Institution: University for the Creative Arts		
Unit of Assessment: Unit 32 – Art and Design: History, Practice and Theory		
Title of case study: Repair Cafés: Implementing Circular Economy Innovation [https://research.uca.ac.uk/5589/]		
Period when the underpinning research was undertaken: 2008-2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Prof. Martin Charter	Director of the Centre for Sustainable Design	28/02/06 – present
Period when the claimed impact occurred: 2014 - ongoing		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact

The impacts created by Professor Martin Charter and The Centre for Sustainable Design® (CfSD) are in the area of Circular Economy social and business innovation. Impacts are led by new approaches to understanding and developing Repair Cafés:

- Farnham Repair Café was set up as a community initiative and 'living laboratory' to enable repair at a local level and to develop understanding of the global Repair Café movement's activities and its participants' motives. New knowledge amplifies the Repair Café movement's efficacy as an agent for change.
- Farnham Repair Café has saved £105,582 for its visitors, diverting 3.8 tonnes of waste from landfill and preventing 35.5 tonnes of CO^2 emissions, and it has supported the setting up of new Repair Cafés elsewhere.
- The creation of an online Carbon Calculator tool allows Repair Cafés to quantify the CO^2 saved by their repairs enabling the Repair Café movement to make the connection between the Circular Economy and mitigation of climate change.

The Repair Café research is situated within broader Circular Economy innovation research by Charter and CfSD which has led or contributed to:

- New British and international standards— BS 8001:2017 is the world's first standard for businesses implementing Circular Economy principles; ISO14006:2020 incorporates eco-design in environmental management systems for businesses.
- Changes in the knowledge base of policy-makers—including those in the European Commission Directorate-General Research and Innovation Department, and the European Commission Joint Research Centre—leading to new consideration of the Circular Economy in the policies that shape business and the economy.

2. Underpinning research

The Centre for Sustainable Design® (CfSD), located in UCA's Business School for the Creative Industries, has a long history of influential research into product sustainability and sustainable innovation. This case study focuses on research and impact in the Circular Economy (CE), aligned to the UN Sustainable Development 2030 Goals, in particular Goal 9, Innovation, and Goal 12, Responsible Consumption and Production. Charter's research generates insights into implementing CE principles to create a world in which the prevailing economic and social model is to retain value in products, components and materials through reuse, repair, refurbishment and remanufacturing.

Charter's 2019 edited book *Designing for the Circular Economy* (**R1**) is the summative output from this research. It draws together advanced thinking on replacing linear models with circular ones and extending product life. The book contains 34 chapters, and in addition to editing the collection, Charter authored/co-authored 4 chapters on the role of the Repair Café in the Circular Economy and on business models for Circular Economy innovation.

Charter, with CfSD researcher Scott Keiller (now UCA's Sustainability Officer), conducted and published the first ever global survey of Repair Cafés in 2014, revealing the activities and motivations of Repair Café participants across the world. The research was further developed in

the setting up of Farnham Repair Café (FRC) in 2015 as a local community initiative and 'living laboratory' of CE social innovation and behavioural change. FRC has focused both on delivering local environmental and community benefits, and on furthering understanding of the Repair Café as a Circular Economy social innovation space.

Further global Repair Café surveys and a survey based on FRC were conducted by CfSD in 2016, 2019 and 2020. The 2019 survey was a collaboration between Charter, Erasmus University NL, the University of Manchester, and Martine Postma, founder of the Repair Café community. As well as looking at motivations, it explored the ways in which Repair Cafés are organised, and how they interact and overlap with each other and with other organisations beyond the Repair Café community. The results were launched at the UK's first ever Repair Café conference, organised by CfSD in 2020. Also launched at the conference was an open-access online Carbon Calculator tool that allows Repair Cafés to determine the carbon savings from their repairs. This was based in part on data collected at FRC and was developed in collaboration with FRC trustee Stephen Privett.

