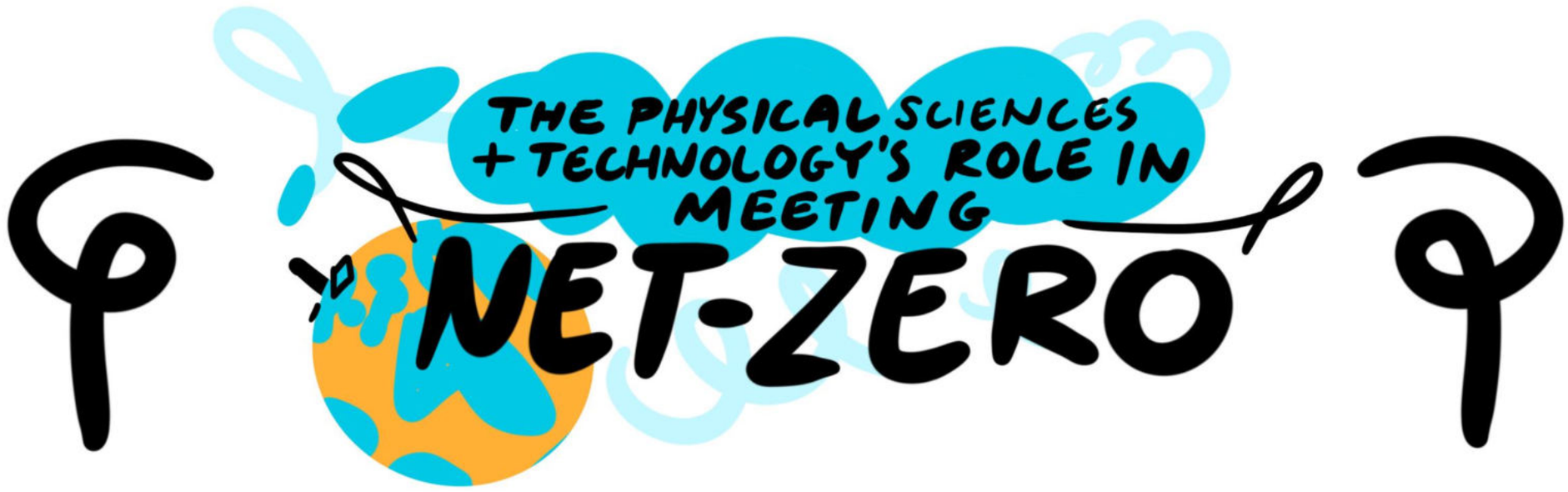
University of Cambridge Decarbonisation Network

Workshop report



Workshop organised by The University of Cambridge Decarbonisation Network and the School of Physical Sciences

21st April, the Maxwell Centre, University of Cambridge

UNIVERSITY OF CAMBRIDGE | CAMBRIDGE ZERO

About this report

This report summarises a workshop hosted by The University of Cambridge Decarbonisation Network and School of Physical Sciences aimed to provide an opportunity for networking and to identify:

- The current research landscape i.e. how attendees research relates to decarbonisation and key topics for collaboration within and across departments.
- Ongoing and potential industry collaborations i.e. where are there gaps in industry input and how research could (or couldn't) benefit from industrial engagement.

The workshop is summarised by live illustrations presented in this report. The workshop breakout discussions are captured in more detail in the Appendix.

Workshop objectives

To identify:

- Current research related to decarbonisation in:
  - the School of Physical Sciences (Faculty of Earth Sciences and Geography, Faculty of Mathematics, Faculty of Physics and Chemistry, Isaac Newton Institute for Mathematical Sciences) and
  - the School of Technology (Engineering, Faculty of Business and Management, Computer Science and Technology, Chemical Engineering and Biotechnology, Cambridge Institute for Sustainability Leadership)
- Where research can benefit from industry input.
- Crossovers with the Decarbonisation Network's SIGs (the Built Environment, Light Harvesting and Hard to Decarbonise technologies) and potential discussion topics for the Network's future events.
- Gaps in academic and industry collaboration where a new SIG could help.

