Design Guidelines and Canvas for More Sustainable Leather Products – The Role of Design as a Driver for Sustainable Leather Goods in the 21st Century

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ABSTRACT:

Leather as an ancient material features characteristics and material properties that in many cases relate to sustainability by default (e.g. durability, repairability and aesthetically pleasing ageing). At the same time, in contrast, highly complex and non-transparent leather supply chains and increasing functional and aesthetic demands lead to problematic conditions regarding, for instance, the leather chemistry.

In line with regulatory developments (e.g. the EU Green Deal and related policies) and growing consumer awareness, many companies in the leather supply chains are striving to use "more sustainable chemistry" and to produce "more sustainable" leather goods. In the early phase of product development, design decisions (including sourcing and LCA) offer big opportunities in this competitive market. However, because of the technical and structural complexities, it is hardly possible to provide a list of design aspects that lead to more sustainable leather goods by default. The herewith presented concept of "Leather Design Guidelines for Sustainable Development", including the "Leather Product Design Canvas", aims to support the product development process of leather goods in favour of sustainable development by offering methods, case studies and paradigms that help designers, product managers and other parties involved in this process.

Based on the results of a transdisciplinary research project (including a scenario process) both guidelines and canvas as part these guidelines are being developed together with representatives from organisations along the leather value chains, as well as NGOs, as part of the project "Systeminnovation: Nachhaltige Entwicklung (s:ne)" at the Darmstadt University of Applied Sciences. This project relates directly to three other subprojects on traceability of chemicals along the supply chains, on chemical and process innovations for a more sustainable leather chemistry and, building on the results from the other subprojects, on harmonisation of standards.

This paper outlines the work done so far in drafting these guidelines. In order to present the overarching framework for the guidelines, the "Leather Product Design Canvas" draws links between general design process aspects and approaches for sustainable development that relate specifically to leather products. From this perspective, innovative systemic solutions as well as

business models (i.e. product-as-a-service offerings) can be developed that go beyond current approaches of leather product design. In a later phase of this project, the guidelines will be applied to one or more products as pilot studies to evaluate them regarding usability and effectiveness.

1 Aiming for More Sustainable Leather Products

Sustainable development, as operationalised by the United Nations' Agenda 2030[2], is a complex and multi-faceted issue. Many of the challenges associated with sustainable development are often referred to as a (super) wicked problem[3]. As outlined by Levin et al.[4], super wicked problems do not only consist of a number of complex and interdependent challenges. Moreover, solutions to one problem might create another problem.

The same applies to the leather industry and leather chemistry in general as well as to the design of more sustainable leather products. The global leather supply chains are complex, diffuse and interdependent systems. Many different production steps across continents, carried out by different companies, are required before a consumer product reaches the place where it is sold. As with most other industries, throughout this process, enormous amounts of chemicals are applied, which can be harmful to humans and the environment, energy is used and CO2 is emitted. For a leather product to be declared "sustainable" to some extent, a systemic perspective is required.

This applies, in particular, with regards to the 11 targets summarised by SDG 12 "Ensure sustainable consumption and production patterns". Designing more sustainable leather products involves a number of aspects, approaches and perspectives that relate to various aspects of sustainable development. Designers and others involved in the development process of new leather products often face the difficulty gaining an oversight of these issues and developing a systems perspective to create more sustainable products. While not all of these topics necessarily need to apply to each individual project or product, gaining an oversight and considering their role in the design process is

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[2] United Nations (2015): Transforming our World. The 2030 Agenda for Sustainable Development. Hg. v. United Nations.

[3] Rittel, H. W. J.; Webber, M. M. (1973): Dilemmas in a general theory of planning. In: *Policy Sciences* 4 (2), S. 155-169.

[4] Levin, Kelly; Cashore, Benjamin; Bernstein, Steven; Auld, Graeme (2012): Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. In: *Policy Sci* 45 (2), S. 123-152. DOI: 10.1007/s11077-012-9151-0.

crucial to making an informed design decision. This requires an interdisciplinary approach that avoids "silo thinking", simplistic solutions and rebound effects (negative side effects caused by a singular improvement).

