

Resilience by circularity and sharing culture at households as precondition for climate-neutral cities: "Circ-in-Town = Circ@Home + Circular services"

Deliverable

**D1.4 - CircServices for Circ@Home: A Concept for
Circular Services Enabling Households to Become
Circular**

Work package / GoA

WP1 | GoA 1.4

Lead partner

**PP9 BEF Estonia – Baltic Environmental Forum
Estonia**

Version / date

1.0 | 22 May 2026

Document control

Project	Circ@Home
Deliverable number	D 1.4
Official deliverable title	CircServices for Circ@Home: A Concept for Circular Services Enabling Households to Become Circular
Type	Concept paper / model
Work package	WP1
GoA / task	GoA 1.4
Dissemination level	Public
Submission date	30.9.2026
Lead partner	Baltic Environmental Forum Estonia
Main author(s)	Tuula Löytty/PP13 SML Maarja Helstein/PP9 BEF Estonia Kai Klein/PP9 BEF Estonia
Contributors	Marie Berner/PP1 Kiel University Marika Hellmund/PP2 BEF Germany Friederike Zängl/PP3 Goldbekhaus Johanna Padge/PP4 UVM Moritz Dietzsch/PP6 ResteRitter Harri Moora/PP7 SEI Tallinn Piret Kuldna/PP7 SEI Tallinn Merle Kuris/PP9 BEF Estonia Mervi Tiermas/PP10 Maa- ja kotitalousnaiset Taru Koskinen/PP10 Maa- ja kotitalousnaiset Teija Timilsina/PP12 Jalotus association Evija Ozola – Ozoliņa/PP17 Zero Waste Latvija
Internal Reviewer(s)	Marie Tebel/PP1 Coordinator - Kiel University All consortium partners
Status	Final

Version history

Version	Date	Author(s)	Changes
0.4	27.4.2026	Tuula Löytty/PP13 SML; Maarja Helstein/PP9 BEF Estonia; Kai Klein/PP9 BEF Estonia	First draft for consortium partners' review. The feedback and comments touched e.g. on conceptual clarity, terminology, visuals and model interpretation.
1.0	6.5.2026	Tuula Löytty/PP13 SML; Maarja Helstein/PP9 BEF Estonia; Kai Klein/PP9 BEF Estonia	Coordinator's and consortium members' comments were systematically reviewed, and the deliverable was revised where appropriate to strengthen conceptual clarity, consistency, and readability.
1.0	22.5.2026	PP18 CCB	D1.4 and Annexes A-D are published via Circ@Home website: https://interreg-baltic.eu/project/circho me/
1.0	30.9.2026	PP1 Kiel	D1.4 and Annexes A-D are submitted to the Interreg BSR Joint Secretariat via BAMOS +

Contents

Executive Summary	6
Introduction, scope and relation to GoA 1.4	6
1. Role of Circular Services in the Circularity Triangle	7
1.1 Circular Service Model interfaces in the Triangle	8
2. Circularity Logic from a Service Perspective	9
2.1 Circular Service Pathway	10
2.2 Circular Service Sector	11
2.3 Circular Service Interaction	12
2.4 Circular Service Practical Conditions	13
2.5 Definition of Circular Service	14
2.6 Vision of the Circular Services Model in Circ@Home	14
3. What makes a service “circular” in Circ@Home? Functional properties, not labels	15
3.1 Visibility & access (Interfaces: I1, I2)	17
3.2 Capability & trust (Interfaces: I1, I4)	17
3.3 Transaction-cost reduction (Interfaces: I1, I2, I4)	18
3.4 Infrastructure linkage (Interfaces: I2, I3, I4)	19
3.5 Same properties, different mechanisms across circularity levels	19
3.6 Operationalising household “readiness-to-do”	20
4. Local Service Provider Models and Functional Properties of Circular Services	21
5. Business Model Reflections (Without Growth Bias)	22
6. Municipal Support and Structural Enablers	23
6.1 Municipal governance → Hub (I3): mandate, legitimacy and continuity	23
6.2 Municipal governance → Services (I4): enabling instruments for viability and diffusion	24
6.3 The enabling role of municipal support in the Circular Services Model	24
6.4 Synthesised Circular Services Model	25
7. Boundary Conditions and Limits of the Circular Services Model	26
Conclusions: Services as Enablers of Household Circularity	27
REFERENCE LIST	27

Tables

Table 1: Circular Services through four key interfaces (I1-I4)	8
Table 2: Circular service needs by pathway and sector in Circ@Home	11
Table 3: Mapping the four functional property families to CSM interfaces (I1–I4)	16

Figures

Figure 1: The service perspective to the Urban Circularity Triangle	9
Figure 2: Dimensions of circularity from a service perspective	10
Figure 3: Four functional property families that make circular services workable in Circ@Home	16
Figure 4: Local service-provider models and ecosystem fit	22
Figure 5: Municipal governance as an enabling layer in the Circular Services Model	25
Figure 6: Synthesised Circular Services Model	26

Annexes

Annex A: Household barriers, readiness-to-do, and service wish list
Annex B: Conclusions of service providers' interviews
Annex C: Circular Services
Annex D: Literature based definitions for the Circular Services

Disclaimer

This deliverable was prepared within the Circ@Home project, co-funded by the Interreg Baltic Sea Region Programme. The content reflects the views of the authors only and does not necessarily represent the official position of the Programme or its bodies.

