leapfrogging) can facilitate the net zero transformation with combined impact. As such, simple interventions of the individuals to have a healthier lifestyle and diet could yield a strong cumulative gain in terms of resources and footprint savings.
5. From downstream to upstream: The design focus should shift towards the upstream partners (including government policy making) by embedding net zero at the fuzzy front end (reframing the assumptions at initial stages of product or service design) and challenging the mainstream with purposeful redesign.
6. From autonomous to collectivist: The governance should move from the current competitive and selfish culture to a sharing and synergy culture as the net zero challenge and climate crisis concern everyone equally.
7. From firefighting to futureproofing: The NHS (in accordance with the UHCW and other trusts) should allocate resources to prepare for both climate induced disruptions and unforeseen and unprecedented externalities. This can be achieved through robust scenario plannings, methodological predictions of the future and effective response strategies for the long term.

Conclusions



Conclusions and achievements

The research sets out to provide a mapping of the UHCW net zero ecosystem with the guiding implications as presented. Achieving both net zero and the survival/viability of the UHCW ecosystem (the NHS at large) are not two separate discussions. Even though the net zero pledge adds an extra layer of responsibility and complexity to the mainstream healthcare management, the underlying philosophy for both pursuits stems from the premise of enhancing quality of life and keeping people alive. Therefore, net zero can be leveraged as an opportunity for the NHS to guarantee its survival/viability by redesigning with the purpose.

Most of the tools and technologies exist to achieve net zero already exist. The narrow anthropocentric focus of NHS trusts should shift towards a more biocentric perspective with the integration of human consciousness.

There is no evidence that the UHCW (and the NHS) can achieve the net zero target by 2040 as a large part of the journey remains ambiguous. The assumptions that were made to set 2040 as the target year might undermine the urgency of the climate change and climate induced risks (creating tendency to delay the potential disruptive innovations). These premises therefore call for a whole system redesign of the NHS.

Principal Investigator's personal evaluation

Given the polycrisis (leading to two thousand excess deaths per week) that the NHS and the UHCW are currently experiencing, it was challenging to discuss net zero with healthcare professionals. Although integrating net zero into the healthcare industry/ecosystem had its challenges, it was nevertheless possible to navigate through them. This led to creation of the UHCW net zero ecosystem transformation mapping, which is ready for further testing and consolidation.

Other outputs based on the research

A methodology and supporting tool for "the net zero transformation of ecosystems" can be produced and published as an additional output to this research.

Future research plans

- Translating net zero into actionable and granular practices for each level of the ecosystem
- Identifying the low resource high impact practices (potential disruptive and leapfrog innovations)
- Creating an alternative governance model that can support both the survival of the NHS and the net zero targets

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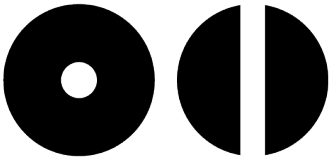

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