WHITE PAPER

Learning from CIRCO

Written by
Jeroen Hinfelaar

With contributions from 22 CIRCO co-creators and reflections from the scientific community

September 2023

CIRCO is a multi-year programme contributing to the transition towards a circular economy. CIRCO operates from the conviction that this transition can only take shape bottom-up.

(How) can one accelerate this bottom-up development? How do you motivate a large number of parties to adjust their ways of thinking and actually start working (together) differently?

CIRCO employs a design-driven approach, which has proven effective. What does this approach look like, and to what extent can it be used to accelerate other transitions? A description *and* exploration.

CLICK NL

CIRCO

TABLE OF CONTENTS

FOREWORD

The transition to a circular economy requires an iterative, design-driven approach. After all, a complex issue is best understood and addressed by applying intelligently designed interventions and consistently observing their outcomes. Every step forward leads to new feedback and additional insights. Learning by doing. Only by designing, prototyping, testing, and refining through multiple iterations will you get to the core of the problem, to the actual challenge, and from there: to structural solutions.

This design-driven approach requires both specific competencies and a strong methodological foundation, fueled by creativity. Design competencies are mainly about integration, reframing, orchestrating, and imagining. In other words, about bringing together multiple perspectives, placing issues in a different context, bringing parties together and fostering collaboration, and showing what a potential future might look like.

The practical application of this design-driven approach is exactly what makes the CIRCO programme successful. It's a thoroughly developed method that encompasses all the necessary elements to motivate companies and designers to take action. This allows the transition to a circular economy to accelerate, taking shape step by step and bottom-up.

After more than eight years of hands-on experience with CIRCO, this is an excellent initiative to uncover the exact active elements of CIRCO. What makes it work, if it works, and under which circumstances? Jeroen Hinfelaar has taken up this challenge, resulting in this whitepaper.

I want to thank Jeroen and all the involved parties for their valuable contributions to CIRCO and to this document. I also sincerely hope that the ten described elements of the CIRCO approach will be applied to similar complex challenges, aiding the much-needed transitions.

Learn from CIRCO!

Bart Ahsmann
Director TKI CLICKNL
Top sector creative industries

ABOUT JEROEN HINFELAAR

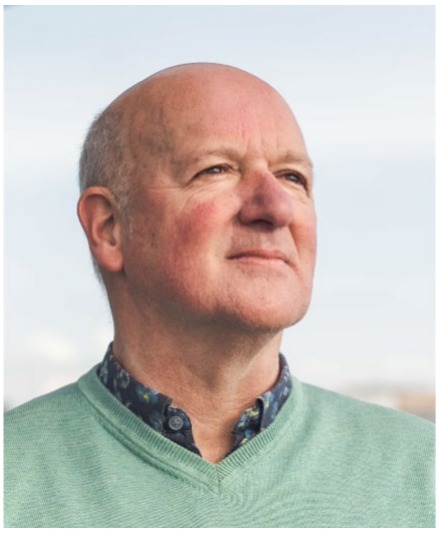
Jeroen Hinfelaar (1962) is an independent systems innovation catalyst[1] and is an associate at the Design Innovation Group[2].

He generally has an optimistic and independent approach to life, with both feet on the ground and a forward-looking perspective. But he is concerned about the future of our planet and the climate. Jeroen therefore focuses on accelerating sustainability transitions, emphasising the circular economy, energy and nature. From 2015 to April 2022, he was the programme manager for CIRCO in the Netherlands.

Jeroen has been active in the field of innovation for over 35 years, in various roles: as an entrepreneur, (programme) manager, and adviser. Over the years, the thematic scope broadened and the complexity increased: after product innovation, service innovation, and numerous business model innovation projects, he now focuses on system innovation. This shift also changes the approach: from a more predictable, project-based approach to a design-driven, more evolutionary perspective.

He was educated in Computer Networks (TU Delft, 1987) and Business Administration (1996). Jeroen is an active member of the Systems Innovation Network.[3]

Jeroen works from the Heuveloord water tower in Utrecht. He lives with Elaine in Amerongen, between the floodplains of the Nederrijn and the forests of the Utrechtse Heuvelrug. In his free time, he enjoys spending time with friends, cycling, photography, and relaxing in nature.



[1] https://jeroenhinfelaar.nl (Dutch)

[2] https://designinnovationgroup.nl (Dutch)

[3] https://www.systemsinnovation.network

MANAGEMENT SUMMARY

CIRCO catalyses the transition to a Circular Economy

CIRCO is a multi-year programme of TKI CLICKNL. Its goal is to catalyse the transition to a Circular Economy through the application of Circular Design. CIRCO was initiated in 2015, is a part of the National Circular Economy programme (NPCE), and is funded by the Ministry of Infrastructure and Water Management (I&WM), among others.

CIRCO works from the belief that the Circular Economy will grow bottom-up and that knowledge and application of circular design principles are crucial in this process. To this end, CIRCO has developed an action-oriented methodology for its target groups, (manufacturing) companies and designers. This methodology provides them with a new conceptual framework and circular design principles, offering a concrete action plan. The objective is to entice and empower them to design, do business and collaborate circularly going forward.

To reach and mobilise as many businesses and designers as possible, CIRCO has developed an ecosystem of dozens of partners. CIRCO is active both in the Netherlands and internationally in sectors such as manufacturing, plastics, construction, and consumer goods.

In the period up to and including 2022, more than 1,300 companies have been mobilised and trained in the Netherlands. Research by Technopolis and TNO (2019) shows that two-thirds of the companies participating in CIRCO actually start with circular design and entrepreneurship, and another quarter say they intend to do so. Thus, step by step, new circular products, services and business models emerge. And circular value chains. The circular economy grows, bottom-up.

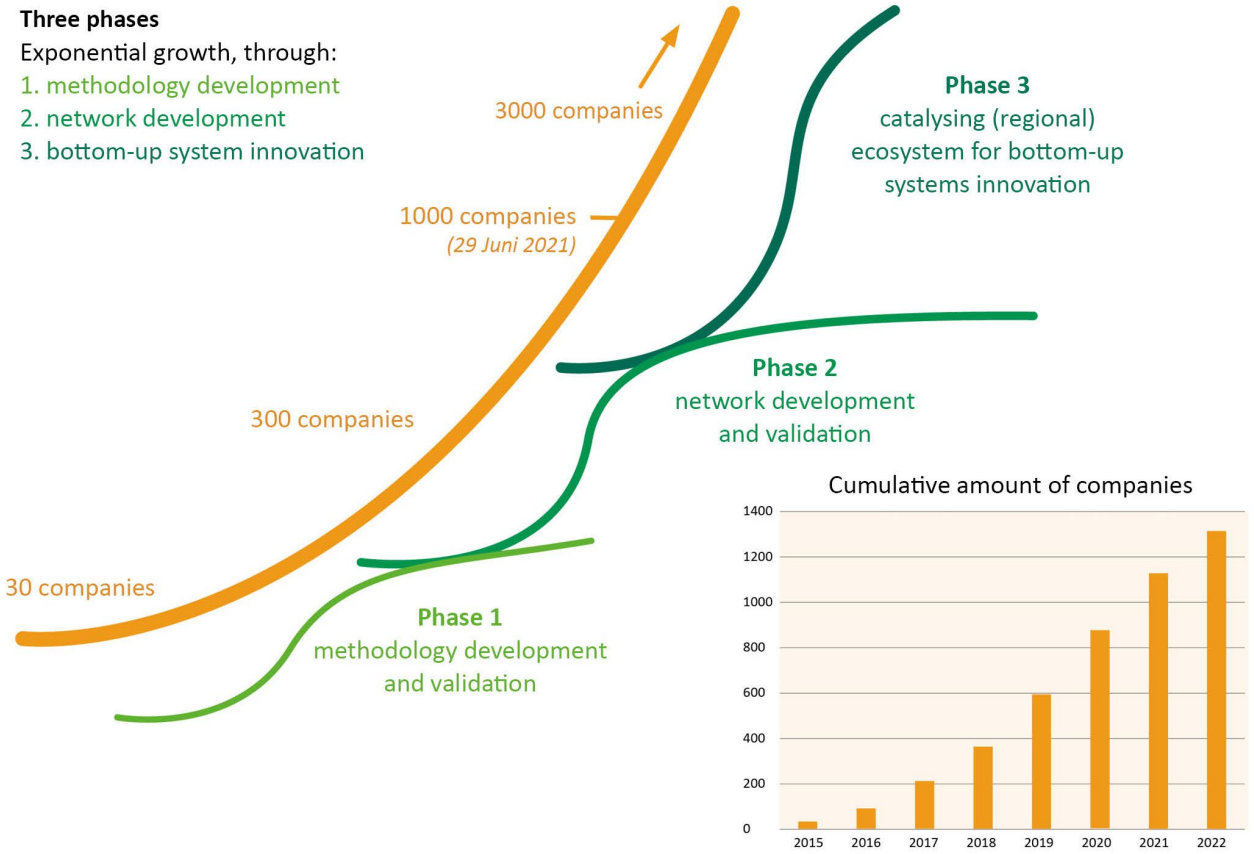


Figure A | CIRCO's mobilisation strategy (2015-2022):
Three phases, exponentially growing number of participating companies.

Various parties see CIRCO as a successful programme that actually contributes to accelerating the intended transition to the Circular Economy. The fact that CIRCO won the Dutch final of the European Enterprise Promotion Award in the 'Sustainability' category in August 2023 and has subsequently reached the European final reaffirms this perception.

Three phases, ten elements

There is a presumption that the approach developed within CIRCO is (partially) reusable to initiate and catalyse other transitions. For this reason, the developed and proven CIRCO approach has now been analysed and described retrospectively. Over twenty CIRCO experts have contributed to this. The essence of the analysis is that the CIRCO approach (in hindsight) can be described based on three phases and ten elements. See Figure B.

THREE PHASES		TEN ELEMENTS	
Phase 1:	**methodology development and validation**	**1.**	**divers core team, enterprising, designing**
		2.	**big ambition, exponential growth curve**
		3.	**transformative, action-oriented methodology**
Phase 2:	**network development and validation**	**4.**	**dynamic network of networking organisations and trainers**
		5.	**the future generation: students (and teachers)**
		6.	**digital technology, co-creation and e-learning**
Phase 3:	**catalysing ecosystem for bottom-up systems innovation**	**7.**	**(inter)national network of regional hubs + embedding**
		8.	**shared knowledge platform**
		9.	**connecting micro-meso-macro via learning loop**
		10.	**funding: decentralised where possible, centralised where necessary**

Figure B | Essence of the CIRCO approach: three phases, ten elements

PHASE 1
Methodology development and validation, three elements

ELEMENT 1
Diverse core team, entrepreneurial and design-driven culture

CIRCO was developed from a compact core team consisting of young, senior, and various disciplines and competencies. Everyone is characterised by their entrepreneurial attitude. This means: entrepreneurial spirit, thinking in opportunities, eager to learn by doing, and consistently focused on target groups and collaboration. This attitude proves to be of great importance in every phase.

ELEMENT 2
High ambition, exponential growth curve

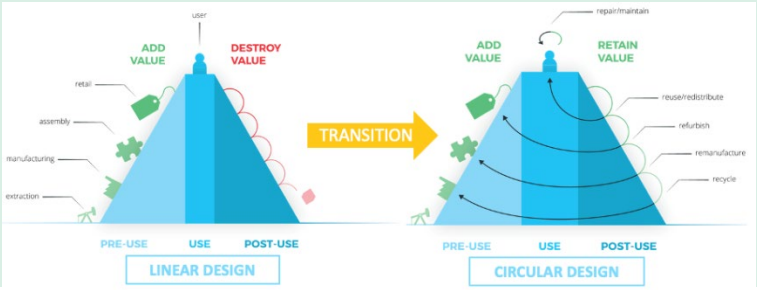
CIRCO has chosen an ambitious goal: to ultimately mobilise 4,000 companies through an exponential development, namely an annual doubling of the number of participating companies. The way to achieve the goal is not yet clear at the start. This 'man on the moon'-like tension makes the programme particularly appealing to entrepreneurial individuals.

ELEMENT 3
A transformative, action-oriented methodology

In collaboration with others, CIRCO develops a three-day workshop programme for groups of companies: the CIRCO Track. In a Track, companies systematically work with a circular design process. Crucial to the approach is creating new design space by challenging participants to look differently at the reality they take for granted. For this purpose, CIRCO, together with others, has created its own model: the Value Hill Model (see box). With the Track's programme, the macro-goal (circular economy) is translated into a concrete action framework for companies and designers. Every CIRCO participant develops a first circular proposition (composed of product, service, and business model) and a roadmap to actually realise it.

Broadening the perspective: Value Hill model

The Value Hill model, a core component of the CIRCO methodology, provides companies with a new conceptual framework and opens up new design space. The model starts with the current reality (the existing value chain on the left slope) and demonstrates (on the right slope) that a lot of value is lost when products are thrown away after use (destroying value). Thought-provoking questions assist in gaining a new perspective: who profits from your product after you've sold it, and why aren't you the one profiting? Why does the customer stop using your product? The right slope in a circular design setting reveals numerous opportunities to retain the value of products longer (from repair, reuse, refurbish, and remanufacture to recycling). Armed with these insights, participants can take the next step and develop a tangible concept for a newly designed circular product, service, and/or business model.



'The Value Hill model opens new space in the mind: you see things differently. And space in the mind is a seed for a transition.'

Marien Korthorst | CIRCO-trainer

PHASE 2
Network development and validation, three elements

ELEMENT 4
Dynamic network of networking organisations and trainers

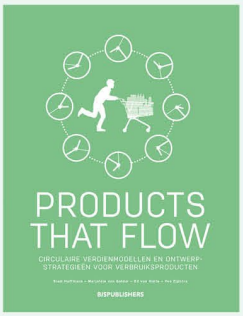
One of the biggest challenges surrounding a transition is to involve an increasing amount of people. For CIRCO too, the autonomous demand from companies for circular design knowledge is not yet there. In Phase 2, CIRCO recruits participants for the Tracks through networks (of other national programmes and industry organisations): by offering CIRCO mini-workshops and creating new Tracks for new target groups. The result: the first few hundred participants. A group of CIRCO trainers is being trained and certified.

ELEMENT 5
The future generation: students (and their teachers)

Collaboration with educational institutions, especially universities of applied sciences, ensures that students are introduced to new frameworks and design principles at an early stage. In the case of CIRCO, these are circular design principles. Teachers can use a specially developed Curriculum Kit for Circular Design in their classes. CIRCO is training teachers with the CIRCO Teacher Class.

ELEMENT 6
Digital version of the methodology, for co-creation and e-learning

The introduction of e-learning tools makes the transfer of knowledge more accessible and also more flexible for participants. Since the end of 2020, CIRCO has been offering a blended version of the CIRCO Track methodology: 50% of the Track now takes place in the participants' own time, via self-service modules. Participants receive tailored content, they can repeat modules or follow in-depth modules. Trainers can easily monitor participants and provide targeted advice. The lower costs associated with the digital version of the programme is important for further scaling up.



The books *Products that Last* (by Conny Bakker and Marcel den Hollander, among others) and *Products that Flow* (by Siem Haffmans and Marjolein van Gelder a.o.) provide archetypes of circular business models and design strategies within the methodology (element 3).

PHASE 3
Catalysing ecosystem for bottom-up system innovation, four elements

A circular economy grows bottom-up: a catalysing ecosystem can accelerate this growth process. CIRCO developed such an ecosystem to achieve this ambitious goal both quantitatively and qualitatively.

ELEMENT 7
(International) network of regional hubs, regional integration

Spreading new frameworks and design principles requires the organisation of larger execution capacity. CIRCO does this by setting up regional CIRCO hubs, under the assumption that a regional approach will lead to the activation of more companies. Additionally, each hub maintains relationships with stakeholders in the region, such as the provinces, regional development agencies, municipalities, universities of applied sciences, and regional branches of national trade associations. From this regional infrastructure, companies are often also supported in follow-up actions after participating in the CIRCO Track. This frequently leads to the creation of new circular value chains. The CIRCO hub concept is also being implemented internationally.

ELEMENT 7
Shared knowledge platform

Setting up a knowledge platform that is developed in co-creation with the target group, facilitates the pooling and broad dissemination of substantive knowledge. The CIRCONNECT platform, initiated by a diverse group of partners, plays a pivotal, connecting role in accumulating and spreading knowledge about circular design. The platform builds deep relationships between knowledge and application partners.

ELEMENT 9
Connecting micro-meso-macro, closing the 'learning loop'

A closed 'learning loop' ensures the most optimal progression possible for a transition. Parties involved in a transition primarily learn from each other when all layers (micro/meso/macro) are effectively interconnected. Within CIRCO, the core team (meso) was positioned to make connections and provide policymakers (macro) with insights from businesses (micro), and vice versa: informing companies about upcoming policies.

ELEMENT 10
Smart funding: decentralise where possible, centralise where necessary

Funding flows aimed at driving transitions shift over time from a centralised to a decentralised level. For CIRCO, the programme's initial funding comes entirely from the Ministry of Infrastructure and Water Management. Later, decentralised activities and their associated costs are also financed at the local level by various entities, including provinces, municipalities, and Rabobank. This trend aligns closely with the 'sense of ownership' of the transition. Participating businesses invest €1,000 per company for two participants in a Track.

CIRCO's impact

In October 2019 (during phase 2), research firms Technopolis and TNO examined CIRCO's impact. Two-thirds of respondents indicated that they had actually started working on a circularly designed proposition (product, service, business model) after participating in CIRCO. Another quarter of the respondents plan to do so. (research by Technopolis and TNO, 2019)

By mid-2023, all the infrastructure is in place to achieve CIRCO's intended objective in the coming years. An important precondition for this is that more directive government measures are developed and deployed for the transition.

Analysis of the CIRCO approach and estimation of reusability

An analysis of the CIRCO approach, through the lens of the Six-aspect model from KIA MV (Knowledge and Innovation Agenda for Social Earning Capacity) and the DRIFT X-curve model, shows that the CIRCO approach fits well with existing transition theory and builds on many of its aspects. A point of attention is that CIRCO, given its strong meso position between government and companies, could have taken the initiative earlier to (try to) influence circular policymaking. With such influence, the conditions needed to accelerate the circular transition (for example through standardisation, pricing and/or incentives) might become more favourable more quickly.

An initial exploration of the possible reusability of the CIRCO approach for other transitions paints an encouraging picture: this could well be the case, provided the respective 'other transition' has certain specific characteristics and a number of preconditions apply. But the proof of the pudding is in the eating. The reader is cordially invited to consider for her/himself whether and to what extent the CIRCO approach can also be useful for catalysing intended transitions in their own field of expertise.

1. INTRODUCTION

1.1 The transition to a Circular Economy

We live in turbulent times. The *Limits to Growth* report by the Club of Rome already more or less foreshadowed this in 1972[4]. The man-made economic system based on the exploitation of the planet and fossil fuel sources, seemed to function well for a long time. It has become clear, however, that this system is leading to significant, interrelated negative effects: climate disruption, rising sea levels, loss of biodiversity, and resource scarcity. We are shooting ourselves in the foot.