As a means to quickly cover all these topics in a first easy-to-access manner, an interdisciplinary group of experts, including, inter alia, design researchers, chemists, leather experts, developed the following Leather Product Design Canvas. It is based on the concept of the „Business Model Canvas" (BMC) proposed by Osterwalder in 2005 and refined since then[5]. According to van Boeijen and colleagues the canvas „as a tool can be used in various stages of the development process […] The Business Model Canvas serves as a checklist to generate business ideas; it also structures, discusses, and evaluates these ideas on a conceptual level"[6].

The Leather Product Design Canvas[7] makes use of a similarly conceptual and graphical structure while comprising more refined elements and specific impulse questions to raise awareness and guide design processes. It aims at supporting the product development and design process of leather products to create more sustainable products. This shall be achieved by providing a quick and multi-perspective overview of relevant topics and considerations. One reason for this approach is that in many cases the designers of leather products such as shoes or bags do not necessarily need to be leather experts. Even interdisciplinary design teams might not include experts that understand both issues of sustainable development and material properties of this versatile material. Moreover, the complexity of the material leather and its various types of application would usually require a

[5] Osterwalder, Alexander; Pigneur, Yves (2013): Business model generation. A handbook for visionaries, game changers, and challengers. New York: Wiley&Sons.

[6] van Boeijen, Annemiek; Daalhuizen, Jaap; Zijlstra, Jelle (2020): Delft design guide. Perspectives, models, approaches, methods. Revised edition. Amsterdam: BIS Publishers. p. 135.

[7] Rehn (2021): Leather Product Design Canvas. Darmstadt University of Applied Sciences, Germany. DOI: 10.48444/h_docs-pub-253

number of different experts to cover the most relevant topics related to sustainable development in order to identify possible rebound effects and systemic interdependencies of certain design decisions. The herewith presented canvas does by no means compensate for these expertise but aims at empowering design teams to take first steps towards more sustainable leather products based on a broadened scope while identifying knowledge gaps or the need for specific experts to be consulted or included in the design team.

One of the key challenges in designing more sustainable products is to improve specific aspects of a product or its ecosystem while avoiding purely "symbolic" actions, managing potential target conflicts and without creating negative side effects regarding another aspect. Therefore, this canvas illustrates relevant elements at one glance, raising awareness for their interdependencies. The Canvas, however, does not replace thorough analysis of these aspects, but rather aims at providing a multi-perspective overview and explorative impulse to foster more sustainable approaches. In line with this, the canvas is not a scientific analysis tool that results in more sustainable leather products by default. Its main function is to illustrate a comprehensive overview that informs and guides the design process through structure and impulse questions. In this way, otherwise potentially neglected issues such as pre- or post-consumer recyclability or sourcing is put into the centre of awareness.

1.1 Background and Development of this Canvas

This canvas is a first spin-off from the project "design guidelines for more sustainable leather products"[8] as part of a transdisciplinary research project at Darmstadt University of Applied Sciences aiming for more sustainable chemistry in the leather supply chains[9]. It is part of a comprehensive transformative research project aiming for system innovation for sustainable development funded by

[8] to be published by Darmstadt University of Applied Sciences in 2022

[9] System innovation for more sustainable leather chemistry: https://sne.h-da.de/en/implementation-project/more-sustainable-chemistry-in-the-leather-supply-chains (last checked on October 19th 2021)

the Federal Ministry of Education and Research - BMBF and the State of Hesse (First funding period until 31.12.2022)[10]. The term “system innovation” refers to technical, social and organisational innovation, underpinned by an institutional framework[11], that is necessary to achieve transformation towards sustainable development.