CfSD's Repair Café research provides case studies and analysis that details insights into the role of repair organisations in the Circular Economy, as described in **R1** chpts 19 & 25. **R2** presents the Repair Café surveys, along with further analysis in a paper in the *Journal of Peer-Production*. Systematically collecting and analysing data from FRC activities has helped to reveal the nature and effects of Repair Cafés, and the research fills an evidence gap that has existed since Repair Cafés started in 2009. Its insight is the potential of community-led CE actions for environmental change.

Charter's research into Repair Cafés intersects with other CfSD Circular Economy projects which have worked with SMEs to investigate and promote sustainable development. This research builds on CfSD's REF 2014 impact case (and see **R3**). Since 2014 a developing focus on circular business models has led to CfSD's involvement in two projects funded by the EU Northern Periphery and Arctic (NPA) programme, Circular Ocean (2015-18) and Blue Circular Economy (2018-22), which builds on Circular Ocean's aims and insights. In Circular Ocean Charter worked with UCA doctoral student Rhiannon Hunt and CfSD's Scott Keiller. They collaborated with partners in Scotland, Denmark, Ireland and Norway to address the Entrepreneurship strand of the NPA programme, researching how start-ups and SMEs can reuse waste fishing nets and ropes in new product development. CfSD, although not in the NPA area, was brought into the project to contribute specialist expertise in eco-innovation and SMEs. Charter and CfSD published 6 research reports and feasibility studies and produced a new Circular-Ocean-specific version of CfSD's *Eco-innovation Guide for Start-ups, Entrepreneurs & SMEs* (**R4**). The insights from this research are a range of methods to stimulate CE innovation; one such method, the 'serious game', is described in **R5**.

3. References to the research (submitted to REF2 or available via links or on request)

Quality is evidenced by peer-reviewed publications and peer-reviewed funding awards. Circular Ocean won the RegioStars 2016 Public Choice Award.

R1 Charter, M. (ed.) (2018) *Designing for the Circular Economy*. London: Routledge, https://doi.org/10.4324/9781315113067, **Edited Book**, **REF2**, peer-reviewed, with 4 chapters authored / co-authored by Charter:
Chpt 3) 'Circular Economy innovation and design: setting the scene'
Chpt 9) 'Business models for a Circular Economy' (with McLanaghan, S.)
Chpt 19) 'Repair cafés: implications for product design and development' (with Keiller, S.)
Chpt 25) 'Repair cafés: circular and social innovation' (with Keiller, S.)

R2 Charter, M. *et al* (2014-20) *Repair Cafés,* **Multi-component Output** comprising 4 research reports into Repair Cafés and a paper in a peer-reviewed journal:
- Charter, M. and Keiller, S. (2014) *Grassroots Innovation and the Circular Economy: A Global Survey of Repair Cafés and Hackerspaces*
- Charter, M. and Keiller, S. (2016) *The Second Global Survey of Repair Cafés*
- Spekkink, W., Rödl, M. and Charter, M. (2020) *Third Global Survey of Repair Cafés*

- Charter, M. and Whitehead, P. (2020) *Farnham Repair Café Survey of Customers*
- Charter, M. (2018) 'Repair Café', *Journal of Peer Production,* Issue 12 [https://research.uca.ac.uk/5588/]

R3 Charter, M. and Clark, T. (2008) 'Product Sustainability: Organisational Considerations', *International Journal of Product Development*, Interscience Publishers, 6:3-4, pp. 251–275, **Journal Article**, peer-reviewed (http://dx.doi.org/10.1504/IJPD.2008.020405)

R4 Charter, M. *et al* (2016-20) *Circular Ocean,* **Multi-component Output** comprising the research in Circular Ocean and Blue Circular Economy: six reports by Charter and others and a new edition of the CfSD *Eco-Innovation Guide for Start-Ups* [https://research.uca.ac.uk/5586/]

R5 Bontoux, L., Sweeney, J.A., Rosa, A.B., Charter, M., *et al* (2020) 'A game for all seasons: lessons and learnings from the JRC's Scenario Exploration System', *World Futures Review*, 12:1, **Journal Article**, peer-reviewed (https://doi.org/10.1177/1946756719890524)

Funding €568,393 (£494,00 approx.)