To regain sight of a flourishing future for humans and other earthlings, we must quickly align our economic system with the planet's capacity. We must make significant changes. In more than fifty years since 1972, however, it's also become clear that humans are not particularly adept at implementing system change. How can we effectively address this?

A transition to a Circular Economy (CE) is essential. In our current linear economy, we deplete the earth's resources, there is a large and relatively rapid loss of value of entire products as well as parts and materials, and we pollute our planet with a lot of, often still usable, waste. This linear economy also produces a significant amount of CO_2 emissions, contributing substantially to climate change.

In a Circular Economy, the focus is on retaining value. Once extracted, resources are (re)used indefinitely. Products are designed to last and can be easily repaired, renewed, reused, and eventually recycled at a high quality. The report *Completing The Picture*[5] by the Ellen MacArthur Foundation indicates that an entirely circular economy could also lead to a 45% CO_2 reduction.

The Dutch government's goal is for the country to be 50% circular by 2030 and 100% by 2050. The Ministry of Infrastructure and Water Management (I&WM) coordinates the circular transition. In its comprehensive National Circular Economy programme (NPCE 2023)[6], the ministry outlines how this transition will take shape. It includes actions and measures for five priority product chains (focusing on a total of 15 product groups): consumer goods, plastics, construction, manufacturing, and biomass & food.

Every two years, the Netherlands Environmental Assessment Agency (PBL) reports on the transition's progress in its Integral Circular Economy Report, the ICER. In the ICER 2023[7], the PBL is critical (as it was in 2021) about the transition's progress. The PBL mainly argues that, in addition to stimulating measures, more mandatory 'push and pull' measures are needed to achieve the government's goal, such as setting standards, pricing, mandating, and prohibiting.

In April 2023, the Social And Economic Council (SER) delivered a similar message in its letter *Accelerating The Resource Transition.*[8] It advocates, among other things, for faster development of more coherent and directive governance and for more equitable treatment of energy transition and resource transition.

[4] Club of Rome: Limits to Growth https://www.clubofrome.org/ltg50/
[5] Ellen MacArthur Foundation: Completing the Picture: How the Circular Economy Tackles Climate Change, https://ellenmacarthurfoundation.org/completing-the-picture
[6] NPCE 23: https://www.rijksoverheid.nl/documenten/beleidsnotas/2023/02/03/nationaal-programma-circulaire-economie-2023-2030 (in Dutch)
[7] ICER 2023: https://www.pbl.nl/publicaties/integrale-circulaire-economie-rapportage-2023 (in Dutch)
[8] See the SER document https://www.ser.nl/nl/Publicaties/advies-vaart-grondstoffentransitie (in Dutch)

1.2 Introduction of CIRCO and its role in the transition

CIRCO[9] is the name of a multi-year programme aimed at helping accelerate the transition to a Circular Economy by developing and actively spreading application-oriented knowledge of Circular Design. To this end, CIRCO activates and equips companies and designers[10] to start designing their products, services, business models, and value networks circularly, and to start doing business in a circular fashion. CIRCO primarily focuses on the Netherlands, but it is also active internationally.

CIRCO is an incentive programme and is part of the aforementioned NPCE. The programme is substantially funded by the Ministry of Infrastructure and Water Management (I&WM) and serves as one of the tools to accelerate the intended transition. CIRCO began in 2015, has been active for eight years as of 2023, and employs a design-oriented, methodical approach.

The CIRCO programme is hosted by the TKI CLICKNL Foundation[11], the Top Consortium for Knowledge and Innovation (TKI) of the top sector Creative Industries. Through CLICKNL, CIRCO easily connects with other parties in the creative sector. These relationships lead to joint knowledge development, among other things.

1.3 Why this white paper and for whom?

The purpose of this whitepaper is to enable others to learn from eight years of CIRCO experience by making its developed, structured approach explicit. There is a presumption that a CIRCO-like approach, or at least elements of it, can also be valuable for accelerating other societal transitions. The division into three phases and ten elements introduced in chapter 2 may also provide guidance for other transitions.

Because of this, this publication is especially relevant for individuals involved in accelerating transitions, for instance in the following roles and capacities:

- Programme Manager
- Transition Accelerator
- Catalyst for System Innovation
- Change Agents, Change Makers
- Policy Maker, Policy Coordinator
- (Innovation) Manager of Industry Associations
- Manager of (Regional) Development Companies
- Method Developer in Education
- Manager of Financial Institutions

In addition, CLICKNL wants to engage in a broader dialogue about the competencies of the creative industry and the potential of the sector to catalyse transitions and radical system innovations. This whitepaper aims to contribute to that dialogue.

[9] see www.circonl.nl/international/

[10] The term 'designer' is interpreted quite broadly in this white paper; reference is made to industrial designers, engineers, architects, etc.; in short, anyone who influences design choices based on the contents.

[11] see www.clicknl.nl/en

1.4 Creation of the white paper: four steps

This whitepaper was created in four steps:

STEP 1 | data collection, analysis, and structuring

In the period of October/November 2022, various data on 'eight years of CIRCO' was collected in close consultation with CIRCO and CLICKNL. This data was then analysed and structured. It proved challenging to describe the organically grown CIRCO development directly in a structured, transferable manner. After all, a lot happened simultaneously over those eight years. For the readability of this document, it was decided in consultation with CIRCO and CLICKNL to retrospectively divide these eight years into three phases, each with a strong distinct focus. Similarly, the main ingredients that make up CIRCO were retrospectively structured into ten elements. To ensure that this retrospective structuring accurately reflects reality, it was validated by various CIRCO partners (see step 3a).

STEP 2 | writing draft text, approaching two reflection groups

From December 2022 to February 2023, the draft text of chapters 1 to 5 was written. Two groups of organisations were also identified and approached to validate these texts based on their practical observations (see step 3a) or to reflect on the described CIRCO development from a theoretical and/or scientific perspective (see step 3b).

STEP 3 | gathering reflections

3a: from CIRCO co-creators

In March 2023, the draft version of chapters 1 to 5 was presented to a broad group of individuals and organisations involved with CIRCO, asking if they fully agree with the text and, if necessary, wish to correct and/or supplement it. 22 of them actually provided feedback, often extensively. The names of these CIRCO co-creators can be found in Appendix 1. Some of them also provided quotes about CIRCO, which can be found in various parts of the document.

3b: from a theoretical/ scientific perspective

Parallel to step 3a, two parties outside the direct CIRCO network were asked to reflect on the described CIRCO developments, each from their own theory and models. These are: DRIFT (developer of the X-curve transition model) and KIA Social Earning Capacity (Six aspects model). Both parties responded positively to this request and made a contribution.

STEP 4 | processing all reflections and an initial exploration of the reusability of the CIRCO approach

All input from steps 3a and 3b was processed into the final version of chapters 1 to 6 in the period of April/May 2023. Based on this information, an exploratory dialogue took place on June 16 with Inge Oskam (lecturer in Circular Design & Entrepreneurship at the Amsterdam University of Applied Sciences) and Eefke Schramade (Transition Manager Circular Economy Province of South Holland). The purpose of this meeting was to jointly conduct an initial exploration to answer the question, 'to what extent could a CIRCO-like approach be reusable for other societal transitions?' (chapter 7).

This white paper was completed, designed and published in September 2023.

1.5 Disclaimer

The author of this whitepaper has (co)led the CIRCO programme from its inception and for the first seven years. And although it is expressly his intention to present all information about CIRCO as factually as possible, and the involvement of the 22 CIRCO co-creators also contributes to the intended objectivity, some bias cannot be ruled out entirely.

In case of interest, there is of course the possibility to subject the developments of CIRCO to a more detailed, possibly scientific, study.

1.6 Reading guide

Chapter 2 provides an overview of eight years of CIRCO at a high level: from 2015 to 2022. This period is divided into the aforementioned three characteristic phases. The ten elements are also introduced, and the impact of CIRCO and examples of participating companies are discussed.

Chapters 3, 4, and 5 elaborate on the activities and results of phases one, two, and three, respectively.

In Chapter 6, the CIRCO approach and evolution from practice are viewed from the perspective of two relevant (scientific) frameworks for (societal) innovation and transition. To what extent do practice and science coincide? What can be learned?

Finally, Chapter 7 provides initial answers to the exploratory question of this whitepaper: where, when, and to what extent could a 'CIRCO-like' approach, or elements from it, be successfully used for other transition challenges?

2. CIRCO IN BROAD TERMS

2.1 CIRCO's ambition

There are approximately 40,000 manufacturing companies in the Netherlands with more than ten employees (source: CBS). CIRCO has set the ambition to activate and train 10% of these, i.e., a total of 4,000 companies, in circular design between 2015 and 2023. This percentage was chosen based on the assumption in 2015 that once 10% of the manufacturing industry engage in circular design and business, a market and societal movement will begin to emerge, prompting other companies to follow suit.

This approach is also based on the vision and reasoning below: the circular economy grows bottom-up (Figure 1), starting with circular (re)design. It's vital that systemic conditions are aligned with the desired circular progression. Examples of these conditions are highlighted in blue text in the figure.

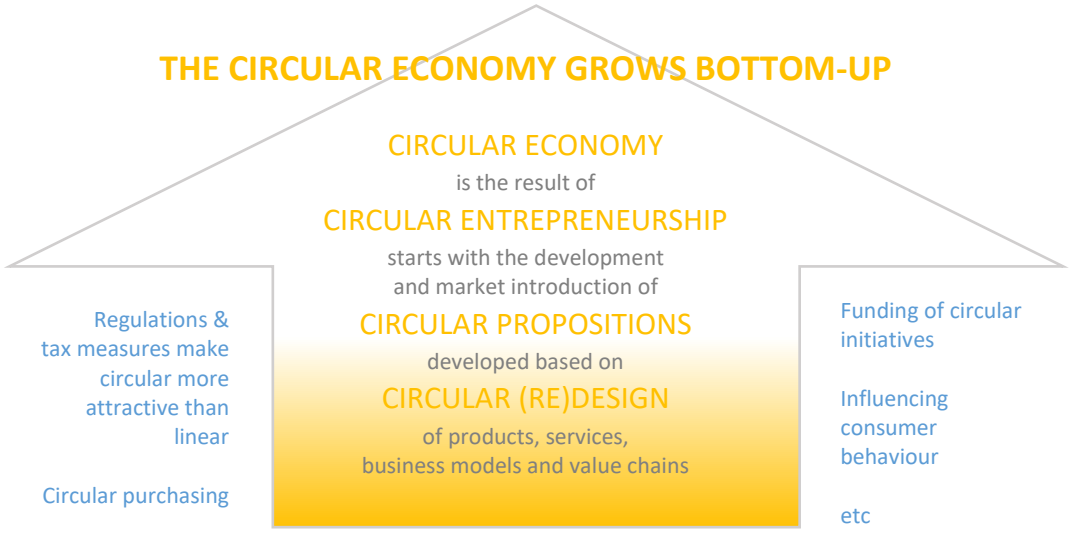


Figure 1 | CIRCO vision: the circular economy grows bottom-up and starts with circular design.

2.2 Design-Driven Approach:

Circular Design Methodology & Mobilisation Strategy

To realise the ambition of training 4,000 companies by 2023, CIRCO has followed a design-driven iterative method since its inception in 2015. This approach is primarily reflected in two methods, which are continuously developed in tandem:

1. CIRCO's substantive circular design methodology (micro)
2. CIRCO's networking mobilisation strategy (meso)

CIRCO's Circular Design Methodology aims to transfer knowledge about circular design to companies and designers (at the micro-level) in a way that encourages its practical application within their businesses, value chains, and clients. This methodology is detailed further in section 3.4, element 3.

CIRCO's Networking Mobilisation Strategy is the approach through which CIRCO incrementally builds a growing network of partners to achieve its ambition (4,000 trained companies by 2023). The Mobilisation Strategy (meso-level) forms the core of this whitepaper and is detailed across three phases and ten elements. These phases and elements are briefly introduced in the next section. Chapters 3 to 5 provide further elaboration on each phase

Note

The substantive Circular Design Methodology is one of the ten elements of the Mobilisation Strategy. Without the Circular Design Methodology, there is no mobilisation. Additionally, both the three phases and the ten elements have been retrospectively chosen as the guiding structure to be able to clearly communicate CIRCO's components.

2.3 Introduction to CIRCO's Mobilisation strategy: three phasen, ten elements

Guided by the ambitious goal (4,000 companies activated and trained by 2023), CIRCO undergoes three phases, each with a distinct focus:

PHASE 1: substantive methodology development & validation

PHASE 2: network development & validation

PHASE 3: development of a catalysing ecosystem for bottom-up system innovation

The three phases of CIRCO's Mobilisation Strategy are depicted in Figure 2 as three consecutive and 'stacked' S-curves. The shape of each S-curve aptly represents the main focus of the respective phase (namely: the development of the substantive methodology, the network, and the ecosystem). The stacking of the S-curves conveys that each phase builds on what came before. The stacking also illustrates that the core activities of phase 1 and 2 do not fully end in phases 2 and 3, but that CIRCO's substantive methodology and network continue to evolve in phase 3.

The three S-curves together can also be seen as a prerequisite for the exponentially rising green line, which represents the number of companies participating in CIRCO. Both the mentioned numbers of companies per phase and the starting and ending points for each phase are indicative.

In the three phases, the CIRCO organisation also evolves: starting with an initially compact core team, through collaboration experiments with various types of network organisations, a clear and synergistic network of (among others) regional CIRCO hubs (and their regional partners), universities of applied sciences, and a central knowledge platform, CIRCONNECT, emerges.

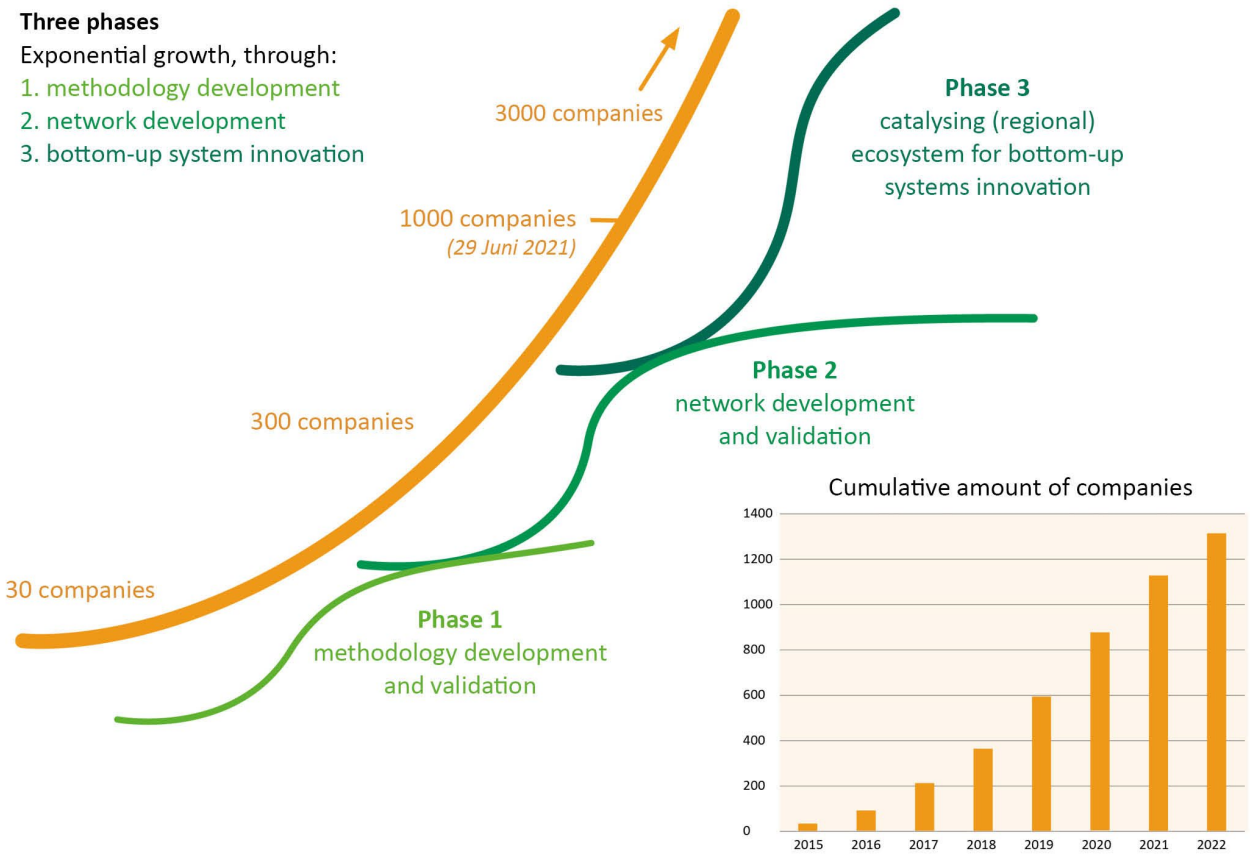


Figure 2 | CIRCO's mobilisation strategy (2015-2022): three phases, exponentially growing number of participating companies.

The three phases and the aforementioned developments within CIRCO are further elaborated in Chapters 3 to 5 based on a total of ten elements, the essential ingredients needed to successfully complete the phase in question. Although most elements (continue to) play a role in multiple phases, each element in this white paper has been assigned a place within the phase in which it is introduced. An overview:

THREE PHASES		TEN ELEMENTS	
Phase 1:	**methodology development and validation**	4.	**divers core team, enterprising, designing**
		5.	**big ambition, exponential growth curve**
		6.	**transformative, action-oriented methodology**
Phase 2:	**network development and validation**	4.	**dynamic network of networking organisations and trainers**
		5.	**the future generation: students (and teachers)**
		6.	**digital technology, co-creation and e-learning**
Phase 3:	**catalysing ecosystem for bottom-up systems innovation**	7.	**(inter)national network of regional hubs + embedding**
		8.	**shared knowledge platform**
		9.	**connecting micro-meso-macro via learning loop**
		10.	**funding: decentralised where possible, centralised where necessary**

2.4 The impact of CIRCO (Technopolis and TNO) and case studies

Research by Technopolis and TNO

In October 2019 (in phase 2), research agency Technopolis and TNO investigated the impact of CIRCO on, among other things, the behaviour of CIRCO participants and (future) CO_2 reduction. For this purpose, they conducted a desk study and interviewed companies and designers who participated in the CIRCO programme.

The main outcomes of this research are:

- Two-thirds of the respondents actually started working on a circularly designed proposition (product, service, business model) after participating in CIRCO.
- Another 25% of the respondents say they plan on working on this in the future.
- 'CIRCO contributes to CO_2 reduction because its participants are trained to develop circular services and products. The amount of (future) CO_2 reduction actually achieved depends on the sector and the success of the participants; however, the potential is significant.'
- The CIRCO workshop programme for companies (see paragraph 3.4) receives an average rating of 7.9, and the CIRCO workshop for designers an 8.1.

The research report by Technopolis and TNO is fully available online[12].