Live illustration of break out group discussions. Artist: Thomas Mclean, Tom Draws

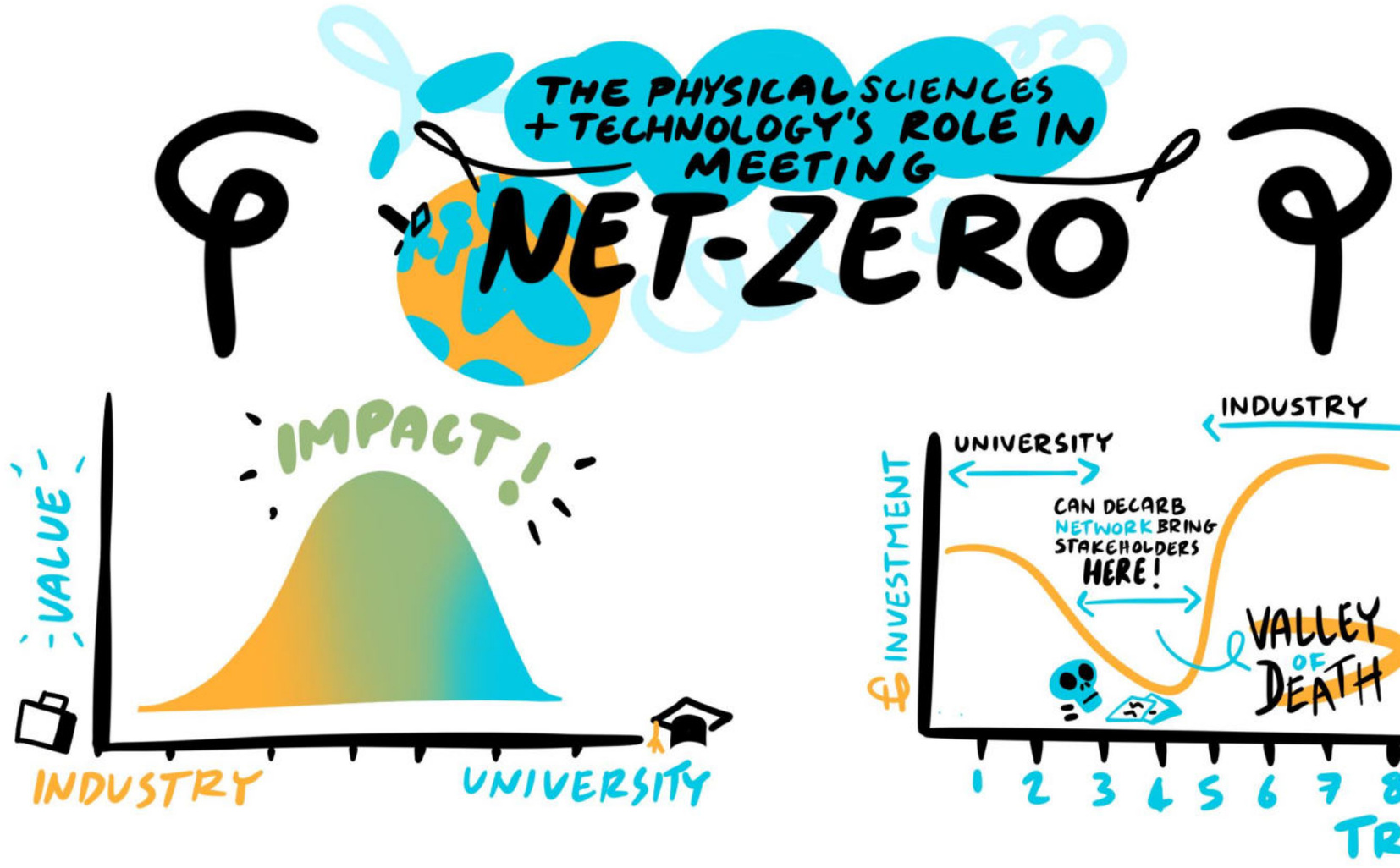
Industry collaborations

Group discussions

Live illustration of break out group discussions. Artist: Thomas Mclean, Tom Draws

Industry collaborations cont'd

Group discussions



Live illustration of break out group discussions. Artist: Thomas Mclean, Tom Draws

Which industrial sectors would you like to work with?