Both the overall project and its “subprojects” are carried out by transdisciplinary teams including experts such as scientists from different fields (Law, Business, Psychology, Design, Chemistry and Engineering), representatives along the leather supply chains (chemicals, tanning companies, processing industry, brands, etc.) and other stakeholders such as NGOs and political consultants. Since the year 2018 the project team conducted a comprehensive participatory process that includes a six-month scenario process in which representatives from the leather supply chains co-created scenarios for the global leather industry for the year 2035. Based on this process a “theory of change” has been developed that aims at structuring a multi-stakeholder process towards a more sustainable leather chemistry by 2035[12]. In September 2020, the project started four multi-stakeholder implementation projects aiming at specific topics outlined in the theory of change that promise the greatest leverage in terms of the envisaged transformation towards more sustainable chemistry[13]. These subprojects focus on (a.) IT tools and governance for traceability of chemicals along supply chains, (b.) chemical and process innovations, (c) design guidelines for more sustainable leather products. and (d.) harmonisation of standards for “more sustainable leather chemistry”.

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[10] System innovation for sustainable development: https://sne.h-da.de/en/ (last checked on October 19th 2021)

[11] Institution, in this context, refers to all formal and informal instructions such as legal rules, company policies, habitual patterns of designers etc., see North 1991.

[12] Schenten, Julian; Rehn, Jonas (2021): A Theory of Change (ToC) supporting the visioning of a sustainable supply chain. Beitrag im Portal "SCNAT wissen - Methoden und Werkzeuge für die Koproduktion von Wissen". Akademien der Wissenschaften Schweiz Netzwerk für transdisziplinäre Forschung (td-net). https://naturwissenschaften.ch/co-producing-knowledge-explained/practical_experiences/theory_of_change, zuletzt geprüft am 22.03.2021.