Six case studies from CIRCO participants

Between 2015 to 2022, over 1300 companies in the Netherlands participated in the CIRCO programme. During the CIRCO training, each company designs a (concept for a) circular proposition *and* develops a roadmap for its actual realisation and implementation. Many companies have actively worked on their product, service, business model, and/or value chain after participating in CIRCO, often in close collaboration with value chain partners.

CIRCO has described dozens of such cases, and some were illustrated with a video. All descriptions are available on the CIRCO website.[13] Six diverse examples from CIRCO participants are:

- 'Facade-as-a-service', a new circular service and business model by the company Jansen by ODS, in collaboration with their value chain partners.[14]
- 'Bedzzzy', the 100% circular mattress, a venture by Auping[15]
- 'Circular Waterbus' by Damen Shipyards[16]
- 'Speedgate-as-a-service' by HTC Parking & Security[17]
- 'Circular concrete' by Bio Bound[18]
- 'Shoes-as-a-service' by Emma Safety Footwear[19]

[12] Research Technopolis / TNO, see: https://www.circonl.nl/onderzoek-impact-circo/ (in Dutch)
[13] See https://www.circonl.nl/cases/ (in Dutch)
[14] See https://www.circonl.nl/case/video-jansen-by-ods-gevel-as-a-service/ (in Dutch)
[15] See https://www.circonl.nl/case/video-circulair-matras-bedzzzy/ (in Dutch)
[16] See https://www.circonl.nl/case/video-damen-circulaire-scheepsbouwer/ (in Dutch)
[17] See https://www.circonl.nl/case/htc-parking-en-security/ (in Dutch)
[18] See https://www.circonl.nl/case/circulair-beton-bio-bound/ (in Dutch)
[19] See https://www.circonl.nl/case/video-emma-safety-footwear-shoes-as-a-service/ (in Dutch)

3. PHASE 1
METHODOLOGY DEVELOPMENT AND VALIDATION

3.1 CIRCO's beginning

At the end of 2014, CLICKNL received a request from the Ministry of Infrastructure and Water Management to submit a project proposal for the development and dissemination of knowledge on circular design. This was remarkable for that time because the emphasis within the circular economy policy mainly was on waste processing and recycling back then. The insight that preventing waste requires smarter design (of products, services, and business models) was still relatively new.

CLICKNL's project proposal was approved, and the *Design for a Circular Economy* project started at the beginning of 2015. Funding was initially provided for one year, and CLICKNL formed a compact core team of eight hired professionals (part-time). At that time, the project was part of the broader 'From Waste to Resource (VANG)' programme of the Ministry of Infrastructure and Water Management (I&WM), and CLICKNL became a participant in the RACE coalition (RACE = Realisation and Acceleration Circular Economy), along with Circle Economy, MVO Nederland, and The Green Brain.

The project quickly got a name: CIRCO. In the first phase of CIRCO, the following three elements were primarily developed. The subsequent paragraphs further detail these three elements.

ELEMENT 1: Composition of a diverse core team with an entrepreneurial and design culture

ELEMENT 2: Formulation of a high ambition, embracing an exponential growth curve

ELEMENT 3: Development of a transformative, action-oriented circular design methodology

3.2 ELEMENT 1: diverse core team, entrepreneurial and design-oriented culture

Diverse core team

At the start of CIRCO, CLICKNL assembled a compact and diverse team: a combination of senior experts, (former) entrepreneurs, and recent graduates. Collectively they have broad expertise in product and service design, and business model and system innovation. The team also has various competencies and experiences, such as workshop facilitation, leading change processes, and marketing/communication. There also is a broad network of industry partners. For the first two years, the CIRCO team worked from the Faculty of Industrial Design Engineering at TU Delft, where a relatively large amount of substantive knowledge about circular design was already available..

Entrepreneurial and Design-Oriented Attitude and Culture

The attitude of the members of the first CIRCO team can perhaps best be summarised as:

1. **Entrepreneurial:** proactive, action-oriented, thinking in opportunities, enthusing.
2. **Design-oriented**: preferring iterative and short-cycle processes, designing prototypes (of method, organisation, agreements, etc.) with the intended target groups, testing and validating them, learning from them, and further developing them, rather than spending a long time internally studying the perfect model without getting feedback from the target group. Modus operandi: there's no 'wrong' version of something, it was a well-intentioned iteration on the way to the next, better version.
3. **Collaboration-oriented:** connecting, comfortable with companies, governments, and knowledge institutions, multilingual, empathetic, respectful.
4. **Business Intuition:** CIRCO wants to work demand-driven, but since the demand for circular design knowledge is not yet articulated, assumptions initially have to be made. The experience of the seniors within CIRCO increases the chance of finding 'product'-market fit from the start and meeting a (still latent) need.

This entrepreneurial and design-oriented attitude is crucial in all phases. Not only for CIRCO's core team itself: the characteristics were also used (first unconsciously, later more consciously) as criteria in the selection of CIRCO partners in phases 2 and 3. The culture of the entire CIRCO network that emerged from this turned out to be increasingly the determining factor for the mobilising capacity of the whole, and with it: for joint success and impact.

3.3 ELEMENT 2: high ambition, exponential growth curve

High ambition, based on facts

To gain insight into the nature and size of the various target groups within the industry, a market analysis was conducted in 2015 based on SBI codes and data from the Central Bureau of Statistics (CBS). This analysis showed that there are approximately 400,000 manufacturing companies and small businesses in the Netherlands, of which 40,000 have ten or more employees.

The ambition level for CIRCO was set to mobilise 4,000 (or 10%) of these companies by the end of 2023, spread across the previously mentioned market segments (consumer goods, plastics, construction, manufacturing industry). The idea is that once 10% is mobilised, a critical mass will be formed, allowing further developments to occur more autonomously.

Embracing an exponential growth curve

In de eerste fase van CIRCO is ook gediscussieerd over de vraag hoe een ambitieuze maar haalbare impact-curve During the first phase of CIRCO, there was also a discussion about what an ambitious but achievable impact curve might look like. Do we aim for steady, linear growth with a fixed number of companies per year, or can we bring about exponential development? Based on the insight that system innovation *can* progress exponentially, provided the conditions are favourable, an exponential growth curve was embraced, aiming to double the number of CIRCO participating companies annually. At that point, the team was still uncertain about how exactly this curve would need to be realised in the coming years.

Managing high ambitions while simultaneously being uncertain about the exact implementation remained characteristic throughout the CIRCO's duration (2015-2022). For the entrepreneurial CIRCO team, this man on the moon-like tension[20] made the programme even more appealing. It soon became clear that the goal of '4,000 companies by 2023' would only be achievable with a strong dose of creativity and continuous organisational adaptation and development.

Initial principles: clear positioning and name, attractive proposition

Several principles were chosen early on to shape the set ambition, which remained guiding for the programme later on. The principles are:

- Target Groups - Initially, manufacturing companies in the Netherlands and designers were identified as the primary CIRCO target groups. Later, teachers and students of universities of applied science, as well as companies and designers outside the Netherlands, were added.
- The name CIRCO - after a healthy discussion, a short, powerful programme name was chosen that reflects the substance, so that all involved parties can easily remember and will hopefully also want to use it. The Spanish meaning of CIRCO, circus, was considered creative collateral and an acceptable risk.
- The Subtitle/Payoff - 'Creating business through circular design' was chosen. This sentence aims to make it clear to (potential) participants that participating in a CIRCO training programme contributes to generating viable, new business. The text deliberately targets many entrepreneurs' motivational triggers, namely generating new business. At the very least it should make them curious. During the training, it becomes clear how circular design can contribute to this.

3.4 ELEMENT 3: transformative, action-oriented methodology

To train companies and designers in the field of circular design, and to encourage them to apply this knowledge to their products, services, and business model, the CIRCO Circular Design methodology was developed.

The methodology was designed iteratively, following a process of development, validation, adjustment, and so on. In the first year of CIRCO, each iteration was tested with a small group of companies (e.g., Philips, Auping, Ahrend, Interface). Most of these companies already possess considerable knowledge of circularity and have contributed significantly to the development of the methodology, resulting in a co-creation process. Members of the CIRCO core team facilitated the workshops during this phase. They incorporated the constructive feedback from the participants into the next version of the methodology. Participation was free during this phase.

Especially in the first year, the Circular Design methodology took various forms: from a board-game-like format, through challenges with students, to its final form: the CIRCO Track and CIRCO Class.

The CIRCO-Track

The CIRCO Track is a three-day workshop programme for groups of companies. With the CIRCO Track, groups of companies are trained and inspired to systematically engage in circular design within their company and supply chain. The CIRCO Class is a compact version: a one-day workshop for groups of designers. The CIRCO Class ensures that the insights and tools of professional designers are expanded with knowledge of and tools for circular design.

[20] With a nod to the 'Moon shot' speech by U.S. President J.F. Kennedy (1962): 'We choose to go to the moon, and do the other things, not because they're easy, but because they are hard'. Also see https://www.youtube.com/watch?v=th5A6ZQ28pE

The main features of the CIRCO Track are:

A. **Objective**: Design a circular proposition, provide a concrete perspective for action.
B. **Optimal setting:** Not too many or too few participants; not too short or too long a process.
C. **Design space:** Opening new design space by reframing the context.
D. **Systems thinking:** Encouraging and specifying systems thinking.
E. **Process**: Facilitating and catalysing the design process.
F. **Implementation plan:** Towards a promising continuation through a roadmap and pitch
G. **Feedback:** Through Track learnings, CIRCO continuously collects feedback and suggestions for improvement.

A. Objective: designing a circular proposition, offering concrete actionable insights

The main goal of the CIRCO Track is to translate the broad macro-concept of the Circular Economy into a tangible and appealing actionable perspective for individual companies (both large and small) and entrepreneurs. The aim is to present it in such a way that they are intrigued to explore the immediate value it can bring to their businesses.

The methodology is also designed to plant 'transformative seeds'. Participants are challenged to view their familiar reality with a new perspective, identifying previously unthinkable opportunities and designing innovative solutions.

The ultimate objective of the Track and CIRCO as a whole is that, through the cumulative transformative actions of participants, structural changes will emerge in value chains. These changes will eventually, from the bottom up, lead to a transformation of the economic system.

B. Optimal setting: not too many, not too few participants; a well-balanced process

Each Track follows various guidelines:

- **Subject**: Especially in phase 1, CIRCO often organises Open Tracks where companies from different sectors participate and inspire one another. In later phases, the focus shifts to specific thematic content (e.g., plastic packaging) or a specific sector chain (e.g., construction), diving deeper into broader value chain issues together.
- **Participants**: 10 companies, 2 representatives per company, totaling 20 participants.
- **Facilitated** by two trained CIRCO trainers and an external designer.
- **Three workshop days** spread over four weeks (when held physically at a location, different for online/blended formats, see section 4.4).

Figure 3 | Methodology, participants, and trainer during the Track.

The mentioned guidelines were chosen based on various observations and considerations:

- Having ten companies per Track enables a reasonably broad or diverse representation from a single sector and/or along a single supply chain to come on board. This ensures a wealth of knowledge and multiple perspectives. Through facilitated interaction among participants, better solutions emerge. A group size of ten companies per Track is also large enough for efficient operations, yet small enough to fill each Track with a reasonable effort. This group size, which remains somewhat 'intimate', familiar, and safe, is also well-suited for parties to learn from and share with one another, offering their own insights and perspectives on the supply chain. Working within a group of like-minded companies also reinforces participants' confidence in the Circular Economy ('Hey, it seems more companies are interested in circular operations, I'm apparently not alone. Could the Circular Economy really be on the horizon?').
- Each company is represented by two individuals, one with a business background and the other with a design profile. This ensures that analyses and proposed solutions during the Track are evaluated early on, both from a financial standpoint and market perspective as well as from a design perspective. This approach filters out less promising ideas while retaining the more viable ones. For larger companies, where internal collaboration between these disciplines isn't always a given, this structure provides immediate added value.
- Another reason for having two representatives per company is that it increases the likelihood of the company continuing with the implementation after participating in the Track. Typically, both individuals feel a sense of ownership over the chosen solution and can motivate each other. An added benefit of having two representatives is that if one of them is unable to attend, continuity is better ensured.
- Two CIRCO trainers facilitate the Track process and monitor progress. They contribute their own expertise and often establish connections with parties outside the immediate group of participants. An 'external designer' has a relatively free role and can provide substantive support to any participant, depending on the unique needs of each party.
- Choosing to have three full-day sessions has proven optimal to facilitate the necessary process and ensure that it resonates with participants. During the workshops, there's a strong focus on time management, allowing for meaningful discussions without letting them become endless. This ensures energy remains high, participants make progress, and finer details can be addressed later on.

Figure 4 | CIRCO Track Design Methodology: Three days, from divergence > convergence.

The methodology: double diamond

The methodology is derived from the Double Diamond design methodology of the English Design Council[21]. Each CIRCO Track day has its own distinct character (see Figure 4).

- **Day 1 (Initiate)**: Introduction to the theory, analysis of the current (linear) supply chain setting, stimulating participants, and identifying the issue they want to redesign in a circular manner.
- **Day 2 (Ideate)**: Circular redesign of the product, service, and/or business model (within the supply chain).
- **Day 3 (Implement)**: Development of an implementation plan for the short, medium, and long term, along with a pitch.

The time between the different sessions is also significant. Participants often use this interval to revisit the material, allow the information to settle, and/or discuss the topics with others (colleagues or peers).

C. Opening a new design space by reframing the context

CIRCO aims to inspire companies to seek new, circular opportunities that have a more significant impact than merely incremental improvements to existing solutions. Hence, there's a search for a suitable conceptual model that offers participating companies structure, language, and guidance. While the existing Butterfly model[22] from the Ellen MacArthur Foundation provides excellent technical and content insights, it is deemed not inspirational enough within CIRCO. This led to the initiative, in collaboration with other parties, to develop a unique model within CIRCO, resulting in the Value Hill model[23] (Figure 5). This model and its associated language have since been embraced by other entities, including banks, research institutions, UNDP, the EU, and consultancies, to structure discussions on the Circular Economy[24].

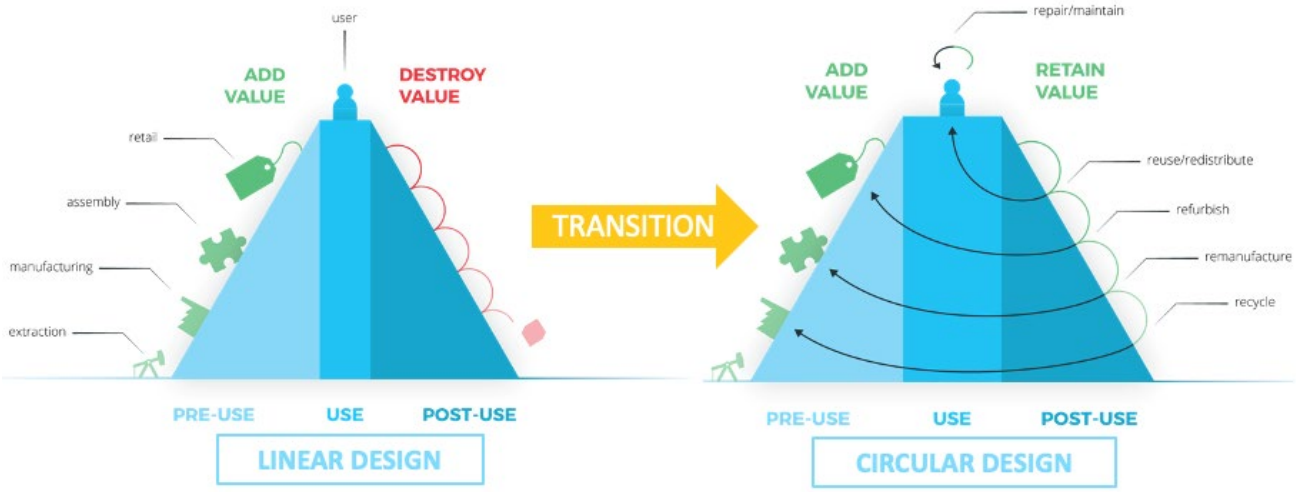


Figure 5 | Value Hill: new design space by reframing the context.

[21] https://www.designcouncil.org.uk/our-work/skills-learning/the-double-diamond/
[22] See https://ellenmacarthurfoundation.org/circular-economy-diagram
[23] The Value Hill model was jointly developed by Circle Economy, Sustainable Finance Lab, Nuovalente and TU Delft; see https://www.circle-economy.com/resources/master-circular-business-with-the-value-hill
[24] Google "value hill"; https://www.google.com/search?q=%22value+hill%22

On the one hand, this model fits in with the accustomed reality of participants, by depicting the (current) value chain, on the left slope of this value hill. This leads to recognition among participants and to connection to the model. In addition, the model introduces new perspectives:

- The hill metaphor makes it visible and subconsciously palpable that it takes a lot of energy to add value to materials and products before they reach the top where the user is located.
- The fact that the hill also has a right slope (new!) makes it visible and subconsciously palpable that a lot of energy and value are also lost when products, after their use phase, are simply thrown away from the top of the hill all the way down (destroy value).
- Through this visualisation, companies realise that after the sale, many things happen to their product that they are (not yet) involved in. Thought-provoking questions help in this regard, such as: "Who makes money from your product after you have sold it, and why don't you? Why does your customer stop using your product?"
- It also becomes visible that on the new right slope lies a range of possibilities to maintain the value of products longer at all levels of value. This can be done through repair, reuse, refurbishment, remanufacturing, up to recycling (retain value). The classic image 'circular = recycling' is replaced by 'recycling = the last resort', namely only when preserving value at higher levels is not feasible.

The function of the Value Hill model within the Track methodology is threefold:

- The model provides Track participants with a common frame of reference and language. This promotes the exchange of ideas and co-creation.
- The model creates new mental design space (especially on the right slope) within which new business opportunities can be identified that participants are often not yet aware of (‘As if after years you discover a new room in your house’).
- Track participants are actively challenged to look for new opportunities on the value hill, among other things by the stimulating CIRCO statement: 'every moment of value loss contains an opportunity for new business'.

D. Encouraging and concretising systems thinking

To enable participating companies to systematically search for new circular opportunities, on the first day they are asked to map out the current value network within which the company now operates (systems map). They name all relevant players, including nearby parties (for example: suppliers, distributors, carriers, customers, financial parties, trade associations, legislator) and parties further away (for example: knowledge institutions, maintenance companies, recyclers, waste processors, governments, etc.). The relationships between these parties are also visualised.

Within this system, participants then look for places where value is currently lost and where they themselves might add circular value. The effect of this systems map is that participants become (extra) aware of the current system in which they are active. They are often shocked by their limited knowledge of the players involved around their product after they have sold it (for example repairers, recyclers, waste processors).

When designing solutions or new circular value propositions, this self-made systems map proves helpful. Particularly because the relationships with, and the potential effects on existing parties quickly become clear.