Group discussions

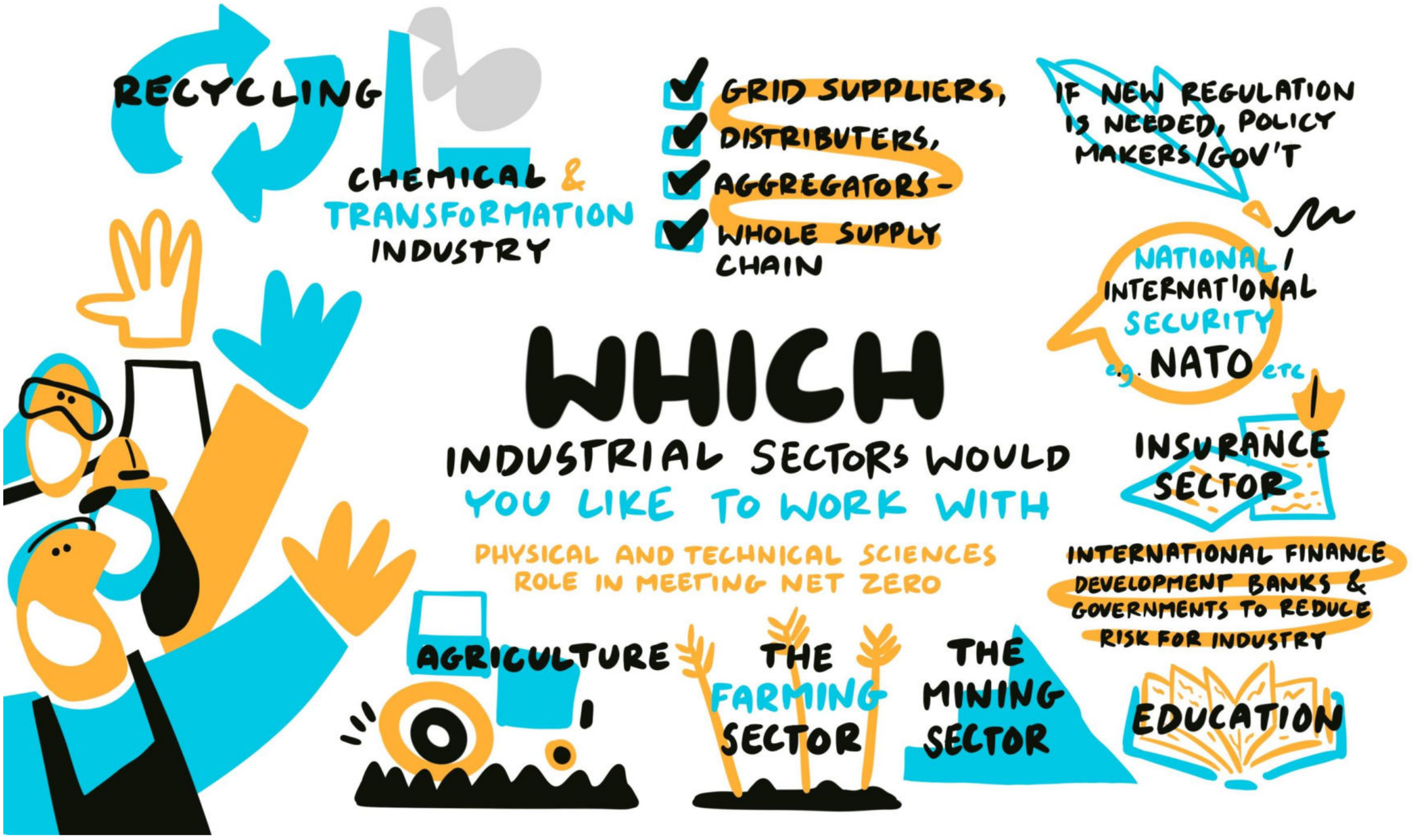
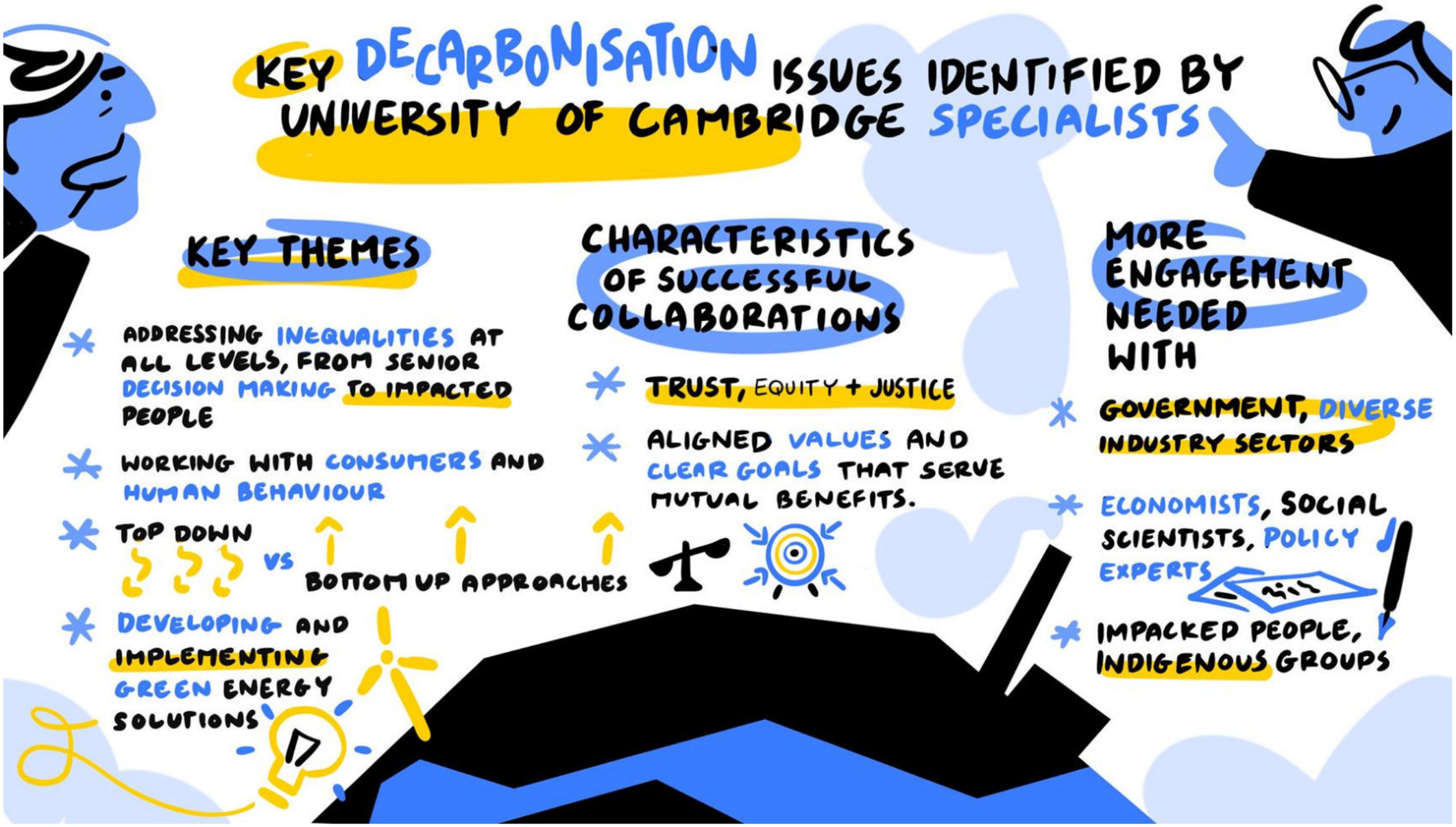


Illustration of break out group discussions. Artist: Thomas Mclean, Tom Draws

Key Decarbonisation Issues

The Decarbonisation Network also hosted an event 'How can the arts, social sciences, and humanities help us decarbonise?'. The following illustration represents key issues identified across both workshops.