Acknowledgement

The main objective of the Circ@Home project is to promote urban circularity by encouraging households, municipalities and circularity service providers to adopt sustainable practices and minimise their environmental impact in the Baltic Sea Region. The Circ@Home project is co-funded by the Interreg Baltic Sea Region Programme.

Use of Generative AI Tools

Generative AI tools were used during the preparation of this deliverable to support language refinement, structural editing, formatting suggestions, drafting assistance, condensation, consistency checking and editorial refinement. Specifically, ChatGPT (OpenAI GPT-5 series) was used interactively during the drafting process. Generative AI tools were not used as sources or as substitutes for expert judgement. All conceptual interpretations, operational descriptions, conclusions and final content decisions were reviewed, validated and approved by the authors. The authors take full responsibility for the accuracy and integrity of the deliverable.

Executive Summary

This deliverable develops the **Circular Services Model (CSM)** in Circ@Home as the service-side element of the Urban Circularity Triangle linking households, local services, municipal governance, and the local circularity hub. The purpose of the model is to clarify under what conditions circular services can help households act more circularly in everyday life. D1.4 is a conceptual deliverable intended to support piloting, assessment, and further development within Circ@Home rather than to provide a service inventory or evaluation report.

The main conclusion is that a service is not circular by label alone. **In Circ@Home, a service is circular when it helps make circular options workable in practice.** The Circular Services Model shows that household circularity depends on both service usability and ecosystem support. Service usability refers to whether circular options are visible, trusted, workable, and practically accessible. Ecosystem support refers to whether provider models, hub support, and municipal enabling conditions make these options stable, coherent, and locally meaningful.

The CSM is elaborated through the **four interfaces** of the Urban Circularity Triangle (Household↔Services; Services↔Hub; Municipal Governance↔Hub; Municipal Governance↔Services) and through four **functional property families**: visibility and access, capability and trust, transaction-cost reduction, and infrastructure linkage.

D1.4 builds on the conceptual foundations established in D1.1, D1.2 and D1.3 and is further informed by service-provider interviews, indicative ecosystem mapping, household-barrier analysis, and selected literature.

The annexes complement the model by translating household barriers into service implications (Annex A), synthesising service-provider insights (Annex B), mapping visible circular service options (Annex C), and providing literature-based perspectives on circular services (Annex D).

The overall contribution of D1.4 is a shared analytical framework for understanding how circular services can support household circularity under different local conditions. Rather than proposing one fixed institutional model, the Circular Services Model is intended as a flexible and diagnostic framework that can support local piloting, ecosystem development, and later validation activities within Circ@Home.

Introduction, scope and relation to GoA 1.4

This deliverable develops the draft Circular Services Model (CSM) in Circ@Home as the service-side element of the Urban Circularity Triangle linking households, local services, municipal governance, and the local circularity hub. Its purpose is to clarify under what conditions circular services can support household circularity in everyday life. In line with the Approved Application Form, D1.4 is a conceptual deliverable intended to support later piloting, assessment, and refinement within Circ@Home rather than a service inventory, handbook, or evaluation report.

In Circ@Home, circular services are understood functionally: a service contributes to circularity when it helps households reduce resource demand, extend product life, intensify utilisation, recover value,

or prevent waste in ways that are practically usable in everyday life. The focus is therefore not only on individual services, but also on the surrounding ecosystem conditions that shape whether circular options become visible, accessible, trustworthy, and workable in practice.

Within GoA 1.4, D1.4 complements the other elements of the Urban Circularity Triangle by developing the service-side perspective of the Circ@Home solution. The deliverable builds on GoA 1.4 activities including service mapping, qualitative interviews, ecosystem observations, and the identification of service needs relevant for later pilot development.

D1.4 also builds on earlier conceptual deliverables of the project. D1.1 provides the wider Urban Circularity Triangle framework, D1.2 elaborates the Local Circularity Hub Model, and D1.3 examines household-side barriers, effort, and readiness-related conditions. D1.4 brings these strands together from the service perspective.

The annexes provide supporting analytical inputs. Annex A links household barriers with effort reduction, readiness-to-do, and service implications. Annex B synthesises qualitative service-provider interview findings. Annex C maps circular service options across the project's circularity pathways. Annex D provides literature-based perspectives supporting the functional interpretation of circular services.

The deliverable proceeds in seven chapters. It first positions circular services within the Urban Circularity Triangle and explains circularity from a service perspective. It then examines the functional properties that make circular services workable in practice, local service-provider models, business-model reflections, municipal enabling conditions, and finally synthesises the Circular Services Model together with its boundary conditions and conclusions.

1. Role of Circular Services in the Circularity Triangle

Circ@Home looks at urban circularity through the **Urban Circularity Triangle (UCT)**. The triangle connects **municipal governance, households and local services**. In this structure, circular services have a practical role. They connect household intentions with real circular outcomes. In other words, they turn circularity into options that people can actually use in everyday life [P01].

In this deliverable, the term **"Town"** is understood as **municipal governance**. This means the local public tools that can support circularity. These include, for example, policies, infrastructure, education, funding, incentives, procurement and administrative processes. Their role is to create enabling conditions for circularity.