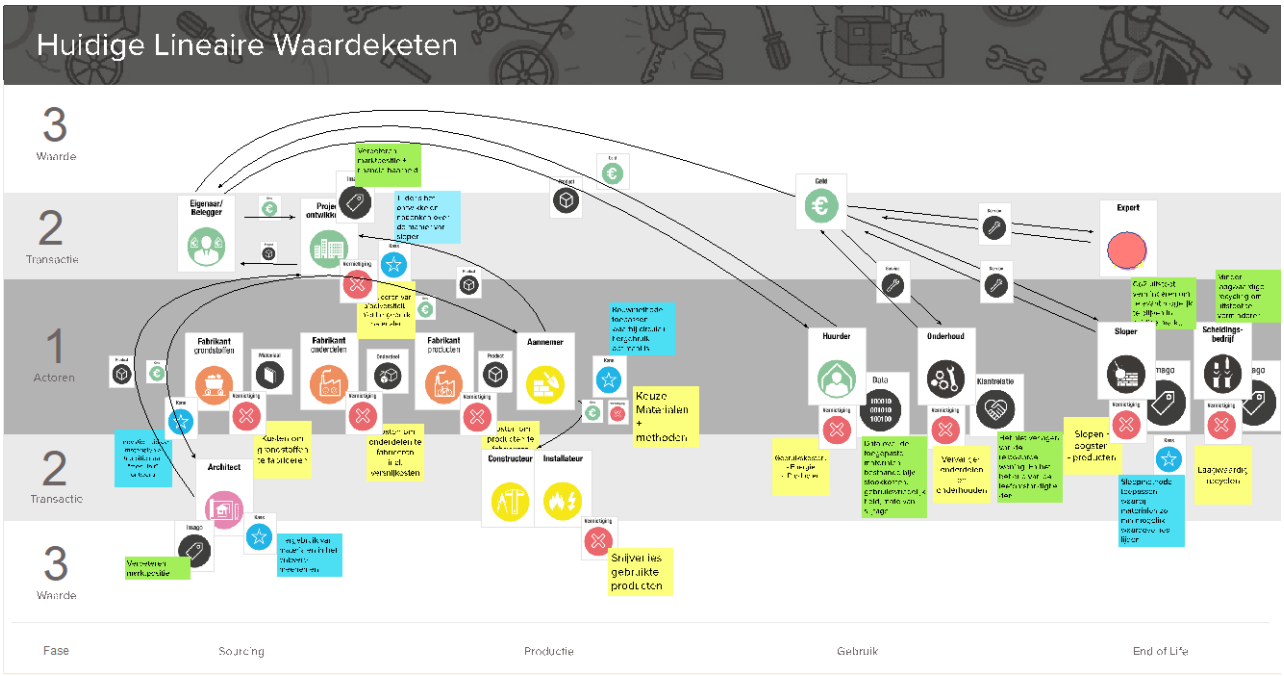


Figure 6 | Example systems map: current linear value chain.

E. Facilitating and catalysing the actual design process

After introducing the new design space (value hill), mapping out the current value network, and identifying the initial[25] opportunity for value loss that participants want to address, the ideate phase begins. In this phase, participants actively shape their (initial) circular value proposition.
This process has the following characteristics:

- The company participants are explicitly the owners of the design process and are responsible for their choices and the outcomes.
- The CIRCO trainers and the external designer facilitate and catalyse the design process, ensuring the new design space is fully utilised.
- To substantively feed the design process, CIRCO trainers introduce archetypes for potential solution directions. These archetypes are derived from two books:
  - *Products that Last:* a book by, among others, Prof. Conny Bakker (TU Delft) and Marcel den Hollander (Rotterdam University Of Applied Sciences), which introduces five archetypes for circular business models and six archetypes for circular design strategies.
  - *Products that Flow:* a book by, among others, Siem Haffmans and Marjolein van Gelder (Partners for Innovation), which delves deeper into and is specifically written for applications in fast-moving consumer goods, packaging, and disposable products.

The result of the design process for each participating company is an (initial concept for) newly designed circular product, service, and/or business model. This design can fit within the existing (and possibly adaptable) value chain, or within an entirely new, yet-to-be-developed, circular value chain.

[25] Within the Track there is room to develop one value loss opportunity into a new circular proposition. Participants are trained to be able to go through this design process independently after the Track.

F. Implementation plan: from road map and pitch to a promising continuation

After completing the ideate day, it's crucial that the designed circular proposition is further developed and implemented. Participants first conduct a concise feasibility analysis and then develop a road map. This road map provides a detailed overview of actions the company will undertake in the short, medium, and long term to bring the circular proposition to life.

Each Track concludes with a pitch round (Figure 7). Every company presents the circular proposition it designed during the Track and outlines how it will be further developed and realised. An added benefit of the pitch is that it prepares participating companies to compellingly present their story to other stakeholders (internally, or externally, e.g., investment firms, governments, grant providers) after the Track. This enhances the chances of successful further development and realisation of the new ideas. In subsequent stages of CIRCO, participants receive post-Track support through CIRCO hubs (see section 2.4).

G. Track-Learnings / feedback

After each Track, the CIRCO trainers ask each participant to fill out a Track-Learning form. Based on this feedback, CIRCO can gauge the extent to which the methodology and trainers meet participants' expectations. This also provides a structured way to gather valuable suggestions to further refine the methodology. It led to various new Track modules (e.g., the initial idea for the development of the *Products that Flow* book, a Class for architects, a Track module for use in the construction environment, and a client module).

Figure 7 | Participants pitch their proposition and road map at the end of each Track.

4. PHASE 2
NETWORK DEVELOPMENT AND VALIDATION

4.1 Enhancing impact

In Phase 2, CIRCO enhances its impact by incorporating three new elements. They are introduced below and elaborated upon in the subsequent sections.

ELEMENT 4: dynamic network of network organizations and trainers
With the stable, effective Circular Design methodology from Phase 1, CIRCO's first scaling step can be designed and implemented. Characteristic of Phase 2 is the further mobilisation of demand (activating more companies to participate in Tracks) and increasing the execution capacity by recruiting and training more CIRCO trainers. To mobilise this demand, there's a strong emphasis on collaborating with various types of network organisations.

ELEMENT 5: dynamic network of network organizations and trainers
In Phase 2, there's also an increase in contacts with educational institutions, especially universities of applied sciences. After various collaborative experiments, CIRCO develops a 'Curriculum Kit' for use by college teachers within the education system. This way, students, the future generation of designers, can get acquainted with circular design principles during their studies. The accompanying 'Teacher Class' training is also introduced, where CIRCO trains educators in using the Curriculum Kit.
.

ELEMENT 6: digital technology for co-creation and e-learning
To spread the CIRCO methodology more broadly and accessible post-Phase 2, investments are made during Phase 2 in developing a (partially) digital version of the CIRCO Track. With this blended version, CIRCO knowledge is largely externalised and codified. This enables online co-creation. This version also reduces the cost per Track. The digitalization of the method had been intended for some time but was expedited due to the outbreak of Covid.

4.2 ELEMENT 4: dynamic network of network organizations and trainers

In Phase 2, a partner and trainer network is developed and tested iteratively (Does the collaboration work as intended? Are the CIRCO propositions and incentives aligned well for all parties? Does anything need adjustment?). It also becomes clear which types of network organisations and trainers synergize well and which do not.

In collaboration with these new partners, CIRCO develops new Tracks. The core CIRCO team retains control over the execution process. During this phase, companies pay CIRCO €500 to participate. This fee was chosen to ensure the commitment of participating companies and to expand CIRCO's financial flexibility. In some cases, this fee is covered by the province or municipality as a sponsor of a Track.

Mobilisation ‘demand side’:
activate more participating companies through network organizations

Between 2015 and 2022, there's little governmental 'push and pull.' Therefore, it consistently requires much effort to find new companies and seduce them to join a CIRCO Track. In CIRCO's early years, it's relatively easy to find and activate willing circular pioneers. However, it becomes more challenging to maintain the exponential curve; mobilising the next cohorts requires more collaboration and creativity.
In other words, throughout its duration, company activation poses the most significant challenge for the CIRCO programme. This bottleneck reaffirms the necessity of CIRCO as a government incentive programme: there's hardly any autonomous demand from companies for CIRCO's circular design knowledge.

In 2015, the CIRCO core team activated the first dozens of companies from its network. Afterwards, they collaborated with various other parties, including:

- other organisations that participate in the previously mentioned National Circular Economy programme (NPCE), such as the Acceleration House CE and various transition agenda teams. Especially the collaboration with the UPCM (Implementation programme Circular Manufacturing) and parties from the Plastics and Consumer Goods domains proves synergistic.
- various industry organisations approach their member companies and mobilise them for participation. Examples include the Royal Metal Union and FME (manufacturing industry), NRK (plastics sector), KIDV (packaging), MODINT (clothing sector), CBM (furniture), and VMRG (facade construction).

During these industry organisation meetings, CIRCO holds one-hour mini-workshops to inspire and entice companies to sign up. Such joint actions lead to several successful Tracks and the first few hundred participants. A note is that the successful activation of companies from all mentioned parties heavily depends on the motivation, network, and skills of often just a few individuals.

In Phase 2, the CIRCO core team also adjusts and aligns with this sector approach. The team's structure now aligns with the National CE programme. Therefore, during this period, CIRCO has four coordinating core team members representing the Consumer Goods, Plastics, Manufacturing, and Construction sectors.

> ***'In 2019, I was introduced to CIRCO. It turned out that in the previous years, both from Rabobank and CIRCO, we had each assisted nearly 500 companies in developing a circular business model. But now, we were looking for a partner to scale up with. It was a fantastic meeting that led to a fruitful and organic collaboration for even more circular businesses!'***
>
> **Martje Fraaije** | Programme manager Circular Business, Rabobank

After about two years, it becomes evident that not all industry associations are accustomed to, equipped for, or willing to allocate sufficient resources to genuinely activate many of their members. This is also related to the differences in role perception: is the organisation there to serve as many members as possible and defend the status quo, or does the organisation also have a role in providing direction (in this case, circular) to a necessary transition?

Parallel to these experiences with industry organisations, conversations arise with several provinces, including North Holland and Overijssel. Overijssel has the intention and resources to organise and fund ten CIRCO Tracks in the region. And although it proves challenging to get these ten Tracks fully 'filled,' several of them proceed. The Tracks turn out to be a welcome tool for Overijssel, and later for other provinces as well, to offer companies a course of action and initiate the first circular movement. At the same time, in collaboration with CIRCO, they

can gather more information about the specific needs and challenges faced by companies wanting to take circular steps.

Provinces then use the information from the CIRCO Tracks as input for supplementary circular policies and for developing new tools at the provincial level (see also element 9, paragraph 5.4). An example of such a tool is the 'circular voucher,' which companies can apply for after (among other things) participating in a CIRCO Track. During Phase 2, it becomes evident that more regional (and often cross-sectoral) networking partners align well with CIRCO's long-term ambition. Hence, from 2019, following a broader exploration and initially in parallel with the ongoing collaboration with industry associations, a decentralised, regional hub strategy is developed. Phase 3 delves deeper into this.

Expanding the 'supply side': increasing capacity by recruiting and training CIRCO trainers

Parallel to, and balanced against, the aforementioned developments on the demand side, CIRCO expands its training capacity (supply side) by establishing relationships with motivated, experienced designers who align with the previously mentioned CIRCO culture. Most of them work at a design agency and, in addition to design knowledge, possess strong training skills, sector-specific knowledge, above-average energy levels, and a complementary relevant network. Some are looking for a role as a change agent and/or have already participated in a CIRCO Class.

The Train the Trainer programme is introduced, where trainers are educated and certified in the CIRCO methodology. To connect these motivated, certified trainers to CIRCO, they are immediately given a prominent place on the CIRCO website. Agreements are also made with each trainer regarding the mode of collaboration, which are documented in the standard Trainer Agreement. Most are proud to contribute to the CIRCO objectives. For each Track, CIRCO provides the trainer with a standardised Track assignment accompanied by a fixed fee. In many cases, the CIRCO trainers also assist in activating participating companies for the Track they facilitate.

The combination of a 'fixed' CIRCO core team of part-time independents and a flexible outer layer of CIRCO trainers available for hire per Track aligns well with the exploration in phase 2 for the most suitable network form.

4.3 ELEMENT 5: the future generation: students (and their teachers)

CIRCO, CLICKNL, and the Ministry of Infrastructure and Water Management recognize the importance of educating students, the future generation, in a 'right from the start' and circular manner.

As a first step in the educational world, the CIRCO methodology is applied within the master course Circular Design at the Faculty of Industrial Design Engineering of TU Delft. Here, CIRCO contributed to the development and execution of two lecture cycles. After this, it became apparent that CIRCO's circular design knowledge and methodology better fit the more application-oriented HBO (Higher Professional Education), especially those courses where design knowledge and economic knowledge converge. In phase 2, CIRCO develops structural relationships with universities of applied sciences to come to an additional CIRCO educational proposition through a co-creation process with some of them. After several exploratory collaboration projects, such as with the Amsterdam University of Applied Sciences, a detailed plan was formulated in 2019 in collaboration with HAN, Saxion, Windesheim, and Zuyd on how a structural collaboration and CIRCO educational proposition could

look that fits with the curricula of these universities. The result of this exploration is the design and development of two new, coherent CIRCO propositions: the CIRCO Curriculum Kit and the CIRCO Teacher Class.

CIRCO Curriculum Kit

The CIRCO Curriculum Kit is an educational package based on the CIRCO method tailored for use within the application-oriented higher professional education (for courses such as product design, architecture, and business administration). This allows students to become acquainted with the principles of circular design early on.

The modules used in the Curriculum Kit are fixed and identical to the building blocks of the regular CIRCO Track. The pace, depth, and any additional modules are determined by the institution's teachers (in consultation with CIRCO), ensuring optimal alignment with the training and learning objectives.

CIRCO Teacher Class

The CIRCO Teacher Class is used to introduce university teachers to the importance of the circular economy and their role in it and to introduce them to the CIRCO methodology. During the Teacher Class, they are challenged and encouraged to apply the Curriculum Kit within their course. The Teacher Class is taught by experienced CIRCO trainers. CIRCO's goal is to participate in one round of teaching with a team of teachers after the Teacher Class. In subsequent editions, the trained teachers teach the CIRCO methodology autonomously.

With these two now standard working methods, CIRCO then approaches other universities of applied sciences. The teachers appreciate the two-stage approach of Class and Kit, especially because the CIRCO methodology helps them to allow students to experience that the complexity of the (transition to a) circular economy can be reduced to a clear, concrete action perspective for (future) designers and companies.

By the end of 2022, CIRCO maintains structural relationships with HAN University of Applied Sciences, Saxion, Windesheim, Zuyd University of Applied Sciences, Amsterdam University of Applied Sciences, Rotterdam University of Applied Sciences, Utrecht University of Applied Sciences, The Hague University of Applied Sciences, Inholland, Avans, Fontys, Design Academy, Hanze University of Applied Sciences, Minerva Art Academy, NHL Stenden, Cibap (furniture training MBO, Zwolle), and the HMC (wood and furniture college).

The Teacher Class has been given at all these universities of applied sciences, sometimes multiple times. At Rotterdam University of Applied Sciences, a total of four Teacher Classes have been given[26] for a total of 80 teachers. This is followed by the actual deployment of the Curriculum Kit at many universities. By the end of 2022, it has been integrated into the curriculum and put into use at HvA, HAN, Windesheim (Almere and Zwolle), Zuyd University of Applied Sciences, and Saxion.

'As a CIRCO trainer, I hope to make company participants, teachers, and students put on a new pair of glasses. Glasses with which they will recognize all moments of value loss from now on. Also, those outside their professional field of view. And that they then try to prevent value losses step by step in their daily actions.'

Bas Roelofs | CIRCO trainer and founder Sustar

The application of the CIRCO methodology at universities of applied sciences does not only take place within regular education. For instance, Windesheim University of Applied Sciences in Almere organised a multi-day

[26] Rotterdam University Of Applied Sciences, see LinkedIn-post: https://www.linkedin.com/feed/update/urn:li:activity:6986234274085531648 (in Dutch)

'Zero Waste Hackathon' in 2021, for which the CIRCO method formed the substantive basis. See this inspiring video on Youtube[27].

In conclusion: each university of applied sciences has an essential networking function in the region in which it operates. The university maintains relationships with local and regional governments and regional companies. This regional networking function is also discussed in section 5.2 (element 7) with an explanation of the Dutch CIRCO hubs and their embedding in regional ecosystems.

'We consider the collaboration with CIRCO to be very important because, through the application of the CIRCO method, we can directly impart the circular principles to the new generations of students in our education.'

Dr. Daniëlle Twardy-Duisters | Researcher Circular Business Models, Zuyd University of Applied Sciences

4.4 ELEMENT 6: digital technology, for co-creation and e-learning

Until March 2020, the execution of CIRCO-Tracks always took place entirely on location. Participants would gather three times for a full day to learn from each other and the trainers, and to design their own company-specific circular solution and roadmap - on paper.

Although the methodology works well in this manner, an idea arises within CIRCO to explore whether and how the deployment of digital technology could contribute to achieving (mobilisation) objectives faster or better. Following this exploration, which showed that technology could indeed contribute in various ways, CIRCO launched a project in early 2020 to design and develop a blended version of the Track methodology. 'Blended' means that a Track will be executed partially online and partially on location.

This blended project originally had five objectives:

1. **Enhance Learning Effect and Impact:** The belief is that a well-thought-out deployment of innovative digital learning tools will result in an even greater effect on participants.
2. **Quality Assurance:** By codifying and offering the 'hard', cognitive part of the knowledge to be transferred digitally online, the quality of the Track is guaranteed and becomes less dependent on the personal knowledge of individual trainers.
3. **Flexibility of Learning Moments:** By offering parts of the methodology online as a self-service module, participants can choose the time and place to complete the modules. This makes participation in the Track more accessible. This is especially true for SMEs and associate foremen/women who don't like to leave their company for entire days. With this approach, CIRCO's mobilisation ambition can potentially be achieved faster.
4. **Lower Cost Price:** This flexibility and the self-service modules will mean that Track participants spend less time together, leading to lower costs.
5. **Easy Upgradability and Translatability:** CIRCO is used to working in a 'permanent beta' mode. The blended version of the Track methodology will not be the last version, and the development will take this into account, as well as the possibility of easily translating the blended version for use outside the Netherlands.

[27] Video Circular Hackathon at Windesheim Almere: https://www.youtube.com/watch?v=xaVadKrxej0

Short-term Solution due to Covid: the 100% Online Track Version

During the development of the blended version, Covid breaks out in the Netherlands (1st lockdown: March 2020). This gives the development project a sixth, urgent objective:

6. **Continuity**: ensuring that CIRCO can continue to perform Tracks during the Covid period.

The direct consequence of this sixth objective is that a 100% online Track version will be the first to be developed. In line with the developments in society as a whole during that period, CIRCO selects the digital means with which the existing (physical) CIRCO methodology can be implemented completely online as quickly as possible.

Zoom and Mural

The Zoom[28] platform becomes the online replacement for the physical locations where participants and trainers gather. The online tool Mural[29] replaces the paper worksheets and canvases where participants design their solutions during a physical Track.