[13] For a recording of the kick-off-event visit: https://youtu.be/_ha6VG4NXUE

1.2 General Structure of the Canvas

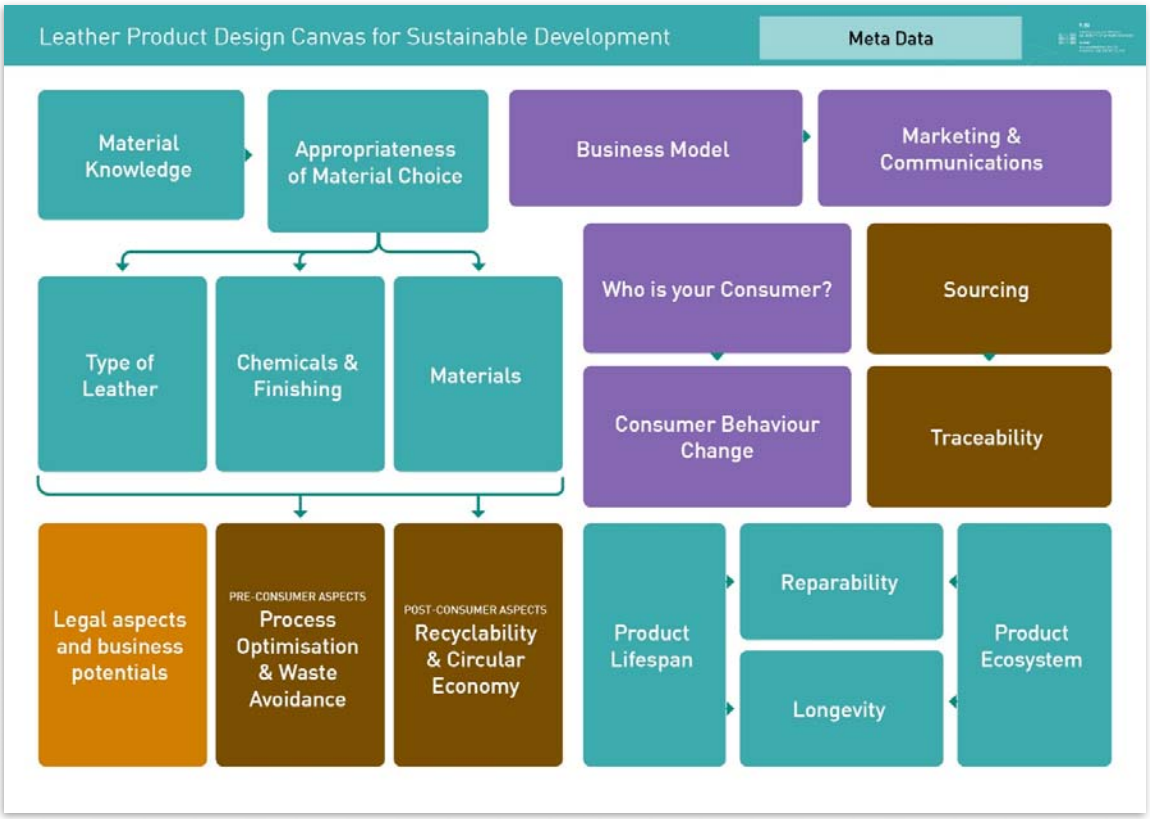

Fig. 1: Overall layout of the Leather Product Design Canvas

The Canvas covers four overarching themes divided into 18 boxes each resembling one relevant aspect of the leather product at hand with regards to sustainable development (Fig. 1). The green boxes in Fig. 1 refer to aspects that could be summarised as rather technical such as material properties, chemicals used or the technical aspects that allow or inhibit reparability. The brown boxes focus on procedural subjects. Although they as well include technical topics such as traceability, they primarily refer to questions or issues that affect the organisation of producing, transporting and disposing or recycling of the products. The purple boxes refer to economical and consumer topics including business models and the role, awareness and behaviour of consumers. The overarching legal and institutional framework that applies to the product at hand is represented by the orange box. It is closely linked to other aspects such as business models that are based on current regulatory developments.

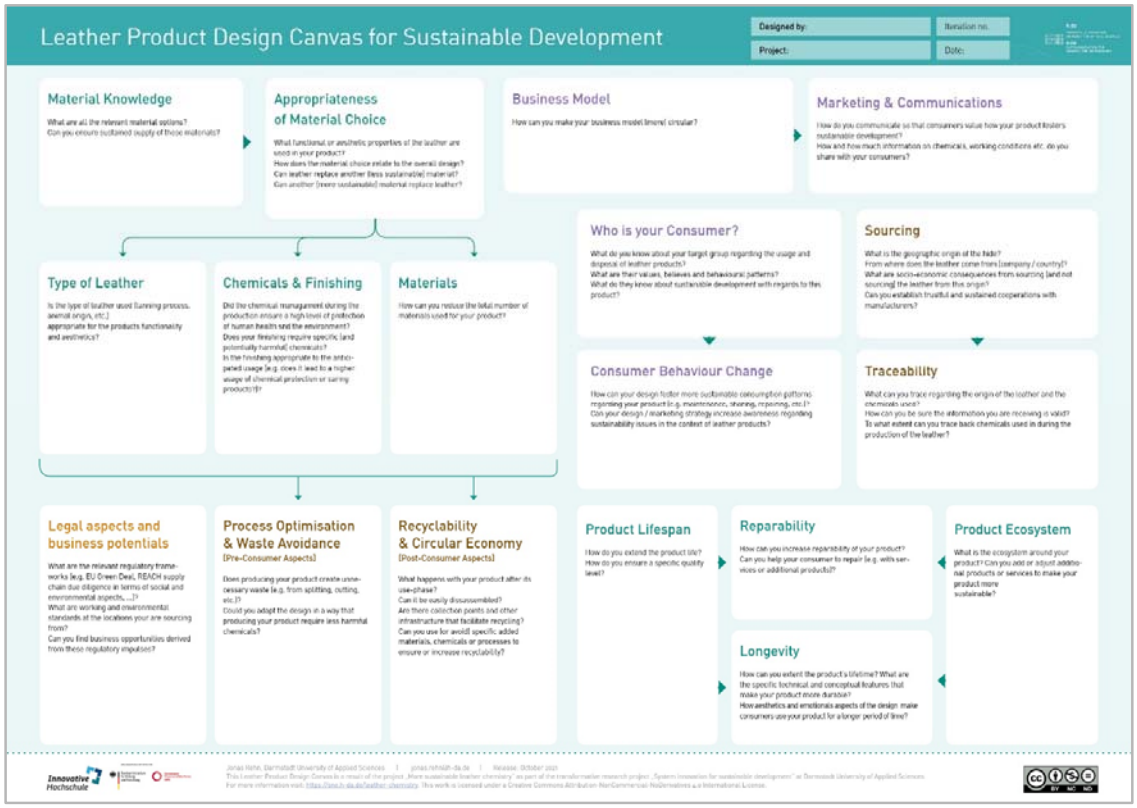

Fig. 2: Leather Product Design Canvas, DinA3 (Rehn, 2021)

In each of the 18 boxes, impulse questions specify the scope of these categories (Fig. 2). These questions are meant to guide the design process and initiate considerations to improve the design concept. As each project, product and supply chain is different, the size of boxes or number of impulse questions do not reflect the importance or relevance of a specific topic.