Artist: Thomas Mclean, Tom Draws

Acknowledgements

Thank you to our attendees and breakout group facilitators.

We would also like to thank:

Nigel Peake, Head of the School of Physical Sciences, for supporting this event and opening the workshop.

The workshop facilitator: Bruce Rowling, Simply Change.

Thomas Mclean, Tom Draws, who illustrated the workshop live and whose illustrations appear in this report.

The events were funded by an internal award of funds, coming from the University's Enhancing Research Culture allocation from Research England. Thank you to the committee for this opportunity.

Attendees

27 people attended the event. Those that agreed to be named are:

Abir Al-Tabbaa, Department of Engineering
Aga Iwasiewicz-Wabnig, Department of Physics
Carmen Li, Cambridge Judge Business School
Charles Beard, Earth Sciences
Chunyan Dai, Cambridge Judge Business School
Ed Marshall, Cambridge Enterprise
Gareth Rees, Scott Polar Research Institute
Hannah Baker, Strategic Partnerships Office
Ioannis Lestas, Department of Engineering
Jinying Xu, Department of Engineering
Lara Allen, Chemical Engineering and Biotechnology
Luca Mannocchi, Cambridge Enterprise
Luoyan Chen, Institute for Innovation and Public Purpose, UCL
Manar Alsaif, Strategic Partnerships Office
Markus Hellenbrand, Materials Science & Metallurgy
Mónica Lucena, Maxwell Centre
Nathalie Muller, Cambridge Enterprise
Nigel Peake, School of Physical Sciences and DAMTP
Sarah Carden, Environmental Sustainability Team
Shafiq Ahmed, Energy IRC
Shaun Fitzgerald, Centre for Climate Repair
Simone Hochgreb, Department of Engineering
Tony Roulstone, Department of Engineering
Vegard Nergard , UIT The Arctic University of Norway / Scott Polar Research Institute
Xiang Cheng, Estates Division
Yolande Cordeaux, Chemistry

Appendix

In the workshop, four questions were posed to the participants in their breakout groups. The collective responses have been summarised in the main report. The following appendix provides a full list of the responses received, condensed to omit repetition.

The questions posed were:

First session

- What are the key issues/themes with respect to decarbonisation that connect you, or that you would be interested in exploring further?
- Are the current Special Interest Group (SIG) definitions sufficient for representing these themes?
- Who is missing from these conversations? Are the current SIG definitions sufficient for representing and why?

Second session

- What are the key industry sectors relevant to the proposed topics/themes?
- What are the characteristics of a successful academic/industry collaboration?
- How can the Decarbonisation Network help?

Biggest challenges to decarbonisation

Appendix a

- Just transition
- University silos
- Alternative processes for energy intensive industries
- Getting CMOS industry to adopt the promising energy-efficient research results
- Low carbon production of HP steam
- Space heating: heat pump or hydrogen?
- Supplying raw materials necessary of rollout of renewables

What are the key decarbonisation issues/themes that connect you or that you would be interested in exploring further?

Appendix b

- Decarbonisation of the University estate (consider budgets, mix of solutions and optimisation)
- Renewables and energy storage (e.g. hydrogen, optimisation, grid integration). Consider the system (timescale and applications), enabling breakthroughs?
- Hydrogen utilisation and large scale storage
- High efficiency electrolysis
- Bacterial/chemical conversion of CO2
- Improve efficiency of technology processes
- Increase integration and collaboration for energy efficient ICT (integration): ICT-related work is segmented: look to build on Royce, etc.
- Stop in-built obsolescence
- Data, simulation, modelling
- Data enabled circular economy
  - National highways
  - Supply chain & waste
  - Carbon reporting: standardise data, compliance (market mechanism), data and IoT, carbon tax (economists)
  - Standardised data collection for AI on decarbonisation
- Transport hub – land/air/sea (see CZ workshop)
  - Capacity to lead vs support team
  - Not enough academics or CZ or CISL to lead
- Electricity grids
- Transportation, aviation, drones
- Public engagement and understanding of what is possible/desirable/essential
- Human behaviour and land use
- Recognition of time frames: immediate/short term impact vs future climate emergency (2030-2050)
- Centralised vs. devolved energy supply
- Decarbonising whole systems
- Responsible innovation (unintended consequences)
- (possibly negative) Impacts of decarb on bottom half of world population
- How to accelerate implementation of new technology
- End of life of new technologies
- Energy intensive industries