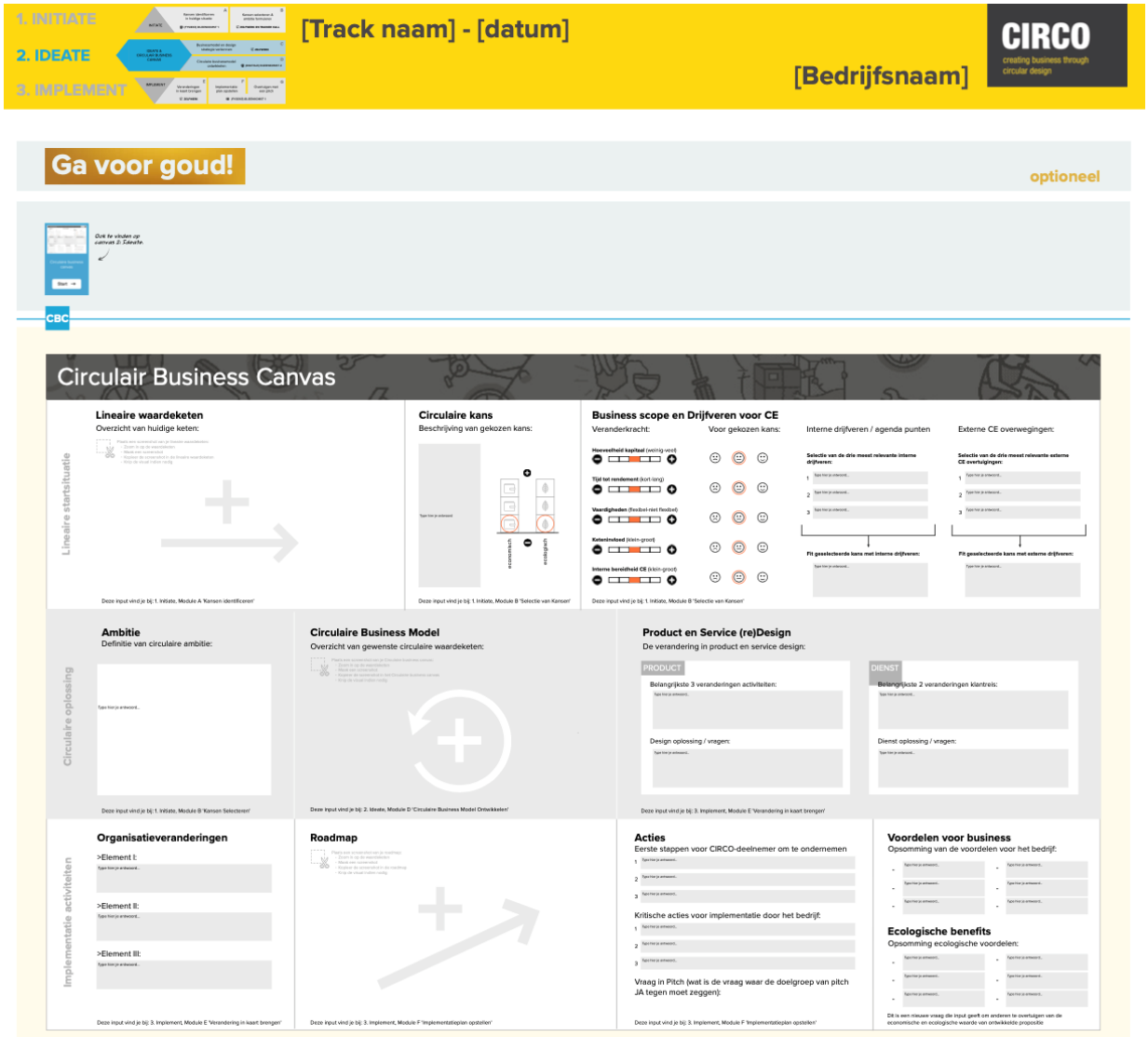


Figure 8 | Online Circular Business Canvas, developed in Mural.

[28] Zoom platform, see https://zoom.us
[29] Mural platform, see https://www.mural.co/

Steep learning curve

Like the earlier methodology development, the online Track version evolves iteratively. The first version is developed, quickly tested in practice (April 2020), and then adjusted several times. The development team, CIRCO trainers, and Track participants go through steep learning curves in a short time. What works? What doesn't? How do we keep people engaged online? The definitive online version is available from June 2020. This new knowledge is invaluable input for the development of the blended version.

Blended Track Version Implementation

Once the online version is sufficiently refined and in production, the project team refocuses on the original objective: developing the blended version. The CIRCO team takes the time for a deeper exploration into the capabilities and limitations of the current digital learning tools available in the market: which platforms and/or products can best achieve CIRCO's original five blended objectives?

After a broader market exploration and advice from independent specialists, the blended version is chosen to consist of a combination of a 'structured learning environment' and a 'creative work environment'. The core team develops both digital environments in conjunction, using the e-learning products of Articulate[30] (new to CIRCO) and the creative environment of Mural (with which CIRCO already has experience, as described in the 100% online Track version).

Articulate is a so-called authoring tool and offers a wide range of templates for different types of learning formats that align well with and provide deeper insights into the CIRCO methodology. It also allows for the facilitation of the entire learning process, encompassing all the steps of the Track, online (figure 9).

The blended version is also developed iteratively. After testing the initial versions in three Tracks between February and March 2021, a comprehensive 1.0 version is delivered and put into production by June 2021.

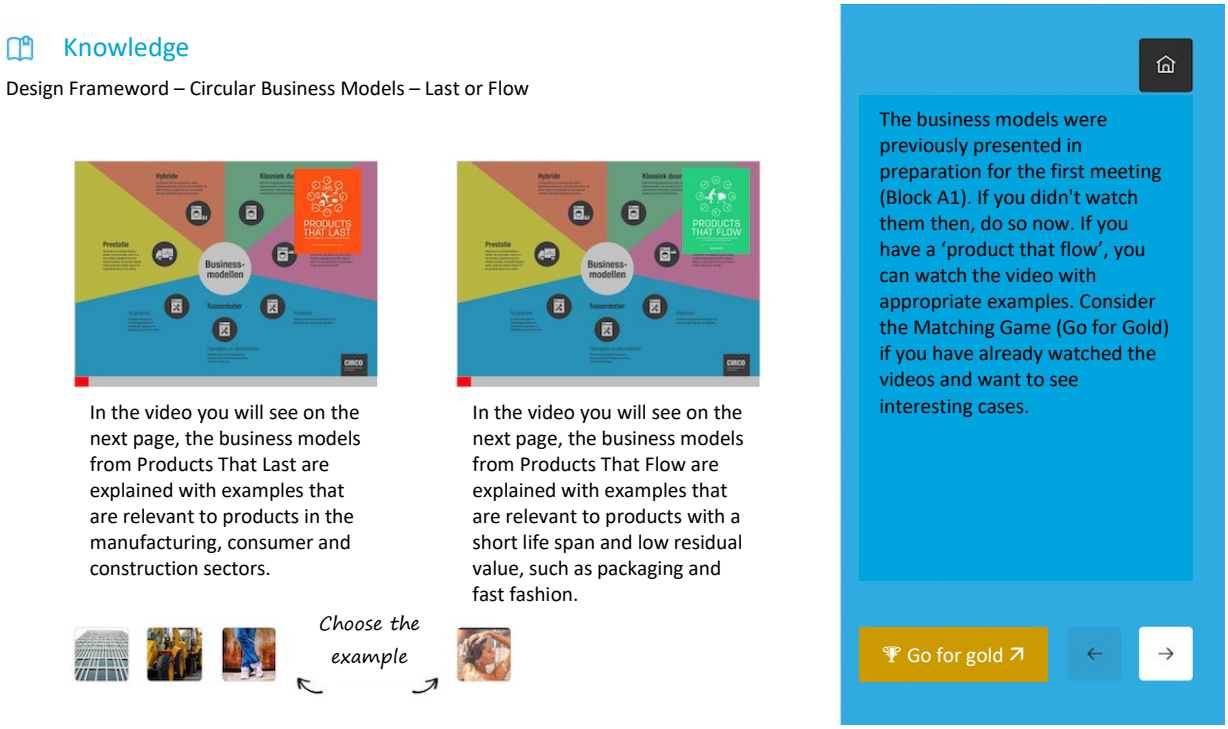


Figure 9 | Example of an online learning environment within Articulate.

[30] Articulate authoring tool, see https://articulate.com

Blended version results and implications

The previously mentioned five objectives (section 4.4) appear to be (reasonably) well achieved with the blended version 1.0:

1. **Enhancing learning effect and impact**: By combining the structured (Articulate) learning environment and the visual, creative (Mural) workspace, they harness the best of both worlds. This combination facilitates both cognitive individual learning at one's pace and collaborative learning and co-creation (via Mural), crucial for advancing the transition to a Circular Economy. The learning method has become richer, enriched with more circular examples. Feedback from participants confirms this. They can now easily share CIRCO knowledge and their designed circular proposition online, potentially leading to a broader impact. However, no measurements were taken to validate this.
2. **Quality assurance:** The 'hard' CIRCO knowledge is now codified through texts, visuals, and videos with the most experienced CIRCO trainers. This ensures that as CIRCO scales up with new trainers, the quality will remain consistent.
3. **Flexibility in learning moments:** About 50% of the original physical Track's duration (12 hours or 1.5 days) is now allocated to self-service modules. Participants have the freedom to decide when and where they complete this portion of the Track. However, this flexibility, which allows participants to learn at their own pace, has a downside. It demands a greater level of self-discipline from participants. There are instances where a participant might not complete their 'homework' adequately. In such cases, trainers have to put in extra effort to ensure that the participant achieves a satisfactory outcome. Occasionally, this extra attention to one participant might detract from the attention given to other participants.
4. **Cost reduction:** The blended Track reduces the hours participants spend together, leading to lower costs than the physical Track.
5. **Easy upgradeability and translatability:** The blended version is modular, making future upgrades and translations easier and more cost-effective.

Besides these objectives, the blended project led to two additional positive outcomes:

6. **Flexibility in depth:** Depending on an individual's pace of learning, interests, and available time, participants can now easily choose to selectively repeat learning modules. They can also take 'detours' through additional, in-depth modules. The built-in 'Go for Gold' option ensures that even the fastest participants remain motivated.
7. **Progress monitoring / customised support by trainers:** In the blended version, it's easier for trainers to (online) track whether individual participants are making progress during the Track or facing obstacles. This also simplifies the provision of more targeted support.

Evolving role of trainers

The introduction of different learning tools also changes the role of the trainer. After all, participants now largely find their own way. The trainer can rely on codified knowledge, focusing even more on facilitating key exercises, inspiring and connecting participants, and providing in-depth and additional personal knowledge and experiences. The 'process mural' developed within the blended project also aids the trainer in their facilitative role.

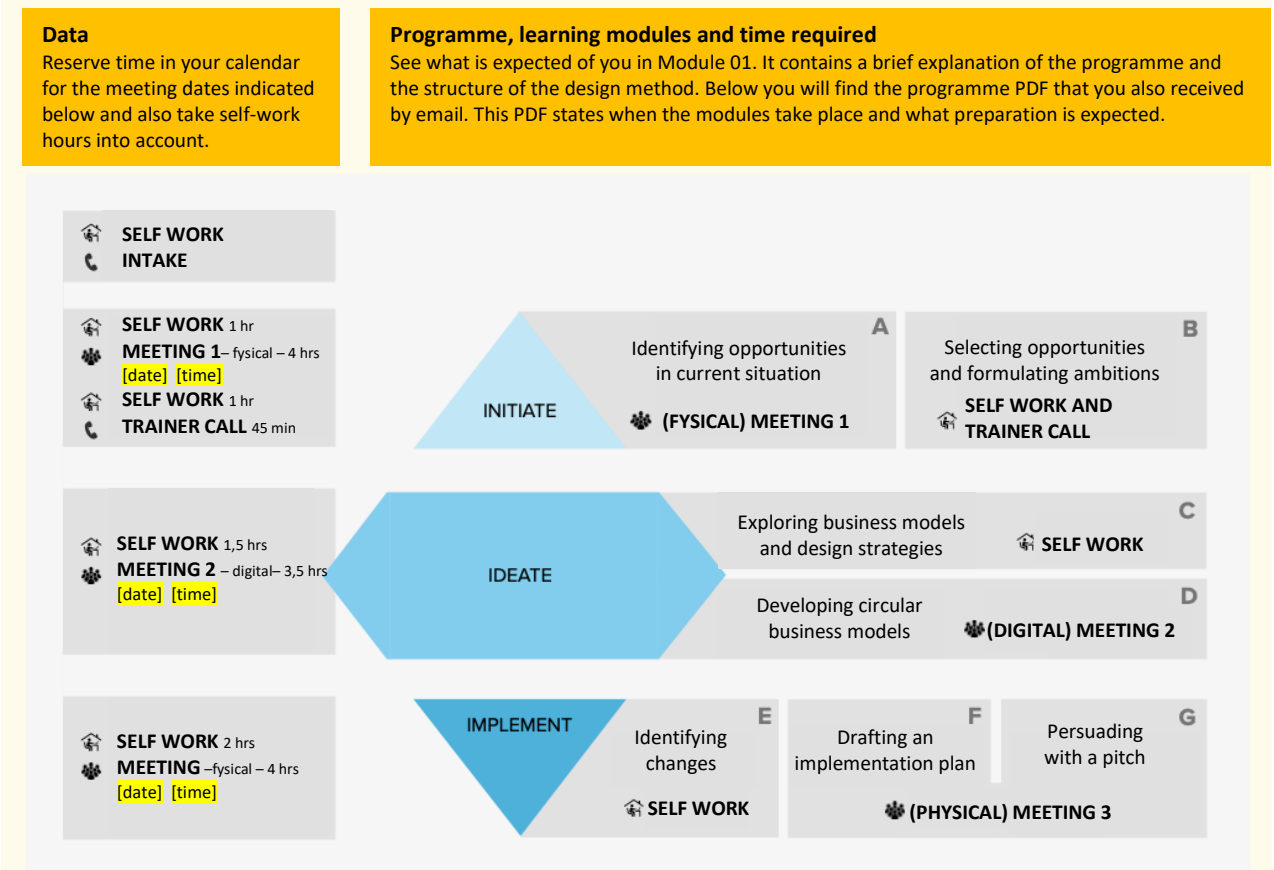


Figure 10 | Self-work modules and shorter (digital) meetings during the Blended Track.

Lower costs > new mobilisation opportunity

A result of the development of the Blended Track variant is that each Track can now be executed in a cost-covering manner. This is possible due to the lower cost per Track and by increasing the participant contribution from companies from €500 to €1000 (provided at least 8 companies participate in a Track). This is a crucial prerequisite for further scaling up (see also section 5.2, element 7: (inter)national hubs and regional integration).

5. PHASE 3
CATALYSING ECOSYSTEM FOR BOTTOM-UP SYSTEM INNOVATION

5.1 Overview of the ecosystem

In phases 1 and 2, a total of six elements of the CIRCO Mobilisation approach have been developed and implemented, in mutual coherence. In phase 3, these are supplemented with four new elements, and the entire network is further aligned, in collaboration with many partners. The vision behind this is outlined in section 2.1 (figure 1: a circular economy grows bottom-up). A catalytic ecosystem can accelerate this growth process. Figure 11 shows the intended ecosystem around CIRCO. In phase 3, this actually takes shape.

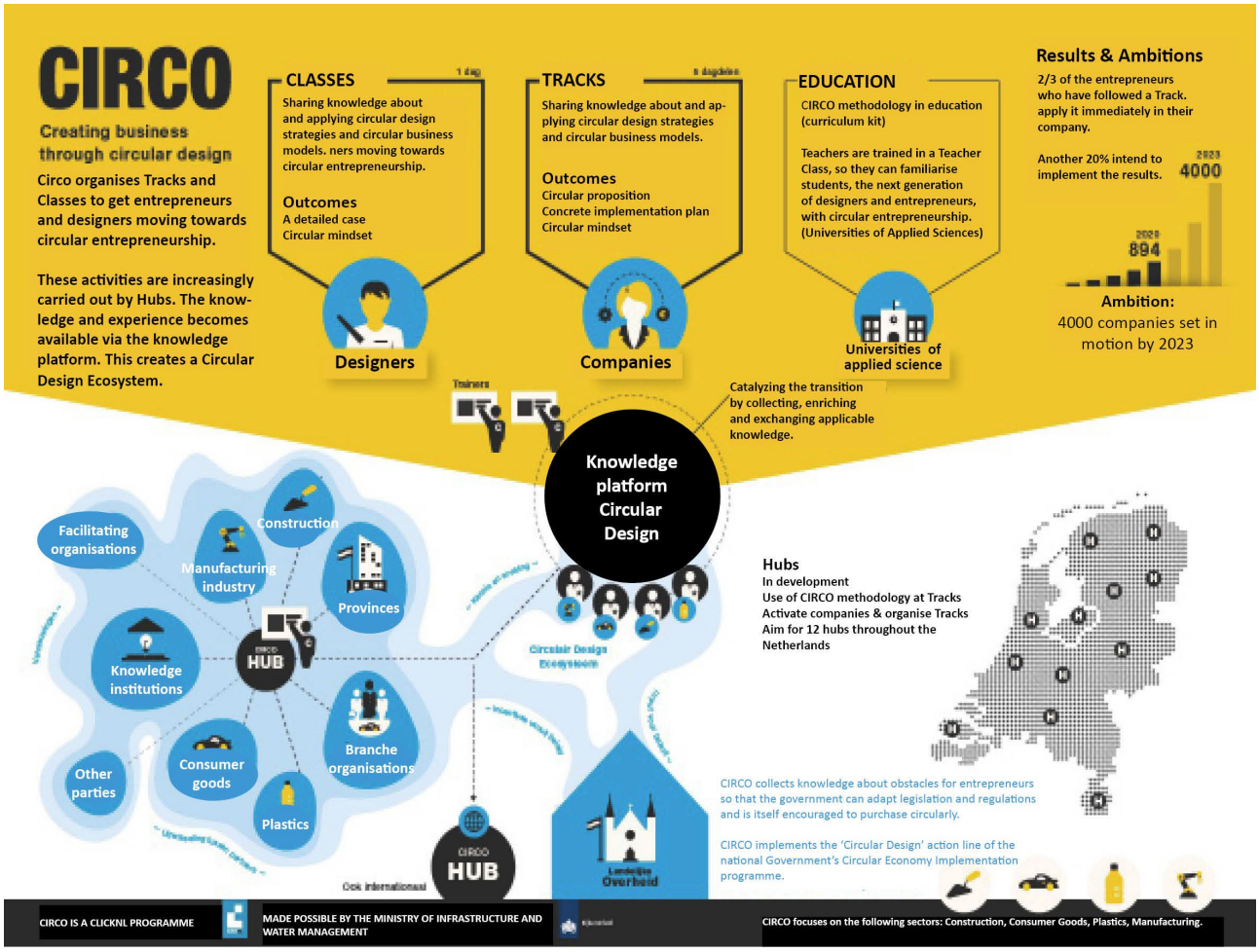


Figure 11 | CIRCO ecosystem (visual from 2021).