Additional arrows and lines indicate clusters, interdependencies and direct relations. However, as leather supply chains are complex systems, all boxes are related to each other to some extent. Therefore, these indications should be seen as rather most basic or obvious relations and clusters.

1.3 Users of the Canvas

The complexity inherent to the field of sustainable development requires an interdisciplinary systems thinking approach. With regards to leather products, designers might be faced with contradicting targets that make it even more difficult to define a proper briefing for more sustainable products. The fashion industry, for instance, is demanding for continuously new styles and approaches that often follow a business model of planned obsolescence. Instead, more sustainable and innovative leather products (and related services for that matter) could include business models or strategies that have a profound impact on many other departments of a company than product development such as sourcing, quality management, business development, marketing etc. Understanding the paramount role design might play to create more sustainable products and influence more sustainable consumer behaviours requires a paradigm shift that puts design decisions at the core of strategic management. Therefore, design cannot be done by one person alone but rather needs to be a team effort across disciplines.

This being said, ideally, the canvas shall be used by an interdisciplinary team comprising as many roles as possible that relate to the design and development of new leather products (such as sourcing, marketing, etc.). As this mode of work poses additional challenges and threats for a design process, it is recommended to use well-prepared workshops when applying this canvas in interdisciplinary teams. In this way, the designer's role might be extended from simply designing products to actually facilitating and moderating the design process, taking all relevant impulses and requirements from other disciplines into account. At the same time, to get the most out of this canvas to thoroughly design leather product while considering as many relevant sustainability issues as possible might require a change of corporate culture or mind-set in some organisation, fostering open-minded and transparent communication across departments and disciplines.

1.4 Mode of Work

As mentioned before, the canvas is not meant to be a strict formula or checklist but rather an exploratory analysis and conceptualisation tool that can be used and revisited (iterative process) at any stage throughout the design process. Boxes and questions do not necessarily have to be addressed in their order of appearance.

While not all impulse questions might apply to each project, they could raise awareness or identify gaps of knowledge that need to be addressed before moving on in the design process. Therefore, the canvas is both explorative inspiration as well as a simplified evaluation tool.

The canvas can be fulfilled by one person alone or as part of a workshop or team effort. It is recommended to use the canvas in an iterative manner. Additional information boxes in the header of the canvas support this iterative mode of work. As illustrated in fig. 3, it might be useful to note down ideas and concepts directly on the canvas. This also encourages short and pointed descriptions due to limited space available. At the same time, the canvas can be used and adjusted to the needs of each individual project. Therefore, team workshops might require more space or additional worksheets to go deeper into specific boxes or topics.

Especially with regards to workshops, it can be useful to combine the canvas with other tools and techniques from the field of design thinking[14]. Workshops applying this canvas should be planned and orchestrated according to the usual principle of design- and brainstorming workshops, curating an open mind-set and appreciating new, disruptive and sometimes unrealistic ideas to go beyond

[14] Kumar, Vijay (2013): 101 design methods. A structured approach for driving innovation in your organization. Hoboken, N.J: Wiley.

current concepts and solutions. After each workshop, the canvas worksheets should be analysed in detail by the workshop facilitator to extract insights and concepts that otherwise might be lost.

One of the most important aspects of working with the canvas is to identify and indicate relations and interdependencies. Therefore, it is recommended to use arrows, lines and other graphical or written information to illustrate connections and foster systems thinking (see e.g. fig. 3).