Operational ecosystem actors, such as utilities, waste operators and multi-actor partnerships, are usually not described here as a separate corner of the triangle. In D1.4, they are mainly understood through the **local Circularity Hub Model**, which works as a layer for coordination and access.

This means that circular services should not be seen as isolated service offers. Their practical value depends on how well they connect to households, to hub functions, and to municipal enabling conditions.

1.1 Circular Service Model interfaces in the Triangle

To describe this system logic more clearly, D1.4 presents the Circular Services Model through **four key interfaces (I1–I4)**. These interfaces show where value, responsibility, resources and trust move from one actor to another. If this does not work, the circular option may exist in theory but not in practice.

Table 1: Circular Services through four key interfaces (I1-I4)

Interface	Purpose	What flows across it	Typical failure modes
I1 Household ↔ Services	Use and uptake interface (how households find, start and complete a circular option).	Information, money, time/effort, trust/responsibility.	Service exists but is not findable; first step unclear; price/time uncertain; low trust.
I2 Services ↔ Hub	Access and coordination interface (how services become visible and reachable locally).	Visibility/catalogue, shared entry points, shared space/logistics, coordination information.	Fragmentation; insider knowledge required; access points missing; duplication/conflict.
I3 Municipal governance ↔ Hub	Mandate and enablement interface (hub legitimacy, continuity, capacity).	Mandate/legitimacy, premises, resourcing, strategy alignment, partnership frameworks.	Hub becomes episodic; unclear ownership; under-resourced; weak institutional anchoring.
I4 Municipal governance ↔ Services	Enabling and scaling interface (conditions for service viability and diffusion).	Incentives, procurement roles, regulatory clarity, risk-sharing, infrastructure access.	Structural barriers persist; unstable demand; unclear permissions; high provider risk.

Across all four interfaces, some important flows appear again and again. These include **information**, **materials**, **money**, **time and effort**, and **trust and responsibility**. If one or more of these flows do not work, a circular option may remain formally available but still stay unused in practice.

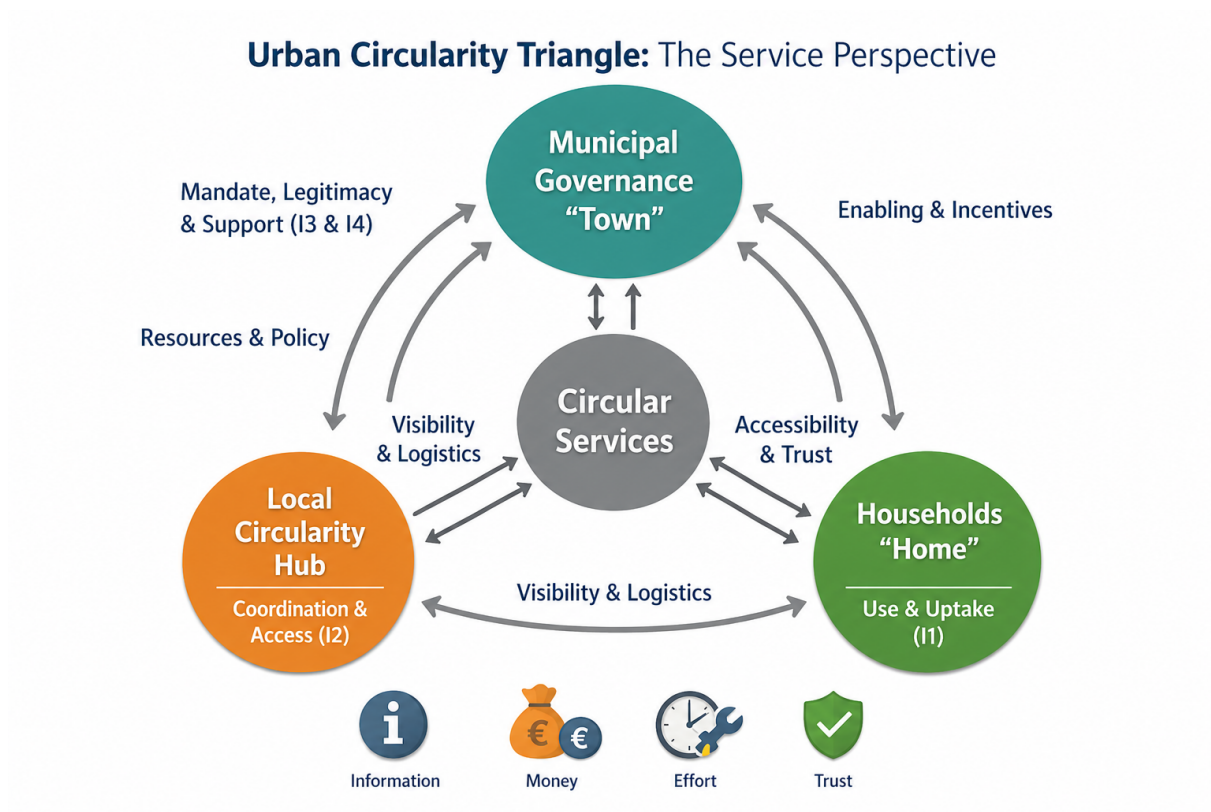


Figure 1: The service perspective to the Urban Circularity Triangle

The logic of the Circular Services Model can be understood through **two complementary perspectives**. The first is an **external, interface-based perspective**. It shows how services connect to households, hubs and municipal governance in the Urban Circularity Triangle. The second is an **internal, functional perspective**. It shows what service properties make a circular option usable in everyday life. The next chapters continue from this point. Chapter 2 explains the circularity logic from a service perspective. Chapter 3 explains the functional properties more clearly.