The development and actual alignment of this entire ecosystem requires an adjustment for all parties involved and takes some lead time (especially in 2022). And 'during the renovation, the shop remains open'.

In phase 3, the following four elements are introduced into the ecosystem. These elements 7 through 10 are further described in sections 5.2 to 5.5.

ELEMENT 7: (inter)national network of regional hubs, regional embedding

Decentralised CIRCO hubs are being established; both regional hubs for each province in the Netherlands and national hubs for countries outside the Netherlands. This CIRCO hub function is housed with existing parties that already have a (multi-year) basic financing (for example, from the province).
The organisation, financing, execution, and follow-up of CIRCO Tracks will from now on take place entirely decentralised. This is overseen by regional and national CIRCO hubs with their trainers. The CIRCO hubs are trained and supported by the CIRCO core team. And, as a reminder (see section 4.4): the execution of a blended CIRCO Track is cost-covering from the start of phase 3.
Despite this decentralisation of execution, CIRCO's central objective to mobilise 4,000 companies remains intact. And yes, the CIRCO core team now has even less control over achieving this goal.

ELEMENT 8: shared knowledge platform

Within the ecosystem, a central knowledge platform will be established where substantive knowledge about Circular Design can accumulate and from which this knowledge will be further disseminated.

ELEMENT 9: connecting micro-meso-macro, closing the learning loop

The position of the CIRCO core team shifts to a more tactical or meso-level. In phase 3, CIRCO mainly plays the roles of network director and connector between government policymakers (macro) and implementation (micro, via hubs). This position offers new possibilities and may also entail an additional responsibility.

ELEMENT 10: smart funding: decentralised where possible, centralised where necessary

The funding of CIRCO-related activities, both centrally and decentrally, is adjusted in line with the aforementioned developments.

5.2 ELEMENT 7: (inter)national network of regional hubs, regional embedding

In section 4.2, it was described how CIRCO, in its search and activation of companies in phase 2, first collaborates with industry organisations. Subsequently, the focus shifted primarily to regionally operating network parties (among others via provinces). In the end, it was decided to continue along this path and pivot CIRCO to primarily focus on regions.

'I recognize the challenge of getting companies on board for a CIRCO Track, but I also see that the companies that do get involved take significant circular steps. And that's what it's all about.'

Marije de Boer | Circulair Friesland (including CIRCO-hub)

INTERMEZZO

Towards a more systemic impact

From the growing, catalytic CIRCO ecosystem, with active involvement of parties at the micro-, meso-, and macro levels, opportunities arise to realise a more systemic impact. This systemic effect first becomes visible bottom-up within specific sub-sectors in the market and in certain regions.
Examples include the 'Circo Pump' initiative[31], involving pump manufacturers, wholesalers, and maintenance organisations, and the 'intensive care goes circular' supply chain initiative[32], initiated by the Erasmus Medical Center. In both initiatives, bottom-up circular value chains emerge. This happens because several organisations that have (partly jointly) followed a CIRCO Track, subsequently develop a new business model individually and then collaborate in a new, circular way with value chain partners, sometimes new ones.

System innovation grows bottom-up

The abovementioned bottom-up development process thus illustrates with practical examples CIRCO's organic vision on system innovation. The belief is that you cannot design and implement a 'complex system' through a linear process. This can only be achieved iteratively, learning from each step. The same applies to all intended more complex circular value chains, and ultimately also for the Circular Economy. It will have to 'grow' bottom-up and iteratively, from collaborating entrepreneurs who feel and take ownership. A prerequisite for success is that the conditions (standardisation, pricing, financing, etc.) are sufficiently and timely aligned with this desired direction.

Note:
Saul Kaplan (American innovation practitioner) has a similar vision and described it as a hypothesis in his blog *Design for Emergence: A Theory of Social System Change*[33], including this quote:

'Social systems are comprised of multiple business models that have figured out how to coexist'

Saul Kaplan

There are three main considerations for this decision. Firstly, a regional approach is expected to ultimately lead to the activation of more companies. Secondly, by embedding the CIRCO hub function in the regional innovation ecosystem, companies can also be supported in the subsequent steps of their 'circular journey' after participating in a CIRCO Track. There are various examples of regional parties (including the provinces of South Holland and Overijssel) adjusting their programming and developing additional instruments accordingly. Lastly, as the number of participating companies increases, there is also the opportunity to learn together more quickly. The hubs (both nationally and internationally) are vital nodes in this joint learning network.

[31] CIRCO PUMP initiative, see https://circopomp.nl/en
[32] Intensive care circulair, see: https://www.linkedin.com/feed/update/urn:li:activity:6983659350779121664 (n Dutch)
[33] Blog Saul Kaplan, see https://saulkaplan.medium.com/design-for-emergence-a-theory-of-social-system-change-4fc095b2b24f

Selection of hubs and collaboration agreement

There are many parties active in the Dutch market that could potentially want to become a CIRCO hub. Therefore, a meticulous selection process has been followed, with the following criteria:

1. The party holds a neutral position and wants to actively contribute to the development of the circular economy / circular design in the region based on its own objectives and policies.
2. The continuity of the party is sufficiently guaranteed, and there is multi-year basic funding.
3. The party has a substantial and relevant business network in the region and maintains good relations with it.
4. The party has enough personnel and competencies to - after training by CIRCO - independently organise and carry out multiple CIRCO Tracks each year under the leadership of trainers certified by CIRCO.
5. The party can serve and/or refer companies that have participated in a Track and subsequently express a need for support, to a more suitable party (in the region). A good relationship with regional universities can be part of this; perhaps students can support companies.
6. The party is willing to regularly and structurally share the acquired circular knowledge with CIRCO and other hubs.

CIRCO / CLICKNL enters into a collaboration agreement with each hub in which all mutual commitments are recorded.

Despite the shift primarily to a regional approach, CIRCO also maintains close relationships with often nationally operating industry associations. They contribute substantively to Tracks and knowledge dissemination but no longer bear responsibility for the organisation of Tracks. Within CIRCO, the relationships with the industry associations are channelled through two sector experts (consumer goods + plastics, and manufacturing + construction). CIRCO launched the first three international hubs in 2019 and the first Dutch hubs in 2020. The initiation of these first hubs essentially marks the beginning of the S-curve of phase 3 (Figure 2).

Collaboration with Rabobank

Following earlier successful collaborations with Rabobank in various regions, CIRCO entered into a national collaboration agreement on February 4, 2020[34]. A significant agreement is that Rabobank, in all its regions in the Netherlands and in close collaboration with the (as of early 2020, partially still to be launched) regional CIRCO hubs, will invite its business clients to participate in CIRCO Tracks organised by the hub. In addition, Rabobank will make an effort to contribute to the financing of newly developed, circular propositions from companies participating in CIRCO.

National Coverage & Regional Integration

By the summer of 2022, the nationally comprehensive hub network was completed, consisting of a total of nine CIRCO hubs, one in (almost) every province. The Central Netherlands Hub (for the provinces of Utrecht and parts of South Holland, North Holland) and the East Netherlands Hub (for Gelderland/Overijssel/Flevoland) each serve (parts of) multiple provinces. Each hub maintains relationships with other parties in its region, including in many cases: the provinces, one or more larger municipalities, a university of applied sciences, regional departments of national industry associations, development companies, and the regional Rabobank.

In this way, an ecosystem has been developed through which the ambitious CIRCO goal (4,000 companies) can, in principle, be achieved. From 2022 onwards, the vast majority of CIRCO Tracks are now organised, implemented, and followed up by autonomous hubs. The lead time required for hubs to genuinely 'get up to speed' and organise new Tracks turned out to be somewhat longer than expected. The intended exponential

[34] Press release Rabobank collaboration, see https://www.circonl.nl/rabobank-partner-van-circo/ (in Dutch)

growth curve in 2022 is less steep, but there remains strong confidence in the potential of the chosen decentralised structure.

'The beauty of a CIRCO Track is that it's a puzzle piece designed to mobilise not just individual SME (manufacturing) companies, but especially an entire product value chain. As seen in the newer challenges within the energy transition, including wind turbines and solar panels! Where companies have found each other to form consortia and where governments meet each other to make a systemic difference'

Eefke Schramade | Transition Catalyst for Circular Economy, Province of South Holland

Still on track towards 4,000 companies?

In June 2021, the 1,000th participating company completed a CIRCO Track (see this video on YouTube[35]). By the end of 2022, a total of 1,315 companies had participated. CIRCO's expectation for 2023 is that 400 new Dutch companies will join. This would bring the total in the Netherlands to over 1,700 companies by the end of 2023. This is still significantly lower than the targeted 4,000. However, the infrastructure has now been developed to potentially achieve this goal within one to two years.

It would also be helpful, as noted by the PBL in its ICER 2023 and the SER in its raw materials letter (see paragraph 1.3), if timely, more directive government measures were implemented to accelerate the transition. For instance, just the announcement of EPR regulations (Extended Producer Responsibility) for mattresses and incontinence materials led to an immediate increase in the number of CIRCO participants from these product groups.

International CIRCO Hubs

CIRCO is also active internationally. In the first years after CIRCO's inception, presentations and workshops were provided in cities like Munich, Paris, Gdansk, and Budapest, always upon request. Initially, the approach was more reactive, but in consultation with the Ministry of Infrastructure and Water Management (I&WM), a more targeted approach was given to international activities and objectives. There were three reasons for this:

1. **International value chains:** Many production chains have an international character. To truly achieve a circular impact in and from the Netherlands, the designing and producing chain parties outside national borders must also work circularly. Using the CIRCO method across borders can contribute to this.
2. **Leading role:** The Dutch government values portraying the Netherlands as a leader in the field of the Circular Economy internationally. CIRCO's Circular Design approach is seen as a tangible and inspiring vehicle for this.
3. **Faster learning:** It's believed that conducting CIRCO activities abroad will allow parties to learn faster together, especially due to the different cultures in which the CIRCO method will be implemented.

The first contacts between CIRCO and international partners mostly arise through the Dutch central government. Especially the posts network (embassies and consulates) and the international directorate of the Ministry of I&WM play an essential role. There's also regular collaboration with Holland Circular Hotspot[36].

[35] Filmpje 1.000e deelnemende bedrijf, see https://www.youtube.com/watch?v=tbimrufrVwE
[36] HCH, see https://hollandcircularhotspot.nl

Parallel to the development of the decentralised CIRCO hub concept in the Netherlands, discussions started with foreign partners about forming a CIRCO hub per country. By the end of 2022, collaboration agreements had been signed with CIRCO hubs in 13 countries: Germany, Belgium/Wallonia, Czech Republic, Estonia, Hungary, Slovakia, Portugal, Turkey, Sri Lanka, Thailand, Malaysia, Singapore, and Brazil.

In each international hub, CIRCO has trained people to activate local companies to participate in CIRCO Tracks and as trainers to facilitate the Tracks. All training materials are available online in English. New hubs translate this, with support from CIRCO Netherlands, into their local language.

By the end of 2022, 37 Tracks had been carried out outside the Netherlands, with a total of 375 (partially estimated) companies participating. Direct 'by-catch' from these international Tracks included shared learning points from various countries. Ideas were also suggested for modular extensions to the Track approach.

Figuur 12 | By the end of 2022, the CIRCO hub in Thailand had completed ten Tracks.

5.3 ELEMENT 8: shared knowledge platform

With the decentralisation and further scaling of the number of Tracks, there's a growing need within the network to focus more on developing a knowledge platform for circular design. The CIRCO core team has room for this. Such a platform would allow the core team, the Hubs, and many other parties to cumulate and share substantive knowledge.

A preliminary exploration into the desirability and feasibility of such a knowledge platform was carried out as early as 2017 by Partners for Innovation on behalf of the Ministry of I&WM: *Market exploration and feasibility study Expertise Center Circular Design*[37]. This showed that such a platform is promising.

The process to truly shape this knowledge platform began in 2021 and has a clear co-creation character. During several meetings, parties exchanged views on which functions this platform should or should not fulfil and how it should be governed.

'After incorporating the CIRCO methodology into various educational modules and linking students to regionally organised CIRCO tracks, CIRCONNECT provides a valuable connection to our practice-oriented research. Through CIRCONNECT, we can make our circular design-related knowledge and tools accessible to a broader audience, and companies can find in-depth knowledge'

Inge Oskam | Lecturer in Circular Design and Entrepreneurship, Amsterdam University of Applied Sciences

The central, multi-stakeholder platform gets its own name and identity: CIRCONNECT. The name CIRCO continues to be used for all (mainly decentralised) activities related to the methodology, such as CIRCO Tracks, CIRCO Classes, and CIRCO hubs.

On March 29, 2022, sixteen parties signed a joint declaration of intent, and CIRCONNECT[38] was launched. In addition to CIRCO, TU Delft / Industrial Design Engineering, Amsterdam University of Applied Sciences, Zuyd University of Applied Sciences, Rijkswaterstaat, TNO, Professional Association of Dutch Designers (BNO), Royal CBM (Industry Association for Interior Construction and Furniture Industry), Midpoint Brabant, Knowledge Institute for Sustainable Packaging (KiDV), Federation NRK (Dutch Rubber and Plastics Industry), Acceleration House Netherlands Circular, development company OostNL, NICE (the Northern Innovation Lab Circular Economy), and the province of Overijssel (figure 14) signed.

[37] First exploration knowledge platform see https://partnersforinnovation.com/nl/publications/expertisecentrum-circular-design/ (in Dutch)
[38] Launch CIRCONNECT: https://www.circonnect.org/nieuws/kennisplatform-circulair-ontwerpen-van-start/ (in Dutch)

Ambition: 'The Circular Design Platform...

...is seen in the Netherlands and internationally as the inspiring, connecting and catalysing node in a network of enthusiastic collaborating parties,...

...who do everything they can to continuously contribute, enrich, share and actively distribute their collective knowledge of Circular Design...

...so that companies and designers will apply this knowledge...

...and other parties (e.g. PBL, KIA CE, Acceleration House) are fed with insights, which they translate into (recommendations for) improved system conditions (including through policy, research, ...)

...which accelerates the transition to a Circular Economy.'

Figuur 13 | Ambition statement from CIRCONNECT founders.

Figure 14 | March 29, 2022: sixteen parties start CIRCONNECT.

CIRCONNECT serves as a central platform with a connecting function. Substantive relationships are established with so-called knowledge partners (offering circular design knowledge, such as TU Delft, Universities of Applied Sciences, TNO, KIDV) and application partners (representatives from the demand side, for example, CIRCO hubs, industry associations, BNO).

CIRCONNECT organises the different types of knowledge in its newly designed circular design framework (Figure 15) and ensures that all knowledge originating from the various knowledge partners is practically applicable and available to the target group.

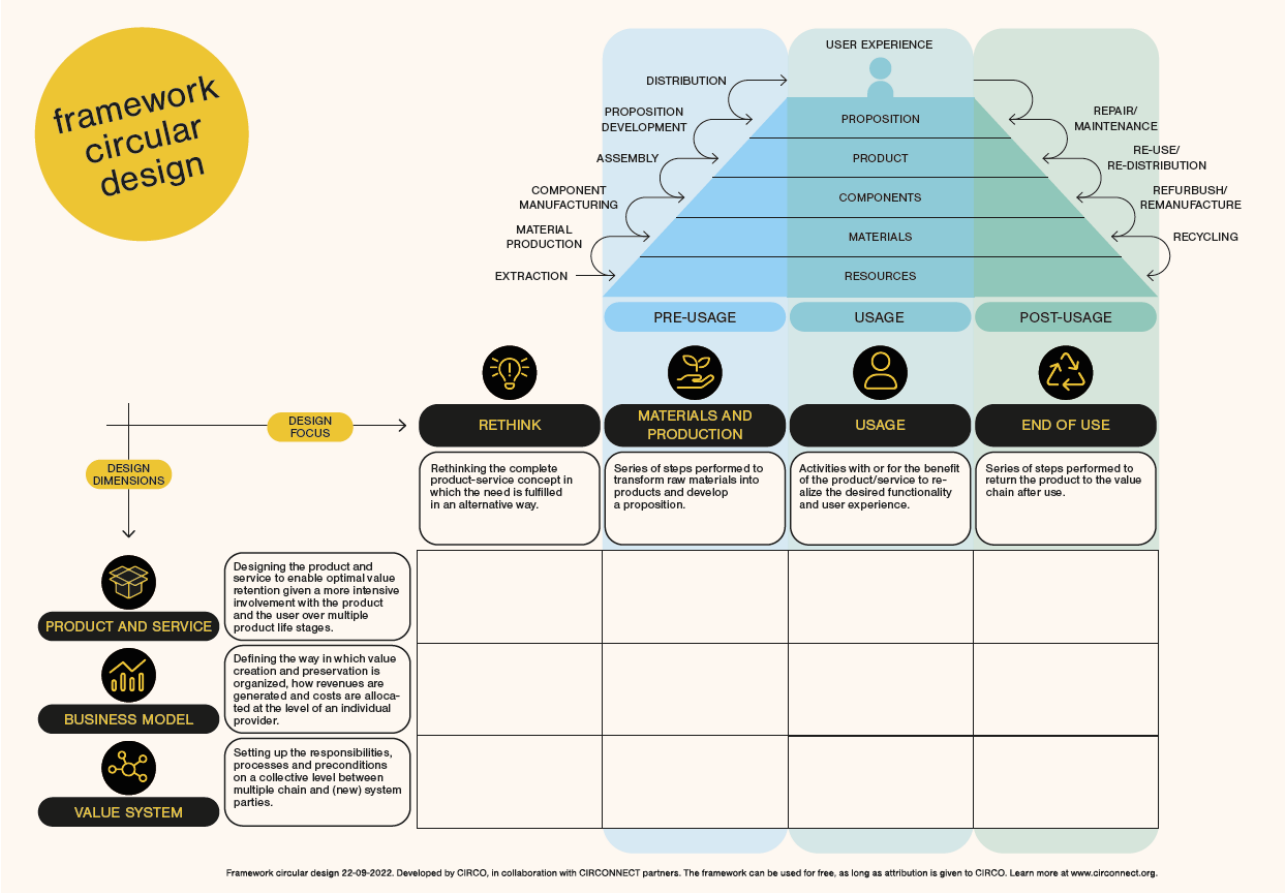


Figure 15 | The Circular Design framework[39] by CIRCONNECT.

In addition to this online platform function, there are also other activities under the CIRCONNECT label:

- The organisation of Expert Cafés, such as discussions on relevant EU legislation that is anticipated.
- The active dissemination of third-party tools, such as the residual value tool, materials module, rethink module, and design knowledge related to repair and refurbishment.
- The development of relevant documents that bundle specific themes relevant to each sector, for which Tracks might potentially be developed.

The sector experts from the CIRCO core team have been conducting Track Learning conversations in the Netherlands and internationally since 2022. After each CIRCO Track, they assess per company, Track, and sector whether new (circular design) topics need attention. If so, CIRCONNECT ensures that this is further elaborated upon.