Key industry sectors

Appendix c

- Agriculture
- The farming sector
- The mining sector
- Education
- International finance: development banks and government to reduce risk for industry
- Insurance sector
- National/international security, e.g. NATO etc
- If new regulation is needed, policy makers/gov't
- Grid suppliers, distributors, aggregators – whole supply chain
- Recycling
- Chemical and transformation industry

What are the key characteristics of a successful collaboration?

Appendix d

- Two-way trust and openness
- Shared values and ambition
- Complementarity and connecting the right people
- Offer solutions embedment and ensure 'translation' between sectors
- Aligned timescales, both on collaboration and outlook to results/impact.
- Balance short term challenge with discovery research. Research fuelling new ideas/disruption
- Co-ownership of goals, with long-term monitoring and coordination
- Reduce risk. Could gov. funding help esp. for high risk projects?
- For it to fly: tech needs to work, to be safe (same or better than existing tech), and to be economically viable.
- Consider different models of collaboration, e.g. subscription based or consortium if too much for one company, but manage sensitivity and efficiency. Also different approach depending on company (e.g. public vs private, large enterprise vs SME)
- Recruitment of students after projects, companies want students with "skills to switch" – diverse knowledge
- Open source tools and data sharing from across supply chain on both sides.
- Strategic relationship (vs reactive/transactional)
- Clear IP strategy and mutually beneficial
- Following through with momentum from ideation to project work
- Informed by market need and analysis/research, or solving long-standing, difficult questions
- Modelled on previous best practice, e.g. MRC LMB/A2/Whittle etc
- Influencing funders (format, delivery, recognise challenges of co-funding etc)
- Collaborators achieve success according to their own measures. Examples of benefits to industry
  - Insights to improve their competitiveness/baseline
  - Fundamental research pipeline
  - Brand/positioning
  - Access to broader academic community
  - IP development of emerging tech
  - Recruitment (visibility)
  - opportunity to influence, e.g. get their perspective across in conjunction with a recognised stakeholder
  - Leveraging PR/comm's of industry collaboration
- Note: TRL4 gap support

Suggestions for SIGs

Appendix e

SIG suggestions:

- Waste revalorisation
- Life cycle analysis, cradle to grave
- Ensure whole system thought
- Key advances in the SIGs overlap: how to manage/exploit
- Food production & waste
- Clean water & sanitation
- resilience
- Sustainable natural resources

Who is currently missing?

- Supply chain resilience
- Supply-materials-usage and security
- Economy of energy transition
  - Economics of heating, politics surrounding this
  - Networks or heat and electricity
- Systems integration
- Consumer/regional economies
- Social scientists
- Behavioural science
- Earth and environmental scientists
- policy experts
- Indigenous groups
- Farmers and food producers
- End users

How can the network help?

Appendix f

- Awareness of university research, build cross departmental communities
- Positioning research & communication
- Case studies of multidiscplinarity and big grants
- Test of SIG importance – could it be a CDT?
- SPO/Decarb Net to help maitain/develop company relationships
- Research symposia/seminars (PIs and early careers)
- 3min pitches (post docs) – online?
- Set quantitative goals
- Thought experiments to catalyse collaboration
- Research call as incentive, or admin support for big calls (grant writing)
- Invite insurers to talk to academics about risk
- Break down disciplinary silos, shift culture & push acceptance of other disciplines
- Co-creation with end users
- Don’t feed the lawyers (patents)
- Key is connecting with middle-tech people in industry
- Organisational memory (addressing large turn-over of personnel)
- Share industry contacts & challenges
- Cambridge needs to know who does what & who could work with whom