2. Circularity Logic from a Service Perspective

Figure 2 explains circularity from a service perspective through four dimensions: **pathway**, **sector**, **interaction**, and **practical conditions**. Together, these show how a service supports household action in line with the Circular Household Model (CHM). In this way, Chapter 2 links the broader Urban Circularity Triangle to the more detailed functional properties examined in the next chapter.

Dimensions of circularity from a service perspective

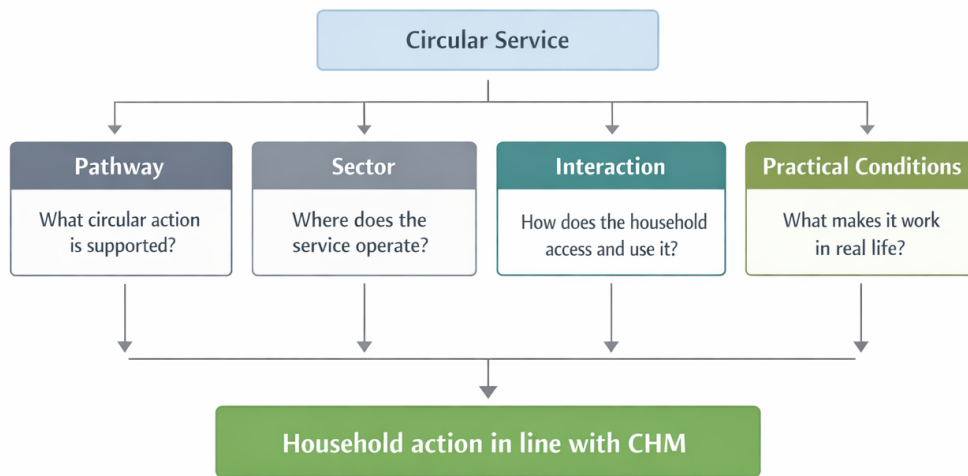


Figure 2: Dimensions of circularity from a service perspective

A service is not circular merely because it carries a label such as repair, reuse, sharing, leasing, take-back, refill, or recycling. In Circ@Home, **a service becomes circular when it helps households or other users reduce resource demand, extend product life, intensify utilisation, recover value, or prevent waste in a way that is practically usable in everyday life.** Annex D supports this interpretation by emphasising that circularity should be understood through function and enabling mechanisms, not labels alone.

2.1 Circular Service Pathway

The first dimension is the **circular service pathway**, meaning the type of circular household action that a service enables. In Circ@Home, this is structured through the project's three-level hierarchy: **(1) buy less and use smarter, (2) expand the lifespan, and (3) use waste as a resource.** This pathway logic helps position services according to the circular action they support rather than according to service labels alone, while keeping the discussion at a practical level instead of turning Chapter 2 into an exhaustive account of detailed R-strategy terminology.

These three pathways can be understood as a service-relevant grouping of circular economy strategies: the first emphasises prevention and smarter use, the second value retention through longer use, and the third downstream recovery of residual value. This framing also reflects the Approved Application Form requirement that D1.4 help service providers connect their work to the project's three-degree hierarchy of R-strategies in both food and non-food contexts.

Annex C shows that all three pathways are present in the mapped pilot ecosystems, but unevenly. The strongest current service landscape is found in **expanding lifespan**, especially in repair and maintenance, second-hand shops, reuse, and related life-extension services. **Buying less and using a smarter** pathway is mostly present in rent and sharing. By contrast **use waste as a resource** is present

but less systematically developed in the current household-facing service landscape. Resource-recovery options are relevant, but often less visible as stand-alone services because they are embedded in municipal, retail, or producer-responsibility infrastructures.

From the provider perspective, these pathways correspond to different service roles: **prevention-oriented services** (e.g. renting, sharing), **life-extension services** (e.g. reuse services and repair), **recovery-oriented services**, and **literacy or decision-support services** that support all three pathways by reducing ambiguity, search effort, and practical friction. The more detailed provider-side interpretation is presented in **Annex C**, where the pathway logic can be linked directly to the mapped service landscape and its observed strengths, gaps, and development needs.

For D1.4, the main implication is that the Circular Services Model should cover all three pathways while recognising that its strongest empirical basis currently lies in lifespan-extension services.

2.2 Circular Service Sector

The second dimension is the **sector** in which the service operates. In D1.4, the most useful distinction is between **non-food circular services** and **food-related circular services**.

In the **non-food** domain, circular services are mainly linked to repair, maintenance, refurbishment, resale, renting, sharing, , lending and reuse. In the **food-related** domain, the service logic is more closely connected to food-waste prevention, surplus redistribution, reusable packaging, sorting, and downstream resource recovery.

This distinction matters because the circularity mechanism differs across sectors. In non-food systems, circularity often depends on durability, repairability, spare parts, technical skills, resale channels, and confidence in service quality. In food systems, circularity is shaped more strongly by perishability, timing, storage, hygiene, packaging, routine management, and collection or treatment systems.