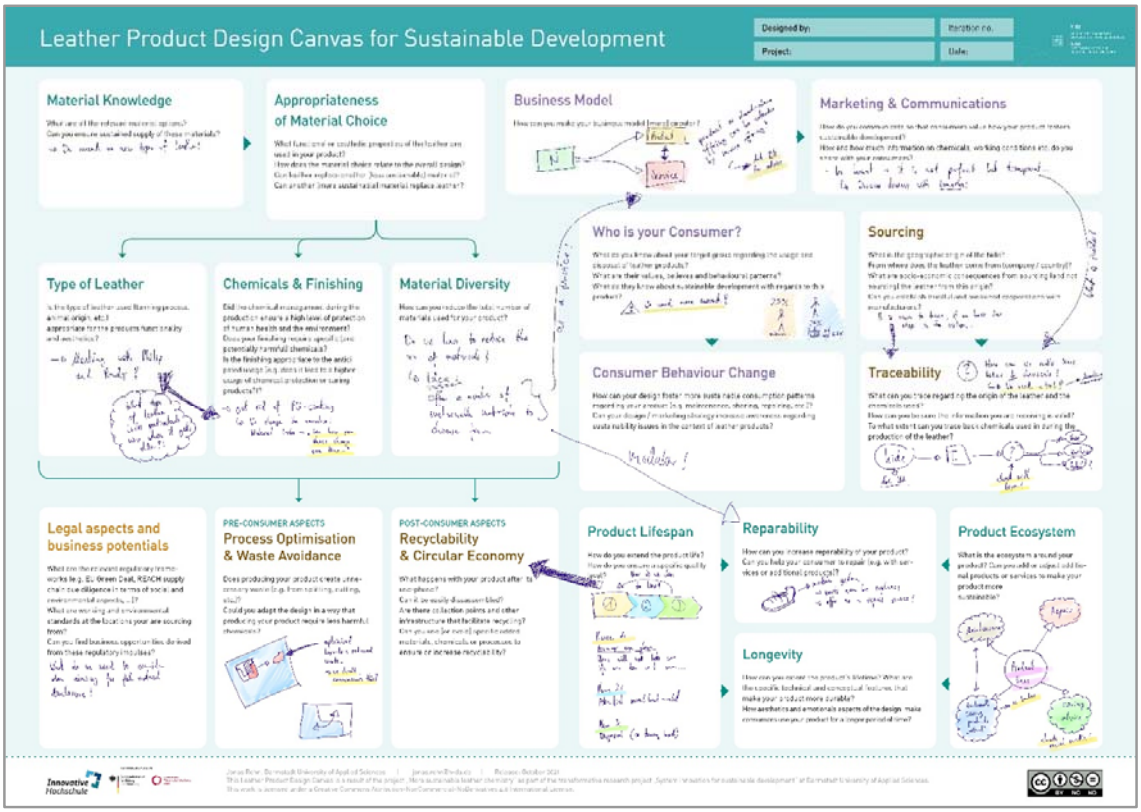

Fig. 3: Applied Leather Product Design Canvas for female dress shoe

It is recommended to use the Leather Product Design Canvas while applying the aforementioned Design Guidelines for Sustainable Development. While the guidelines aim at deepening one's knowledge and broadening one's scope with regards to more sustainable leather products, they shall

be seen as both piece of reference and exploratory source of inspiration like comparable guidelines in the field of circular economy[15] or even public design[16].

1.5 Open-End Template

Although this canvas has been co-developed and tested with industry partners and an interdisciplinary group of scientific experts, there might be projects or phases for which important aspects or new trends are entirely missing. Users of the canvas should therefore feel free to adjust and extent the canvas according to the needs of the project. We encourage users who have feedback and ideas for improvement to get in touch with us.

[15] e.g. Nike, Inc. (Hg.) (2021): Circularity Workbook. Guiding the Future of Design. Online verfügbar unter https://www.nikecirculardesign.com/guides/CircularityGuide.pdf, zuletzt geprüft am 16.03.2021.

[16] e.g. Center for Active Design (2010): Active Design Guidelines. Promoting physical activity and health in design. Hg. v. City of New York. New York. Online verfügbar unter https://centerforactivedesign.org/guidelines/, zuletzt geprüft am 03.12.2016.