[39] Circular Design Framework, see https://www.circonnect.org/en/framework-circular-design/

5.4 ELEMENT 9: connecting micro-meso-macro, the systemic learning loop

During phases 2 and 3, CIRCO was initially approached occasionally, and later more frequently, by regional and national governments to contribute their insights based on their knowledge and market experiences. This could relate to the evaluation of existing or the development of new CE regulations, or the preparation of a CE analysis or report. Examples include the subsidy scheme for circular value chain projects[40] from the Ministry of I&WM, the circular voucher scheme of the Overijssel province (see section 4.2), CIRCO's contribution to the Integral Circular Economy Report (ICER) of the PBL, and the *Common Thread analysis*[41] of the Acceleration House CE. In all these cases, CIRCO responded positively and provided the requested contribution.

…from a reactive approach ...

Until early 2022, CIRCO responded reactively to requests for cooperation. They didn't see it as their primary role to provide unsolicited input for policy. Other parties within the broader National programme Circular Economy (NPCE) seemed better equipped for this. After all, CIRCO's primary focus is on mobilising companies and spreading circular design knowledge in the market.

... towards a proactive approach ...

Around the start of CIRCONNECT in phase 3, the CIRCO core team realises that they occupy a unique, central position at the meso-level. CIRCO operates between, on the one hand, over 1,300 companies that want to operate circularly (micro-level, contacts via the hubs), and on the other hand, government parties including policymakers (at the macro level). Along with other CIRCONNECT parties, CIRCO realises that the accumulated practical knowledge and experience from these 1,300 companies gives them a 'right to speak'. They can proactively contribute to further developing the systemic conditions (such as standardising, pricing, subsidising) needed to accelerate the transition. Therefore, in the ambition statement of CIRCONNECT's founders (see 5.3, figure 13), text is included about making 'recommendations for improved system conditions'. This marks the first time a more proactive intention is expressed in this area.

CIRCO and CIRCONNECT also see a role for themselves in phase 3 to help disseminate information about relevant EU and national laws and regulations and to translate them into practical actionable perspectives, both towards network partners and companies. An example of this is the organisation of a CIRCONNECT event entirely dedicated to disseminating knowledge about new EU legislation in the field of Ecodesign. This also fulfils the call from the European Commission to member states to pay particular attention to the implementation of circular entrepreneurship in SMEs.

Additional reflection

In hindsight, more can be said about a proactive contribution from CIRCO / CIRCONNECT to policymakers. Within CIRCO and CIRCONNECT, it was not discussed until the end of 2022 that the ad hoc information exchange with government parties could be considered as part of a larger, systemic learning loop. Figure 16 shows this loop in red.

In the field of system innovation, the actual design of such a learning loop is considered of great importance. In this loop, parties learn structurally and iteratively from each other, based on the targeted collection and processing of information about the effect of each intervention on the system to be changed. This stems from the belief that the actual reaction of a complex system (such as the linear economy) to an external intervention (such as new circular policy or introduction of a EPR regulation) is often not (completely) predictable. Setting up

[40] Value chain project regulations, see https://www.rvo.nl/subsidies-financiering/circulaire-ketenprojecten (in Dutch)
[41] Common thread analysis, see https://versnellingshuisce.nl/nieuws/rode-draden-2023-zes-inzichten-in-circulaire-ketensamenwerking (in Dutch)

a learning loop ensures that parties can learn (or perhaps discover) fairly quickly which measures work/do not work, which ones need to be adjusted, and which interventions and instruments have the greatest impact.

Figure 16 summarises the above text and provides an overview of the positioning of companies/designers <> CIRCO hubs <> CIRCONNECT <> NL government <> EU government, and their mutual relationships, specifically for the topic of Circular Design.

To conclude this topic (element 9): if CIRCO / CIRCONNECT had sought a more active role earlier, this *might* have had a favourable effect on the speed of the circular transition. This applies both to the design of this structural joint 'learning loop' with multiple parties and to the provision of concrete suggestions for additional (regional and/or national) circular policy and regulations, based on CIRCO's observations from practice (via the hubs). Possibly, the effect of this could have also positively contributed to the trajectory of the intended exponential growth curve, towards the target of 4,000 companies in 2023.

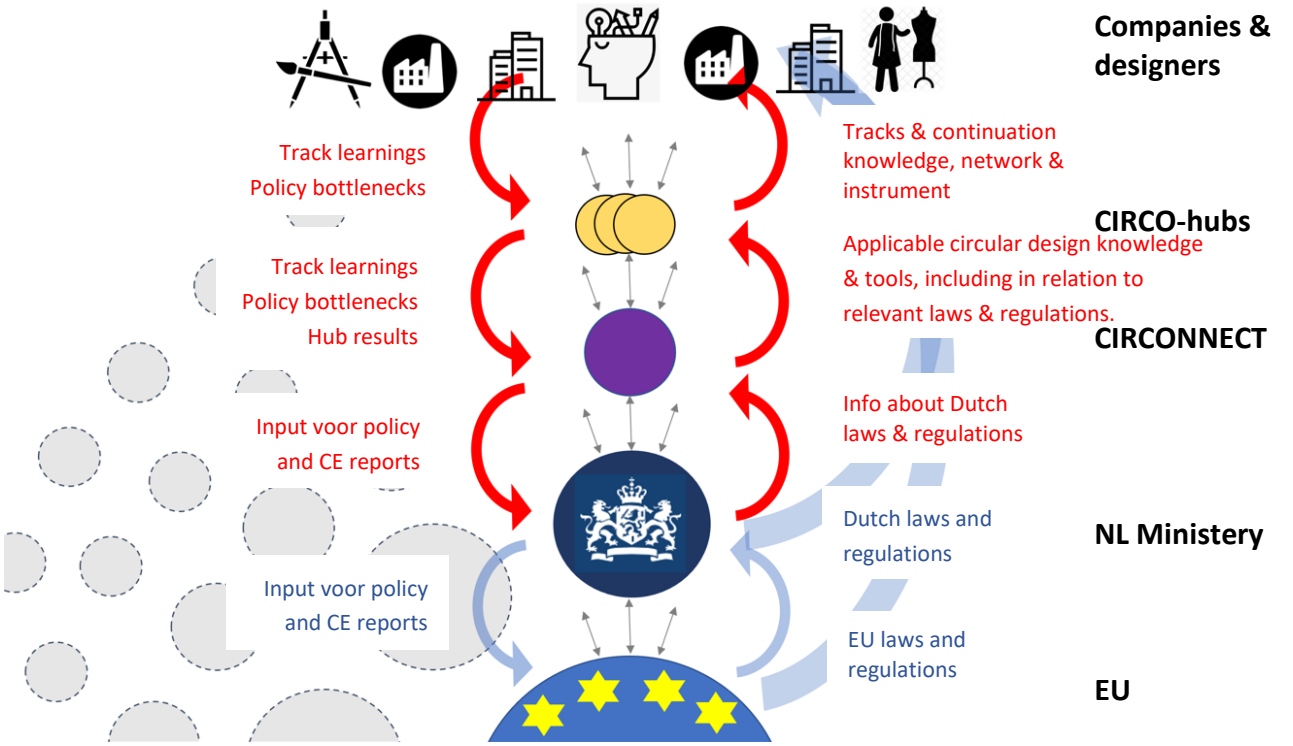


Figure 16 | The systemic learning loop: learning connections and feedback loops. From top to bottom: micro-meso-macro

5.5 ELEMENT 10: smart funding: decentralised where possible, centralised where neccessary

This whitepaper only addresses the topic of financing at this point (as phase 3, element 10, and not already in phase 1 or 2). At this point, it is easier to describe how the various CIRCO activities and developments in all three phases have been financed. After all, phases 1, 2, and 3 have already been explained in detail above.

The main principle for the financing of all CIRCO-related activities can be summarised as 'decentralised where possible, centralised where necessary'. This is further explained below.

The Dutch central government aims for the Dutch economy to be 100% circular by 2050 and 50% by 2030. The development towards the required circular market needs to be catalysed first. It is a logical role for the central government to take the lead and invest in this.

This is precisely why the Ministry of I&WM has been funding CIRCO substantially since its inception in 2015. In the first four years (2015 to 2018), this was about €500k per year. In 2019, there was a one-time grant of €3M, and in 2020, €2M. In 2021-2022, the national contribution was €1M per year. The subsidies were always granted based on a detailed CIRCO annual plan, formally submitted by CLICKNL.

CIRCO provides a yearly accountability report on the actual expenditures to the ministry through CLICKNL. In broad terms, this can be summarised as follows:

- **PHASE 1:** The government subsidy is used for the development and validation of the method; organising and executing the first CIRCO Tracks and Classes by the CIRCO core team; participation by companies is free.
- **PHASE 2**: The government subsidy is spent on training trainers, network development, the blended Track, the Curriculum-kit, and the Teacher Class training. It also covers organising and executing Tracks with trade associations; participating companies each pay a €500 contribution.
- **PHASE 3:** The government subsidy is increasingly used for CIRCO activities at the tactical level (network management, hub support, CIRCONNECT, knowledge development). Decentralised CIRCO hubs (both in the Netherlands and internationally) organise, finance, execute, and follow up on the Tracks themselves; participating companies pay €1,000 per company to the hubs.

In short: The government subsidy is always used for the rapidly changing central CIRCO and later also the CIRCONNECT activities. The growing decentralised costs are borne by various parties. The CIRCO hubs organise the CIRCO Tracks and their follow-ups, often in collaboration with various other regional parties and/or knowledge organisations. These hub activities are mostly financed by the province, and partly also by municipalities and/or Rabobank. Participating companies invest time, plus €1,000 per company to go through the Track with two people.

CIRCO estimates that the total decentralised costs involved in 2023 (ambition: a total of 70 Tracks: 40 in the Netherlands, 30 internationally) will amount to approximately €1.4 million. This amount is then 40% higher than the annual government contribution.

The government subsidy has been stable in absolute terms in recent years (€1M/year) but is decreasing in percentage terms due to rapidly growing decentralised financing. A pleasant side effect of this development is that the ownership of the starting circular transition ends up with the right players. When parties (such as hubs, provinces, network organisations, but also companies) co-finance this development, the chances are higher that they will actually start working on the transition.

6. THE CIRCO APPROACH IN PERSPECTIVE

6.1 Theoretical and Scientific Framework

In previous chapters, the development of CIRCO and the CIRCO ecosystem has been described from a practical perspective. CIRCO can also be viewed from a theoretical and scientific framework. In paragraph 6.2, the activities, development, and effect of CIRCO are mapped onto DRIFT's X-curve model. In paragraph 6.3, CIRCO is examined from the perspective of KIA MV's Six-Aspect Model. We conclude with some clear conclusions and recommendations.

6.2 CIRCO and the X-curve model (Drift)

The text in this paragraph was created in consultation with, and with the consent of, Prof. Derk Loorbach in his roles as professor of socio-economic transitions, academic lead of DIT (the Design Impact Transition platform)[42], and director of DRIFT[43]. Derk fulfils these three roles within, respectively affiliated with Erasmus University.

6.2.1 Introduction

Previous chapters show that CIRCO contributes to the transition to a circular economy. But how do the various activities of CIRCO relate to other activities and interventions needed to make the circular transition successful? To answer this question, we explore how CIRCO relates to DRIFT's scientific framework on transitions.

Research, consultancy, and educational agency DRIFT specialises in how transitions proceed and how this process can be influenced. To provide more insight into this, DRIFT uses the X-curve framework they developed (see figure 17).

The version of the X-curve framework[44] below comes from the publication *An actionable understanding of societal transitions: the X-curve framework*, by Aniek Hebinck and several of her DRIFT colleagues (including Derk Loorbach).

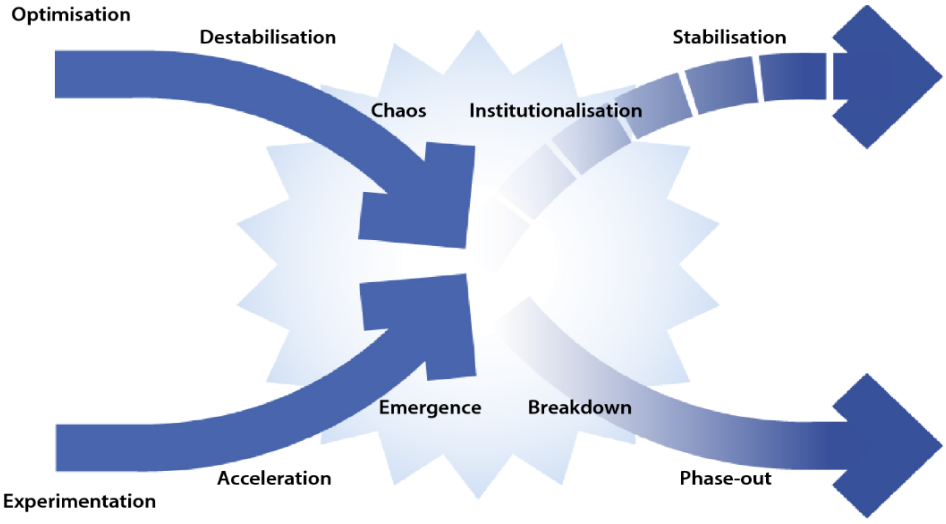


Figure 17 | The X-curve framework (reproduced with permission from DRIFT).

[42] https://www.eur.nl/en/about-eur/strategy-2024/strategy-practice/dit-platform
[43] https://drift.eur.nl
[44] see https://link.springer.com/article/10.1007/s11625-021-01084-w

Below, the X-curve framework is briefly explained. Then, the circular transition and the activities and development of CIRCO are mapped onto the framework and interpreted. The paragraph concludes with a conclusion and recommendation.

6.2.2 Explanation of the X-curve framework

The X-curve framework is further described in the above-mentioned publication by Hebinck et al.; below is a summary and explanation:

- In a transition, an existing social system is gradually replaced by a new social system.
- There is an ascending and a descending 'S-curve'
- Both curves do not progress linearly, are not directly planable or predictable, each has its own dynamics, and they influence each other.
- The ascending curve (in figure 17 from bottom left to top right) represents the (r)evolutionary development of the new system: radically new, initially separate initiatives - the 'niches' - discover through experiments what works/doesn't work. Then acceleration occurs, and connections form. Over time, a new stable system emerges. Along the way, some niche initiatives may also fall by the wayside because they don't thrive in the new context.
- The descending curve (in figure 17 from top left to bottom right) represents the destabilisation, decline, and phasing out of the existing, soon-to-be old system, the current 'regime'.
- In transition practice, more attention is often paid to the ('more sexy'?) ascending curve than to influencing and guiding parties affected by the descending curve. Ironically, this lack of attention to the old can slow down the intended transition: the regime will often try to continue the existing system and slow down the innovation. Here too, interventions will be needed.
- In the background of every transition, influential societal trends and developments play a role. These developments influence both the regime and niches and partly determine the course of both curves and the speed of the transition.
- When both curves 'cross' each other, in the middle of the X, this usually goes hand in hand with considerable turbulence. It becomes inevitable and visible to everyone: the old system must eventually make way for the new. The star in the centre of figure 17 refers to the associated conflict and tension.
- The term 'chaos' mentioned here is not primarily meant negatively. The term mainly refers to the energy released in this phase, which can also be used to shape the new system. This phase is therefore often seen as a window of opportunity.

The mentioned publication contains a table about the meaning of the different terms for both curves. This table is reproduced below as Table 1.

Table 1 | xplanation of terminology for both (ascending/build-up and descending/breakdown) curves.

PATTERN	OF BUILD-UP	PATTERN	OF BREAKDOWN
Experimentation	Radical new practices Radical new thinking	**Optimisation**	Improving the existing No doubts about the system
Acceleration	Alternatives are connecting Alternatives are visible and accessible	**Destabilisation**	Incidents lead to (sense of) urgency Fundamental discussions about desired direction
Emergence	New structures become visible Need for transition is broadly accepted	**Chaos**	Contradictions and uncertainties Opposing interests and conflicts
Institutionalisation	The new normal (thinking and doing) Solidifying new structures	**Breakdown**	Repelling & releasing former established order Losers of processes of change become visible
Stabilisation	Tweaking Optimism	**Phase-out**	Saying goodbye Dealing with loss

6.2.3 Activities of CIRCO depicted on the X-curve framework

When we map the activities and developments of CIRCO as described in the previous chapters onto the X-curve, the following observations and analysis emerge:

- The Linear Economy, composed of all parties, mindsets, working methods, structures, culture, regulation, etc., is seen as the current 'regime'.
- The ambition of the Dutch government (50% Circular by 2030, 100% Circular by 2050) is to gradually dismantle this current regime (breakdown curve) while simultaneously allowing the Circular Economy to emerge (build-up curve). The Circular Economy must take shape through the various phases of the ascending build-up curve.
- CIRCO, along with hubs and other partners, focuses primarily on catalysing and accelerating this build-up curve:
  - Companies that have participated in a CIRCO Track can be depicted in the lower left of the X-curve.
  - The terms experimentation, acceleration, and emergence, and the explanations of these terms in Table 1 fit well with the activities that companies actually carry out after participating in CIRCO. During or after the CIRCO Tracks, they individually experiment with new circular products, services, business models, and/or value chains. Thereafter, they develop new networks and collaborations to jointly accelerate and/or bring about systemic change (see, for example, the CIRCO pump initiative in paragraph 5.1).
  - Various partners of CIRCO (including hubs, provinces, regional development agencies, industry associations) play supporting roles in these subsequent phases.
- CIRCO does not directly focus on the intended downward curve, or on specifically influencing or 'destabilising' the existing linear regime.
- Finally, in the period 2015-2022, CIRCO experienced little direction from (or sought little interaction with) the ministry or other parties, specifically aimed at aligning the various interventions for the transition through both the build-up and breakdown curves. As a result, potential opportunities for further acceleration of the circular transition remained untapped. From 2022 onwards, CIRCO has become more aware of the potential role it could also play in this regard (see element 9, paragraph 5.5).

6.2.4 CIRCO and X-curve: conclusion and recommendation

The above synopsis leads to a clear conclusion and a recommendation:

1. The path that companies follow during and after participating in a CIRCO Track (including any subsequent support from CIRCO partners) maps well onto the X-curve, especially the first three phases of the build-up curve. These activities thus contribute to a growing foundation for the further emergence, institutionalisation, and stabilisation of—eventually—a Circular Economy.
2. For the transition to a Circular Economy as a whole (thus through the development of both the build-up and breakdown curves) to proceed at optimal speed, more intensive and structural coordination between CIRCO, the ministry, and other parties catalysing the circular transition would be valuable.

6.3 CIRCO and KIA MV's Six Aspects Model

The analysis in this section was, upon request, conducted by Arada Vording, Eva Loopik, and Kees Joosten in their role within the KIA MV[45] (Knowledge and Innovation Agenda Social Earnings Capacity) programme. In addition, they work at the European innovation consultancy Bax & Company. The text is written by them and reproduced here in its entirety.