- **Circular Ocean** 2015-18, EU Northern Periphery & Arctic Programme, €305,158
- **Blue Circular Economy** 2018-22, EU Northern Periphery & Arctic Programme, €263,235

4. Details of the impact

Dissemination: Repair Café research, pathways to impact

Repair Cafés are part of a 'maker, modifier and fixer' movement that looks beyond throwaway culture, encouraging people to repair and reuse broken items. Farnham Repair Café (FRC), co-founded by Charter in 2015 (in a partnership between UCA, Farnham Town Council and Spire Church), has held 60 sessions, welcoming 3,022 visitors (**S1**). The FRC acts as a living laboratory to undertake and disseminate research; CfSD has completed 8 workshops, webinars and events based on data and experience from FRC activities, including the UK's first Repair Café Conference (March 2020), with 80 delegates. Over 290 people have engaged with all FRC events (**S1**). FRC has featured on BBC TV, BBC radio, Brazilian TV, Taiwan TV and in local press reports and blogs (including a 2016 post by Charter on the blog of the science journal *Nature*), demonstrating public engagement (**S2**). Farnham Repair Café has direct impacts locally in Farnham, and its experience has been used to stimulate other Repair Cafés both locally and internationally and to create tools to help them evidence their value.

Impact: Farnham Repair Café benefits the local environment, economy & community

The 60 sessions of FRC have completed 1,320 repairs, saving visitors £105,582 by enabling them to continue to use an old product rather than buying a new replacement. As a result, 3.8 tonnes of waste have been diverted from landfill and 35.5 tonnes of CO^2 emissions have been avoided (**S1**). In addition to these benefits for the environment, the FRC has valuable social benefits for both volunteers and visitors: '*it was good to see volunteers working together to help people'*; *'a wonderful idea saving us all time, trouble and money'* (**R2**, 2016 survey). The latest survey of FRC customers evidences behavioural change in that 33 per cent of FRC's visitors gain confidence and knowledge to complete a repair on their own (**R2:** 2020 FRC survey). 98 per cent of FRC's customers are satisfied with their visit. Survey data shows that this results not just from successful repairs, but also from the strong sense of community spirit, proving the social benefits of sustainability in the local community (**R2**: 2020 FRC Survey).

Impact: formation and development of other Repair Cafés, locally and globally

Charter, CfSD and FRC have encouraged the establishment of other Repair Cafés, providing advice and support, benefitting the Repair Café movement. In November 2020 CfSD invited participants from the Repair Café Conference and a series of webinars held in the summer of 2020 ('Managing Repair Cafés'; 'Repair Café Learning'; 'Repair Cafés in Lockdown') to complete a feedback survey (**S3**). Of the respondents who were new to the Repair Café movement, the survey revealed the impact of the conference and webinars in stimulating new Repair Cafés. One respondent reported that attending the conference was *'transformational'* in motivating him to establish a Repair Café in Epsom; another volunteer (also from Epsom) noted that as a result of CfSD events *'we now have the know-how and confidence to start our own repair café'* (**S3**). Delayed by COVID-19, Epsom Repair Café commenced in early 2021. Other respondents reported their concrete plans to establish Repair Cafés in the near future

(**S3**). Respondents to this feedback survey who were already involved in running Repair Cafés also reported positive change; the 'Repair Cafés in Lockdown' webinar inspired at least 4 Repair Cafés that had closed during the COVID-19 outbreak to re-open using online, 'click and collect' or drop off/pick up models (**S3**). Earlier evidence (**S1**) shows how FRC encouraged and supported the formation of new Repair Cafés locally at Alton, Bordon and Basingstoke.