Annex D supports this interpretation by showing that circular services can be understood through several complementary lenses, including resource flows, business models, product-service systems, service ecosystems, and household enablement. Together, these lenses show that circular services are not one homogeneous category, but a broader functional family spanning multiple sectors and service mechanisms.

Table 2 summarises the service implications of the Approved Application Form question by showing what kinds of circular services are typically needed for each pathway in food and non-food contexts.

Table 2: Circular service needs by pathway and sector in Circ@Home

Circular pathway	What services need to do	Food-related service examples	Non-food / clothing / housing service examples
------------------	--------------------------	-------------------------------	--

Buy less and use smarter	Reduce unnecessary consumption, support better planning, intensify use, and make lower-material options easier to choose	meal-planning support, food-sharing options, refill services, reusable takeaway systems, community-supported agriculture, guidance that helps avoid food waste	rental, borrowing and sharing services, tool libraries, refill services, product-as-a-service, second-hand-first guidance, services that help households choose reuse, borrowing, or repair before buying new
Expand the lifespan	Keep products and materials in use longer through maintenance, repair, refurbishment, reuse, redistribution, resale	services that prolong food usability through better storage and handling, redistribution of edible surplus, reusable food container systems	repair, diagnostics, maintenance, spare-part access, tailoring, refurbishment, second-hand retail, resale platforms, donation and reuse, redistribution, resale channels
Use waste as a resource	Enable sorting, return, collection, take-back, and recovery of residual value when prevention or life extension is no longer possible	bio-waste collection, composting support, anaerobic digestion, nutrient recovery, packaging return systems	take-back systems, e-waste collection, textile collection, packaging collection, recycling logistics, producer take-back
Cross-cutting enabling role	Help households find, understand, compare, trust, learn about, and start circular options across all pathways through practical guidance and decision support	food-waste guidance, local directories, one-stop advice, hub-based signposting	circular service maps, repairability guidance, digital decision-support tools, booking and signposting services, hub-mediated one-stop access

The table is not a full inventory of services, but a compact synthesis of how the Circular Services Model connects the project's pathway logic to sector-specific service needs.

2.3 Circular Service Interaction

The third dimension is **interaction**, meaning how the household accesses, understands, starts, uses, and completes the service. This is a central contribution of D1.4. The service perspective developed here highlights three essential elements: **usability at the household decision moment, trust and predictability, and coordination through a hub layer and enabling municipal governance.**

From this perspective, circularity depends not only on the service offer itself, but on whether households can realistically engage with it in practice. A circular option must be discoverable, understandable, and reachable at the moment of need. If it exists only in principle, but requires insider knowledge, multiple searches, or excessive effort, its practical circular value remains weak.

Interaction also depends on **trust and predictability**. Households need sufficient confidence regarding expected quality, price logic, likely time needed, responsibilities, and practical steps. Without that confidence, circular options remain risky or burdensome even when they formally exist.

A third interaction element is **coordination beyond the single provider**. In Circ@Home, service usability may depend on local visibility, shared entry points, signposting, return or drop-off arrangements, and the coordinating role of the hub layer. Municipal enabling conditions can further support clarity, continuity, and legitimacy.

“Not enough information on
where to get it repaired”

A woman from Lahti, FI

Annex B strongly supports this interpretation. The interviews suggest that customers rarely choose circular services primarily for environmental reasons. Instead, their decisions are driven more by price, convenience, temporary need, lack of storage space, and attachment to objects. Annex B also shows that service providers often frame their work as practical problem-solving rather than explicitly as circular economy. This reinforces the point that actual uptake depends more on service logic and usability than on circular-economy language alone.

2.4 Circular Service Practical Conditions

The fourth dimension is **practical conditions**, meaning what makes the service work in real life. This keeps the Circular Services Model grounded in actual ecosystem conditions rather than abstract service labels.

A service cannot meaningfully be treated as circular if households cannot realistically use it, if the effort required is too high, or if the surrounding support system is too weak to allow the circular pathway to be completed. Practical conditions therefore include such factors as local availability, affordability, acceptable effort, predictability, repair and refurbishment capacity, reuse channels, return and collection points, logistics, storage, coordination capacity, regulation, and enabling public support.

Annex B is especially important here. It shows that structural barriers are often more decisive than attitudes alone. Storage space and premises are recurring bottlenecks for rental, reuse, and repair actors. Operating costs, logistics, scale, product design, spare-part availability, and unclear rules all shape whether circular services are viable in practice. Annex B also highlights missing but desired support, such as repair vouchers, affordable work or storage spaces for service providers, and clearer public support roles for circular services.

Annex C complements this by showing that the mapping provides a credible baseline overview of visible circular service options, but does not measure service quality, accessibility, affordability, uptake, viability, or impact. The existence of a mapped service therefore does not yet mean that it works well as a circular option in daily life.

2.5 Definition of Circular Service

Based on the four dimensions above, a circular service in Circ@Home can be defined as follows:

In Circ@Home, and within this conceptual model, a circular service refers to a service that helps households or other users reduce virgin resource demand, extend product life, intensify utilisation, recover value, or prevent waste, while making circular action practically feasible through trust, access, affordability, coordination and reduced friction.