6.3.1 Introduction of KIA MV's Six Aspects Model

Mission-driven innovation requires changes in our approach to research and innovation. Thus, societal earnings capacity (encompassing both economic earnings capacity and social impact) can be realised. Preliminary research in more than 60 innovation ecosystems has identified six aspects that require attention. These are common opportunities and challenges faced by (regional) innovation ecosystems that influence the success or failure of their mission-driven innovation.

The core consists of:

1. Support
2. Regional embedding
3. Organization of collaboration
4. Reflection and adaptation
5. Measurement and funding
6. Institutions and governance

Furthermore, we distinguish between the innovation process (aspects 1-4), which we refer to as the micro-level, and the innovation system (aspects 5&6), which comprises dynamics at the micro-, meso-, and macro-levels. A more detailed overview of the six aspects and their sub-aspects can be found on the social earnings capacity website[46].

6.3.2 Activities of CIRCO depicted on the Six Aspects Model

In the CIRCO approach, many of the (sub)aspects for accelerating mission-driven innovation are evident. Since the CIRCO approach primarily focuses on the innovation process at the micro-level, we mainly see alignment with the first four aspects of the model. Only in the last phase of the CIRCO approach do the last two aspects become more prominent. Below we will highlight the most notable points of alignment of the CIRCO approach with the six aspects. The complete overview of the CIRCO approach in relation to the six-aspects model can be found in Table 2.

[45] See https://maatschappelijkverdienvermogen.nl (in Dutch)
[46] See https://maatschappelijkverdienvermogen.nl/hoe-doe-je-dat (in Dutch)

ASPECT 1 |

Support

Awareness, understanding, and involvement of a multitude of stakeholders are necessary from the start of programmes and projects for successful transitions; we collectively refer to this in the six-aspects model as 'support'. This is also reflected in the CIRCO approach. The transition to a circular economy is a societal challenge that is central to (the emergence of) CIRCO, but also to its methodology and services. The approach was developed in a diverse and interdisciplinary team, and in co-creation with the programme's users. In designing, developing, and improving the tracks, CIRCO continuously involves its users – companies and designers.

ASPECT 2 |

Regional embedding

Each region has its own characteristics and contextual factors that must be taken into account in mission-driven innovation. We see that this aspect really plays a role only in phase three of the CIRCO approach. Throughout the process, CIRCO does consider the existing expertise and knowledge, and it also responds to this with the Tracks. However, this mainly happens from a sectoral approach in phases one and two. Tracks are given to companies from one sector or one value chain. In phase three, CIRCO chooses to focus less on sectors and industry associations and more on regions. Regional CIRCO hubs are set up – similar to what we call 'labs' in the aspects model – and attention is paid to trans-regional knowledge exchange. In this way, CIRCO effectively builds regional innovation ecosystems. In phase three, CIRCO also establishes partnerships with international partners. Here too, CIRCO hubs are established, creating an overarching network in which knowledge and expertise are exchanged not just between regions, but also between countries.

1. SUPPORT BASE	**PHASE 1**	**PHASE 2**	**PHASE 3**
1a. Starting with societal challenges	X	X	X
1b. Co-creation of integrated vision and approach	X	X	X
1c. Combining technological and social innovation			
1d. Involving users/citizens in development and implementation	X	X	X
1e. Developing new revenue and business models		X	X
2. REGIONAL EMBEDDING			
2a. Taking the specific context into account	X		X
2b. Having insight into (locally) available and missing knowledge and skills	X	X	X
2c. Creating transregional knowledge exchange			X
2d. Making use of labs			X
3. ORGANISATION OF COLLABORATION			
3a. Taking different interests into account	X	X	X
3b. Paying attention to communication and language			X
3c. Collective assignment of roles			X
3d. Organising decision-making	X	X	
3e. Breaking silos	X	X	X
3f. Assuring neutral coordination		X	X
4. REFLECTION AND ADAPTATION			
4a. Involving all stakeholders in evaluating progress	X		X
4b. Making integrated considerations when choosing technology or innovation		X	
4c. Reflecting on economic and social impact	X	X	X
4d. Flexible adjustment to changing context	X	X	X
5. MEASURING AND FUNDING			
5a. Quantifying economic and social benefits			X
5b. Measuring output and impact	X		
5c. Organising funding models to scale up innovations	X	X	X
5d. Actively focusing on human capital	X	X	X
6. INSTITUTIONS AND GOVERNANCE			
6a. Clear division of tasks between national, regional and local government			
6b. Proper treatment of losers			
6c. Phasing out existing systems	X / X	X / X	X / X
6d. Proactively contributing to the formulation of missions			
6e. Integrating creative capacity	X	X	

Tabel 2 | The three CIRCO phases depicted on the six aspects and the various sub-aspects.

ASPECT 3

Organization of Collaboration

Collaboration among multiple stakeholders in mission-driven innovation processes requires understanding everyone's interests and proactively connecting partners and users. We observe that CIRCO has taken this into account by actively organising interdisciplinary collaboration. This is evident both within its core team and through the diverse collaboration partners in various phases. As a result, silos are broken down, allowing for a more effective approach to the transition to a circular economy, without working past each other. We also note that CIRCO has considered the varied interests of different stakeholders in its collaboration organisation. An example of this is the flexibility introduced in learning moments by offering the Track in a hybrid form. This lowers the threshold for (smaller) organisations to participate. CIRCO could potentially have performed better in this aspect by making clearer agreements with industry associations about their role during phase 2 (sub-aspect 3c: collective role allocation). This prevents differences in role perception and ensures clarity on the capacity of parties to fulfil their roles.

ASPECT 4

Reflection and adaptation

Mission-driven innovation occurs within a dynamic context. The rapid pace of technological, political, economic, and societal changes calls for continuous monitoring, analysis, interpretation, reflection, and adaptation to adjust flexibly to the changing environment. This approach is evident in CIRCO's strategy. Their methods are frequently adjusted, both to achieve set goals (e.g., a more regional approach, setting up CIRCO hubs, etc.) and due to completely changed working contexts (e.g., due to Covid-19). For this, they reflect on the economic and societal impact and seek input from relevant stakeholders.

ASPECT 5

Measurement and funding

Funding mission-driven innovation is challenging; innovations with a societal goal often only become economically viable in the long term. This suggests that new financing methods might be needed for mission-driven innovation, where new indicators to value both economic and non-economic returns can play a significant role. Throughout its three phases, and with various partners, CIRCO has carefully considered and implemented new financing methods. This is done to stimulate the market towards a circular transition and to offer a cost-covering programme. They also actively focus on human capital. With tools like the CIRCO Curriculum Kit, CIRCO Teacher Class, CIRCO Class, and CIRCO Track, they educate students, teachers, designers, and businesses for the transition to a circular economy.

ASPECT 6

Institutions and governance

Mission-driven innovation requires new forms of organisation and governance, both within regional innovation ecosystems and at local, regional, and national government levels. Successful mission-driven innovation also demands the deliberate dismantling of existing systems and structures that hinder transitions. CIRCO has already made significant strides in this area concerning the required behavioural change from participants and partners. However, changes are also needed in areas like legislation to realise the circular economy. Here we see a missed opportunity for CIRCO. Given its close ties with the national government, CIRCO could have advocated more for supportive legislation at the national level in later phases.

6.3.3 Conclusions and recommendations

The CIRCO approach clearly emphasises interdisciplinary collaboration and experimentation to determine what works, in conjunction with users and stakeholders. The CIRCO method undergoes continuous improvement in an iterative process or is flexibly adapted to a changing environment. Although the process was not predetermined and required flexibility from the core team, there's still a discernible structure in the approach. The method is gradually scaled up towards a clear goal: training 4,000 businesses. This takes into account the growing number of trainers required and efforts to cover costs so that it becomes financially independent of subsidies.

The CIRCO approach thus has significant overlap with the sub-aspects of the KIA MV's six-aspect model. However, we notice that most aspects only emerge in phase 3. We believe this is mainly because lessons are learned from the earlier phases, leading to adjustments and improvements in the approach.

Furthermore, we observe that the first four aspects are clearly evident in the CIRCO approach, while the last two are less so. This is understandable as the CIRCO approach describes an innovation process focused primarily on building and scaling innovation and dismantling systems at the micro-level. However, it's also crucial for CIRCO to consider its role in and influence on the innovation system, which encompasses macro-level dynamics. Both movements are essential to realise a transition, such as that of the circular economy.

Our advice aligns with this observation, suggesting that CIRCO should ideally also focus on promoting the *innovation system* in the future. Firstly, CIRCO could pay more attention to leveraging its position to influence (national) legislation and regulations. Additionally, it would benefit CIRCO to define its goals in terms of qualitative output and impact indicators, alongside quantitative KPIs. Finally, we recommend that CIRCO continues to explicitly define and communicate its collaborative organisation, both internally and with partners and stakeholders, to prevent working past each other in the future. Most sub-aspects were evident in CIRCO's process, though more attention could have been given to collective role allocation (3c) and focusing on communication and language (3b) in earlier phases.

In conclusion, whether intentionally or not, CIRCO's approach has taken into account many of the six aspects of mission-driven innovation, with a few areas left for improvement. However, it's noteworthy that the six-aspect model is now being applied to the CIRCO approach post-factum, mainly because our model hadn't been developed at the onset of CIRCO. It would be interesting, in the upcoming (three) phases, to evaluate how CIRCO differently or better addresses the six aspects of mission-driven innovation in its approach, now that the six-aspect model is consistently available for CIRCO's use.

7. IS A CIRCO-LIKE APPROACH MORE BROADLY APPLICABLE?

There is a presumption that the CIRCO approach, or more broadly formulated: a CIRCO-like approach, is reusable for accelerating other transitions as well. After describing the approach in the previous chapters, this last chapter is a first exploration of that potential reusability. The basis for this exploration is a conversation (June 2023) with Inge Oskam (Lecturer Circular Design and Business, Amsterdam University of Applied Sciences) and Eefke Schramade (Transition Manager Circular Economy, Province of South Holland). They are familiar with CIRCO and had previously read chapters 1 to 5. The central question was: is the CIRCO approach (three phases, ten elements) more broadly applicable?

The expectation was not to get clear-cut answers immediately, as the surroundings and transitions are too different and complex. However, the conversation led to valuable shared insights.

The first insight was that it is good to distinguish between the question of whether a CIRCO-like approach is reusable for accelerating other transitions (Line of Thought A) or reusable for other target groups than companies (for example municipalities), but also within the circular transition (Line of Thought B).

7.1 Line of thought A: CIRCO-like approach in other transitions

Characteristics

A CIRCO-like approach (including methodology, hub ecosystem, aligning micro-meso-macro, etc.) will probably be most useful in other transitions with the following *characteristics*:

1. There is a large group of sufficiently similar parties for which change is inevitable.
2. Incremental change or innovation among these parties is not, or no longer sufficient. Creative reframing of the issue is necessary for a breakthrough.
3. The behaviour of other adjacent parties will have to be adjusted *and* aligned to make the whole successful again.
4. New value networks must be formed to make the whole successful again in the new setting.
5. Given the size and complexity, the entire process will probably take several years.

Prerequisites

In addition to these transition characteristics, it seems important that the environment meets the following *prerequisites*:

1. There is a widely supported and high societal sense of urgency.
2. There are already some pioneers who can serve as an inspiring example.
3. There is at least one party that early on recognizes that the issue at hand is systemic in nature and that a design approach is necessary. That party wants to develop a CIRCO-like approach and/or wants to finance that development.

Possible transitions that have these characteristics and where the prerequisites are present in the environment are the nitrogen transition, area transition, (regional) energy transition, protein transition, strengthening biodiversity in municipalities, healthcare, …

7.2 Line of thought B: CIRCO-like approach with other parties, within the circular transition

CIRCO accelerates the transition to the circular economy mainly by activating and equipping companies and designers. In addition, CIRCO contributes to the development of an ecosystem of hubs, provinces, financiers and/or development companies that primarily provide further support to companies in the subsequent steps of their circular journey. The question is whether a CIRCO-like approach is also valuable for actively approaching and training (or empowering) other parties than companies to contribute more to the circular transition. Consider, for example, financiers and municipalities. Again, there is a presumption that there is a lot to be gained in many cases. It will need to be examined which elements of the CIRCO approach are suitable for the target group and where adjustments are needed.

'The use of the CIRCO Track promotes circular value chain collaboration. I see this, for example, in healthcare, where hospitals are now specifically shaping the transition from disposables to reusables (already 7 tracks), a change with a major impact.'

Ingeborg Gort | CIRCO sector expert plastics and consumer goods, and partner at Partners for Innovation

7.3 Conclusion

This first exploration endorses the presumption that a CIRCO-like approach *could* be reusable. There are interesting initial ideas to further develop. Especially the transition characteristics, prerequisites, and 'matching transitions' mentioned under Line Of Thought A seem worthy of a deeper analysis. To get beyond this speculative phase and make more concrete statements, an actual practical test is inevitable. The reader is therefore warmly invited to provide concrete suggestions for this. Who?

PERSONAL WORD OF GRATITUDE

Leading question: how does one catalyse a transition?

After an intense period of just over seven years, I said goodbye as programme manager of the CIRCO programme in April 2022. In the LinkedIn post[47] about my departure, in which I thanked everyone for the collaboration, I wrote:

> *'I am now starting a (6-month?) sabbatical. Taking a moment to relax and reflect on these exhilarating seven years. And delve deeper into the question 'System innovation: how do you do that?'. What does science say about this? Is a CIRCO-like approach more broadly applicable? (How) can it be faster? After all, the current times pose a few more urgent system issues...'.*

This sabbatical was particularly relaxing and gave me space to reflect on and delve deeper into the 'How' question of system innovation. It also became even clearer to me that this field is in full motion. Through this current lens, I now look back at seven years of CIRCO (2015-2022), with the aim of making these experiences more broadly applicable. In December '22, I started writing this whitepaper. Fortunately, I did not know beforehand that this process would take nine months ;). I mainly hope that its lifespan will be significantly longer.

Thanks to all whitepaper co-creators and proofreaders

Here I would like to thank everyone who contributed to this whitepaper. First of all, thanks to the twenty-two CIRCO co-creators: a broad cross-section of the dozens of people who contributed to the circular transition within the CIRCO ecosystem over the mentioned seven years. These co-creators provided extremely valuable feedback on earlier versions of this document. Appendix 1 provides the list of names. Thanks also to Derk Loorbach from Erasmus University and from DRIFT for the valuable sparring sessions and reflections on CIRCO from a transition and X-curve perspective. Thanks also to Derk's Erasmus/DIT colleagues Femke Coops and Jilde Garst who co-read and thought along. In addition, Arada Vording, Eva Loopik, and Kees Joosten, in their role from the Knowledge and Innovation Agenda Societal Earning Capacity (KIA MV), considered CIRCO from the Six-aspects perspective. Thank you for your valuable reflections! I had an exploratory dialogue about the reusability of the CIRCO approach with Inge Oskam (Amsterdam University of Applied Sciences) and Eefke Schramade (Province of South Holland). Thanks for this enriching conversation. Communication agency De Lynx took care of the final editing and design of this document. Many thanks to Miranda Koffijberg and Annemarie Wijmenga for the smooth collaboration and the beautiful result. Also thanks to designer Aline Gerards, who on behalf of Design Innovation Group contributed with the first sketches for the visuals of the 10 elements.

In conclusion

Dear reader, I hope you can use the knowledge about the (development of the) CIRCO approach and its ecosystem to catalyse other transitions as well. If you feel the need for a sparring session, further explanation, or interactive presentation after reading this document, please let me know. We learn faster together. Enjoy reading!

Jeroen Hinfelaar
systems innovation catalyst

www.jeroenhinfelaar.nl
info@jeroenhinfelaar.nl

[47] https://www.linkedin.com/posts/jeroenhinfelaar_beste-circo-en-andere-relaties-in-2015-activity-6916678102043512832-dupJ (in Dutch)

APPENDICES

APPENDIX 1 | CIRCO CO-CREATORS

CIRCO's partner network has grown significantly in recent years. Since its inception in 2015, dozens of professionals from various organisations and roles have been involved. The following 22 people, referred to here as CIRCO co-creators, represent this network. They have made a substantial contribution to the development of CIRCO during (a part of) the period 2015-2022, and most of them are still doing so in 2023. They co-read and commented on chapters 1 to 5 of this whitepaper in earlier draft versions.

- Bart Ahsmann, director TKI CLICKNL, formal host of the CIRCO programme
- Hans Spiegeler, senior policy officer Ministry of I&WM, CIRCO contact person
- Iris Grobben, programme manager CIRCO Netherlands
- Pieter van Os, programme manager CIRCO International
- Martin van Dord, plastics expert at the NRK industry association
- Dirk van Deursen, innovation manager at Royal CBM, industry association for interior and furniture industry
- Eefke Schramade, transition manager Circular Economy, Province of South Holland
- Jos Mulder, senior policy office CE, Ministry of I&WM, formerly at Province Overijssel
- Inge Oskam, lecturer Circular Design and Entrepreneurship, Amsterdam University of Applied Sciences
- Daniëlle Twardy-Duisters, senior researcher creative and circular entrepreneurship, Zuyd University of Applied Sciences
- Marije de Boer, Association Circular Friesland, (among others) CIRCO hub
- Martje Fraaije, programme manager Circular Entrepreneurship, Rabobank
- Diana de Graaf, consultant Circular Economy / project manager team Expansion, at Implementation programme Circular Manufacturing Industry (UPCM)
- Hanneke Op den Brouw, Rijkswaterstaat (now retired)
- Bas Hillerström, former manager operations CIRCO Nederland, now CIRCO trainer
- Bas Roelofs, designer/entrepreneur at Sustar, CIRCO coordinator for universities of applied science, CIRCO trainer
- Marien Korthorst, designer/entrepreneur at Cirkel Design and CIRCO trainer
- Ronald Lewerissa, designer/entrepreneur at Generous Minds and CIRCO trainer
- Herman van der Vegt, designer/entrepreneur at NPK Design and CIRCO trainer
- Jeroen Segers, was CIRCO project leader for the development of the Blended Track version
- Marieke Rietbergen, designer/entrepreneur at Design Innovation Group, facilitated several CIRCO work sessions, including the development of the CIRCONNECT knowledge platform
- Ingeborg Gort, partner at Partners for Innovation, plastics and consumer goods expert at CIRCO

APPENDIX 2 | SOURCE DOCUMENTS

References to most source documents are included as footnotes in the text of this white paper, on the page where they are referred to. In addition, the following CIRCO documents were used as sources:

1. CIRCO Annual Plans 2015-2022
2. CIRCO Annual Reports 2015-2022
3. CIRCO Trainer Framework Agreement (template)
4. CIRCO Trainer Track Agreement (template)
5. CIRCO Trainer Class Agreement (template)
6. CIRCO Hub Agreement NL (template)
7. CIRCO Hub Agreement International (template)
8. CIRCONNECT participant declaration of intent (template)

WHITE PAPER

Learning from CIRCO

CLICK NL

CIRCO