In 2019 Charter was invited to visit National Sun Yat-sen University in Taiwan by the Co-PI of a Social Responsibility research project at the University, who had encountered Charter's Repair Café research in *Designing for the Circular Economy* (**R1**). Charter worked with NSYSU staff and students and local community groups on projects to establish Repair Cafés (**C1**). In 2020 he returned to Taiwan to take part in a programme of activities that culminated, (later than planned due to COVID-19), in the launch of the Southern Taiwan Repair Café Alliance, establishing the first Repair Cafés in this new global territory (**C1**).

Impact: providing a knowledge base to advocate for Repair Cafés worldwide

FRC trustee Stephen Privett used data from FRC and other Repair Cafés to develop a methodology for calculating CO^2 emissions saved by successful repairs, demonstrating that Repair Cafés provide the potential to mitigate an average of -24 kg CO^2e of greenhouse gas emissions per completed repair. Based on this method, an online Repair Café Carbon Calculator was launched by CfSD/FRC at the Repair Café Conference in 2020. From April – December 2020 it was used 988 times on the FRC website, providing a simple tool to benefit the Repair Café movement by enabling Repair Cafés across the world to prove their efficacy.

The Professor at NSYSU Taiwan notes how the Taiwanese Repair Café Alliance has adopted the Carbon Calculator, as *'it is clear that we need systematic data to show the impacts of repair activities'* (**C1**). In the November 2020 feedback survey a number of volunteers from other Repair Cafés reported on take up of the Carbon Calculator. At least 7 had adopted the calculator since its launch or were planning to use it: *'we will be updating our recording methods and using the online calculator to see the savings our individual café makes'; 'the calculations of the impact that the repairing has had on the environment is really motivating'; 'we can use the repair data to make a better case for repair'* (**S3**).

The Director of the Repair Café International Foundation (RCIF) reinforces how the Carbon Calculator allows Repair Cafés worldwide to *'better quantify the CO^2 emissions associated with repairs',* noting that, *'this is a useful resource for RCIF in helping to create the links between circular economy, repair, and climate change'* (**C2**). This source also notes how CfSD's Repair Café surveys *'have significantly helped increase the understanding of the Repair Café movement worldwide'* (**C2**), showing that Charter and CfSD have changed understanding of the environmental and social benefits of the Repair Café model. Charter and CfSD's Repair Café research influences policy-makers looking to implement alternatives to 'take, make, waste' economic models. The Repair Café research in **R2** is cited in a 2016 UK Parliamentary Office of Science and Technology (POST) policy briefing, *Designing a Circular Economy* (**S4**). Charter's work to collect data on repairs at the FRC, and the second Repair Café Survey (**R2**) are discussed in the United Nations Environment Programme report, *Redefining Value: the Manufacturing Revolution* (2018) (**S5**).

Dissemination: wider Circular Economy research, pathways to impact

The Repair Café project forefronts Charter and CfSD's broader research into the Circular Economy. This research has been disseminated in multiple ways: the CfSD has run annual Sustainable Innovation conferences since the late 1990s, which to date have attracted more than 2,700 delegates from 50-plus countries. Since 2018 it has staged 22 free webinars on all aspects of Circular Economy innovation. As part of the Circular Ocean project, Charter has run workshops based on his eco-innovation and CE methodologies including a 'Net Hack Challenge' to develop new products from waste nets and ropes, and a 'Chem Hack Challenge' to work with contaminated nets. He has also co-delivered a new application of the EU Scenario Exploration System ('serious games') as a mechanism to enable stake-holders to address the problem of waste nets and ropes (**R5**). CfSD and Charter deliver training to private and public

sector bodies across the globe, and Charter is a Chinese Government High Level Foreign Expert at Renmin University and team leader of the EU-China Ecodesign and Standards Cooperation Project. These pathways ensure that the research has been influential in changing thinking about Circular Economy innovation, and is taken up by beneficiaries including EU policy makers and international standards bodies.