This definition is intentionally functional and non-binary. It is not used to classify services as circular or non-circular, but to understand under what conditions services contribute to circular outcomes in practice. A service may contribute partially, conditionally, or weakly, depending on its usability and the surrounding ecosystem support.

This definition is suitable for D1.4 because it combines resource outcomes with enabling conditions. It aligns with Annex D's literature synthesis and also fits the practical evidence from Annex B, which shows that circular service use depends less on moral framing than on whether the service is affordable, convenient, trustworthy, and workable in concrete daily situations.

2.6 Vision of the Circular Services Model in Circ@Home

The vision of the Circular Services Model in Circ@Home is to make circular household action a normal, practical, and trustworthy part of everyday life. In this vision, households do not need exceptional motivation, technical knowledge, or extra effort in order to act circularly. Instead, local services, hub functions, and enabling municipal conditions work together so that circular options are visible, accessible, understandable, reliable, and easy enough to choose in ordinary everyday situations.

This implies a transition from isolated circular offers toward a local circular service environment in which households can routinely buy less and use smarter, expand the lifespan of products, and use waste as a resource through workable service pathways. The Circular Services Model is therefore not only about individual services, but about the conditions through which circularity becomes actionable in everyday life.

Chapter 3 continues from this logic by examining what functional properties make a circular service practically usable in everyday life, regardless of the specific sector or pathway.

3. What makes a service “circular” in Circ@Home? Functional properties, not labels

In the Urban Circularity Triangle, a service is not “circular” only because it uses circular economy language. A service becomes circular when it makes a higher-value circular option possible in everyday life. The main question is therefore practical: does the service help households find, start, trust and complete a more circular action?

For this reason, D1.4 uses the concept of household **readiness-to-do** (see the chapter 3.6). A service can work as a circular service only if households can realistically use it in practice. Readiness is therefore not outside the service model. It is one way to see whether the household–service interface works.

For analytical purposes, a service can be understood as an **offer + access mechanism**.

The **offer** is what is provided. It can be, for example, repair, resale, refill, borrowing, redistribution or refurbishment. The **access mechanism** is how households can realistically begin and complete the service. It includes the entry point, number of steps, price logic, time expectations, quality assurance, responsibilities and local availability. The same offer may support circularity in one place and fail in another if the access mechanism does not work.

The GoA 1.4 interview material in Annex B supports this view. Interviewees did not describe circular service use mainly in moral or environmental terms. Practical issues were more important: price, convenience, lack of storage space and temporary need. Annex B also suggests that structural and operational barriers often matter more than positive attitudes alone.

For this reason, Chapter 3 defines workable circularity through four functional property families. These do not describe service labels, but the practical conditions under which a circular option becomes usable in everyday life:

3.1 Visibility & access

3.2 Capability & trust

3.3 Transaction-cost reduction

3.4 Infrastructure linkage

Together, these four property families provide the analytical structure for the rest of the chapter. Figure 3 presents them schematically as the core functional conditions that make circular services workable in Circ@Home.

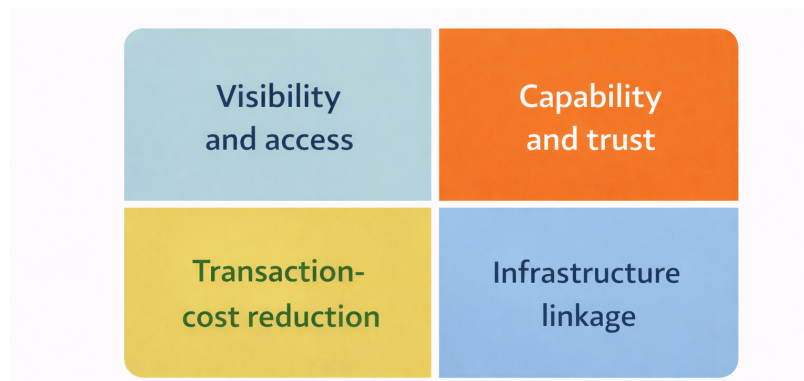


Figure 3: Four functional property families that make circular services workable in Circ@Home

The four property families shown in Figure 3 are not separate criteria, but overlapping practical conditions that determine whether a circular option becomes workable for households in everyday life. Each property family is expressed through the four interfaces of the Urban Circularity Triangle—household ↔ services (I1), services ↔ hub (I2), municipal governance ↔ hub (I3), and municipal governance ↔ services (I4). Table 3 summarises this mapping, after which each property family is elaborated in turn.

Table 3: Mapping the four functional property families to CSM interfaces (I1–I4)

Chapter 4 functional property	Primary interface	Supporting interface(s)	Meaning in the Urban Circularity Triangle
4.1 Visibility & access	I1	I2	Households can find and access a circular option at the moment of need; hubs make options visible locally.
4.2 Capability & trust	I1	I4	Households feel confident to proceed because guidance, quality signals and responsibility arrangements reduce risk.
4.3 Transaction-cost reduction	I1	I2, I4	The circular route competes with the linear default by reducing steps, time, coordination burden and uncertainty.