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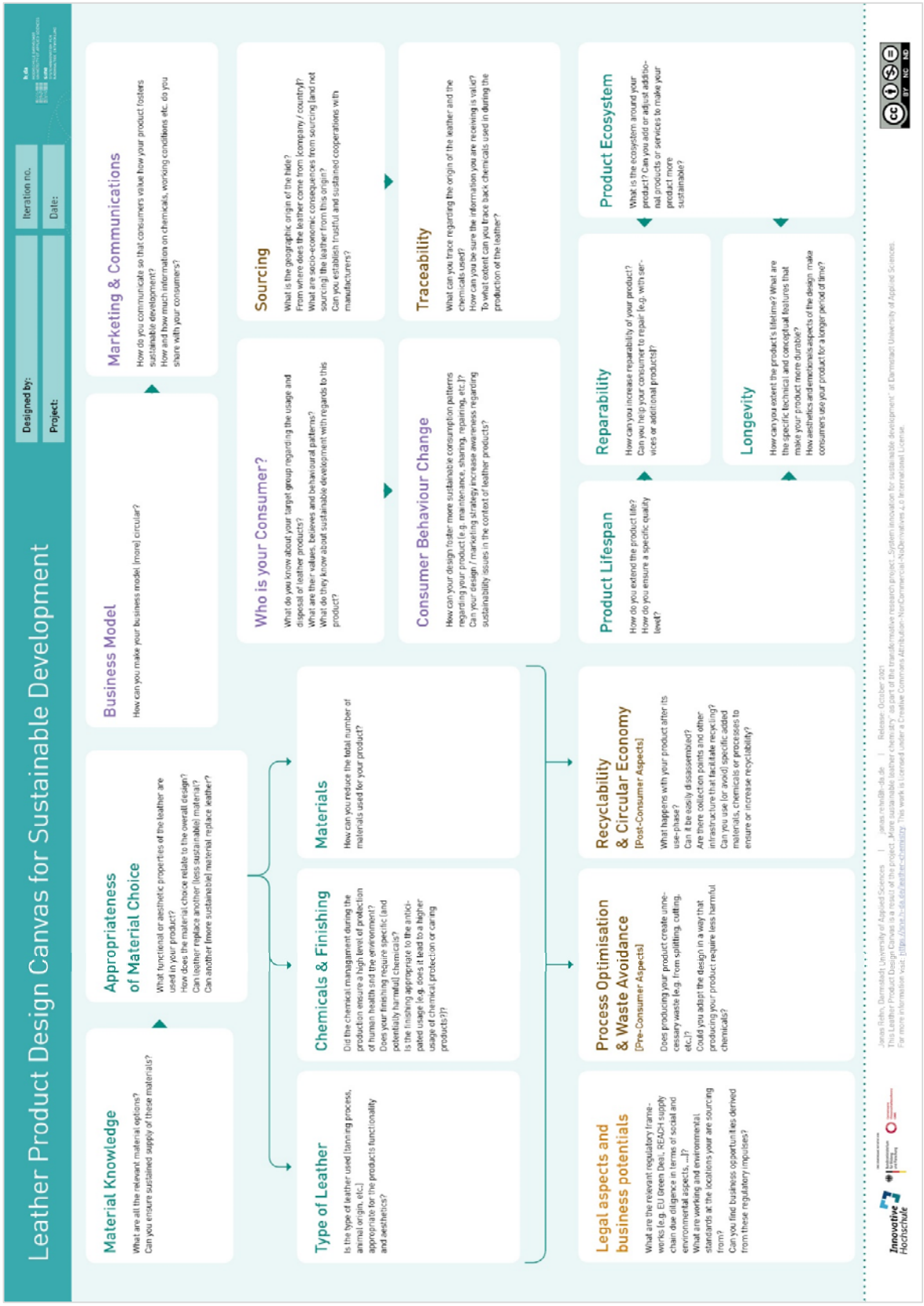
Appendix

Leather Product Design Canvas – A3-template (PDF)