Impact: changing the approach of policy-makers in the EU, China and globally

In 2019 Charter was commissioned by the European Commission to lead research for a report evaluating how CE principles were reflected in funded research and innovation projects (**C3**). The Policy Officer who commissioned Charter states that he did so because of his research in *Designing for the Circular Economy*, his work with *'citizen-oriented initiatives'* and his record as *'one of the top experts in CE'* (**C3**). The report makes recommendations for developing EU CE policy, embedding CE principles in future R&I funding. The Policy Officer describes how the report's findings feed into implementation of *'follow-up actions to the new Circular Economy Action Plan, on packaging, consumer empowerment, green claims, and on sustainable product policy'* (**C3**). In 2020 Charter was commissioned by the Italian Ministry of Foreign Affairs to write the report *The Role of the G20 in Support of the Circular Economy*, for Italy's 2021 G20 Presidency. This has been disseminated to policymakers in Italy, and globally via CfSD webinars. As team leader of the EU-China Ecodesign and Standards Cooperation Project, Charter exchanged best practice on ecodesign with Chinese policy-makers in the Ministry of Industry & Information Technology (MIIT). The EU Project Manager on this project notes that his research is *'well-known'* in MIIT, and the project saw a linking of CE policy to *'major flagship policy areas'* with *'consequent increase in interest on the part of the Chinese government'* (**C4**).

Impact: influencing standards organisations, and through them, businesses

Charter's research in eco-innovation and CE has also led to his role in drafting national and international standards to shape how Circular Economy and ecodesign principles are implemented, benefitting businesses and shaping policy (**C4**). Charter was invited to serve on the British Standards Institute panel that drafted BS 8001:2017, *'the world's first practical framework and guidance . . . for organizations to implement the principles of the circular economy'* (**C5**). In 2020, Charter was elected UK head of delegation to ISOTC323, focused on the development of four international CE standards. Charter was Chair of the International Standards Organisation's panel of international experts that developed ISO14006:2020. This is a revision of the 2011 standard (also convened by Charter) that sets guidelines for incorporating ecodesign into Environmental Management Systems (EMS). The new standard includes detailed alignment to revisions in ISO14001:2015 (EMS) and ISO9001:2015 (Quality Management Systems) and to IEC62430:2019, another new design standard on ecodesign, for which Charter also served as the UK ISO expert. The Sub-committee Chair for ISO environmental management standards notes that ISO14006 is *'excellent guidance to environmental managers on how to manage ecodesign'* (**C5**). It is a guidance standard for use with the master standard for EMS, ISO14001; this has 350,000 certifications worldwide, indicating, as noted by the Chair, the reach of this impact (**C5**).

5. Sources to corroborate the impact

(available from UCA on request; **S** = documentary/online source; **C** =corroborator/testimonial)

S1 Repair Cafés: Implementing Circular Economy Innovation, Quantitative Report
S2 Repair Cafés: Implementing Circular Economy Innovation, Media Report
S3 Repair Cafés: Implementing Circular Economy Innovation, Participant Feedback
S4 POST (2016) *Designing a Circular Economy*
S5 United Nations (2018) *Redefining Value: the Manufacturing Revolution*
C1 Letter from Co-PI, Socially Embedded Comm. Engagement, NSYSU Taiwan (Corrob.1)
C2 Letter from Director of Repair Café International Foundation (Corroborator 2)
C3 European Commission (2020) *Products and Circular Economy* and Letter from Policy Officer, European Commission Directorate General for Environment (Corroborator 3)
C4 Letter from EU Project Manager, EU-China Ecodesign & Standards Project (Corrob. 4)
C5 Standards: Letter from ISO Sub-Cttee Chair, and BSI 8001 overview (Corroborator 5)