4.4 Infrastructure linkage	I2	I3, I4	Circular services connect to repeatable local pathways such as collection, repair, refurbishment, reuse, composting and recycling.
-----------------------------------	----	--------	--

Annex A complements this chapter. It translates household barriers identified in GoA 1.3, D1.3 and relevant literature into a service-oriented logic: the barrier itself, the effort that must be reduced, the likely level of readiness-to-do, and the related service response or wish-list implication.

3.1 Visibility & access (Interfaces: I1, I2)

Circular decisions often happen at moments of need: a device breaks, groceries are purchased, packaging accumulates, or a household needs an item only temporarily. A service becomes circular when the circular option is discoverable, understandable and reachable at those moments. If the service exists only in principle, but requires insider knowledge, multiple searches or extra travel, its practical circular value remains weak.

Annex B supports this interpretation. Interviewees emphasized convenience, temporary need and lack of storage space as practical reasons for using rental, reuse or non-ownership options. The same annex suggests that circular options remain marginal when they are poorly visible or hard to access.

Annex A shows the same logic from the household side. When services are fragmented, hard to find or not visible at the moment of need, the required search and start-up effort becomes too high. The practical implication is clear: circular services need better findability, one clear entry point, local signposting and simple guidance.

Lietovelreiz.lv is a digital one-stop platform that encourages people to reuse, repair, and share items instead of buying new ones. It provides a map where users can find repair services, rental places, and exchange points across Latvia, as well as a catalogue of items that can be borrowed, rented, or obtained for free. The platform also includes a circular economy roadmap with practical actions for municipalities to support resource efficiency. Overall, it helps reduce waste and makes sustainable choices easier and more affordable for everyday users.

3.2 Capability & trust (Interfaces: I1, I4)

Households avoid circular options when outcomes feel risky or unclear. Common questions are simple: *Will it work? Is it safe? Who is responsible? Will it last?* A service becomes circular when it builds enough confidence for households to proceed. This includes guidance, clear terms, quality signals, warranty or liability arrangements, and clarity about responsibility. In some cases, governance also supports trust by reducing ambiguity.

D1.3 showed weak understanding of circular economy, difficulty with R-strategy terminology, and limited trust in services, labels and large actors. It also showed that households understand the three broad levels of circularity more easily than detailed R-strategy language. Annex A translates these barriers into implications such as plain-language communication, practical examples, visible responsibility allocation, reviews, warranties and decision support.

Annex B supports the same point from the provider side. Repair and reuse models face quality-control issues and uncertainty about outcomes. Environmental benefit is often seen as a bonus, not the main reason for using the service. Trust therefore has to be built around practical value, expected quality and risk reduction.

Upgreat is a largest reseller of used Apple devices in the Baltics makes buying second-hand electronics simple and reliable by offering professionally refurbished devices with clear condition grading and warranty. By reducing uncertainty around quality, performance, and responsibility, it makes choosing refurbished tech as easy and trustworthy as buying from a regular electronics store.

3.3 Transaction-cost reduction (Interfaces: I1, I2, I4)

Circularity often fails because the circular route is too slow, too uncertain, too fragmented or too demanding compared with the linear default. A service becomes circular when it reduces steps, coordination effort, waiting anxiety and uncertainty about price, time or outcome. In practice, the circular route must be easy enough to compete with “buy new”, “throw away” or the most convenient alternative.

GoA 1.3 and D1.3 identified many barriers that belong here: lack of time, convenience, impulse buying, stress-related consumption, high repair costs, over-purchasing, poor storage and confusion around best-before dates. Annex A translates these into service implications such as price ranges, pre-diagnosis, reminder functions, easy-start services, booking options and practical food-management support.

Annex B strengthens this point. Interviewees stressed that customers usually choose circular services when they are affordable, convenient, space-saving or fit a temporary need. Rental models are sensitive to transport costs and seasonality. Repair models are limited by spare-part availability, product design and quality limitations, lack of skills and the challenge of activating demand.

ResQ Club is a mobile app and online platform operating in Finland, Estonia, and Sweden that makes surplus food easy to access by reducing the usual friction of circular choices. By allowing users to quickly find nearby offers, pay in-app, and pick up at a fixed time with clear expectations, it removes uncertainty around price, availability, and quality, making surplus food a convenient and reliable option for everyday use.

The following example is used to illustrate how transaction-cost reduction operates in practice; the focus is not on assessing the service itself, but on examining how its characteristics may influence household circularity.

Bolt is a platform that provides on-demand transportation and delivery services through a single mobile app. It allows users to book rides, rent electric scooters or bikes, and order food or groceries conveniently. Operating in over 45 countries and more than 500 cities, Bolt connects customers with drivers, couriers, and local businesses, creating an efficient service network. By combining multiple services in one app, it simplifies access, reduces search effort, and provides clearer expectations regarding price, availability and timing. This illustrates how reduced friction, fewer steps and improved predictability can make a service easier to use in everyday situations.

3.4 Infrastructure linkage (Interfaces: I2, I3, I4)

Household circularity becomes routine only when services connect to repeatable local pathways. These include intake points, sorting, logistics, repair and refurbishment capacity, reuse channels, composting and recycling systems, coordination platforms, and local anchoring through hub and governance arrangements. A circular service is therefore not only an offer to a household. It is also one node in a wider local pathway. If that pathway is weak, circularity stays fragile even when households are willing and services exist.

GoA 1.3 and D1.3 identified many barriers that belong here: unclear sorting and collection pathways, inconvenient collection points, limited space in apartments, fragmented waste systems, and lack of a central local platform. Annex A reflects these under 4.4 Infrastructure linkage through responses such as nearby collection points, pick-up and drop-off solutions, hub-linked material flows, compact collection arrangements and municipal enabling support.

Annex B supports this interpretation from the provider side. Service provision may stay weak even when household demand exists if local infrastructure, coordination capacity or enabling institutional conditions are missing. Legal or regulatory uncertainty can also reduce service availability.

Second hand department store Echt Gut in Kiel functions as a strong node in the local circular infrastructure by linking collection, reuse and recycling, while cooperating with the municipal waste management company and social partners. This integrated approach helps ensure that materials remain in circulation and that reuse becomes efficient and reliable.

3.5 Same properties, different mechanisms across circularity levels

The same functional properties apply across the three-level hierarchy, but they are achieved through different mechanisms.

In **Buy less & use smarter**, actionability may be created through sharing, refill, borrowing, defaults or convenient service access. In **Extend product life**, predictability and trust depend more on diagnostics, repairability, pricing logic, turnaround time, spare-part availability and warranties. In **Use**

waste as a resource, usability depends heavily on spatial and routine design, such as bin design, drop-off points, collection reliability and downstream processing capacity. The properties remain stable, but the mechanisms vary by stream, place and local interface conditions.

Annex B supports this interpretation by showing that rental, repair, reuse and municipal recycling perform different circular functions and face different viability conditions. This reinforces the core argument of Chapter 4: *what matters is not the service label itself, but whether the specific service model fulfils the functional conditions needed to make a higher-value circular pathway workable in practice.*

3.6 Operationalising household “readiness-to-do”

Household readiness-to-do is used here as an operational concept, not as a separate behavioural model. It refers to the household’s practical preparedness to engage in a circular option when the required effort remains acceptable in everyday life. This effort includes not only time and inconvenience, but also uncertainty, coordination burden, cost predictability, and perceived risk. Readiness-to-do is therefore treated in D1.4 as a service-related and ecosystem-shaped condition: it indicates whether circular options have become actionable in practice through usable services and enabling local support.

Annex B supports this interpretation by suggesting that readiness to use circular services often depends less on explicit environmental motivation than on whether the option is affordable, convenient, space-saving and clearly suited to a real household need.

Annex A operationalises this logic in detail. It translates household barriers identified in GoA 1.3, D1.3 and selected literature into required effort reduction, readiness-to-do implications, and corresponding service responses. In this sense, Annex A makes explicit the GoA 1.4 service wish list by showing which service features and enabling conditions are needed if circular options are to become workable for households in practice. For example, if repair is seen as too uncertain or expensive, readiness stays low unless services offer clearer diagnosis, more predictable pricing or some form of warranty. If food-related circularity is hindered by poor storage, over-purchasing or confusion around best-before dates, readiness can be strengthened through practical support such as storage guidance, “use-first” meal ideas or simple food-sharing options. If services are fragmented across platforms or hard to find locally, the implication is a shared entry point, local directory, signposting or hub-mediated one-stop guidance.

For analytical purposes, readiness-to-do can be examined through five practical dimensions:

- visibility and findability
- understanding and confidence
- trust and perceived safety
- effort and time burden
- economic predictability.

These dimensions provide a bridge between household barriers, service design requirements and later pilot-based assessment.

4. Local Service Provider Models and Functional Properties of Circular Services

This chapter makes explicit the local service provider dimension of the Circular Services Model in Circ@Home. Rather than defining one fixed organisational template, it identifies the functional properties and ecosystem roles through which local service providers can enable household circularity in different contexts.

Circular services do not function in isolation. Their practical value depends on how well they fit local household needs, local governance conditions, neighbourhood structures, and the coordinating role of the local circularity hub (ref. D1.1 and D1.2). In Circ@Home, a **local service provider model** therefore means the locally embedded way in which one or more circular services are organised, accessed, coordinated, and enabled so that they can respond to household needs and support circularity in practice.

The model is intentionally place-dependent. The same service offer may work in one locality and fail in another depending on local demand, visibility, logistics, premises, accessibility, hub capacity, or municipal support. This is consistent with the hub logic developed in GoA 1.2, D1.2, where the Local Circularity Hub is understood as a physical and/or digital centre that activates household circularity, initiates services, and adapts to concrete neighbourhood conditions.

In practice, local service provider models may take different forms as shown in Figure 4. Some are stand-alone specialist services, such as repair, second-hand, refill, or redistribution actors. Some are hub-linked models, where the provider remains independent but becomes more usable through shared visibility, signposting, a directory, or coordinated access points. Others are hybrid public–community–provider arrangements, especially where market provision alone is too weak. In addition, some models are primarily literacy or decision-support services, such as local service directories, repairability guidance, or hub-mediated one-stop support. The key issue is not the label of the model, but whether it helps households act circularly in practice.

This can be assessed through **ecosystem fit** across the four interfaces used in D1.4. At **I1**, households must be able to find, understand, trust, and use the service with acceptable effort. At **I2**, the hub must make access and coordination real through visibility, signposting, or shared entry points. At **I3**, the hub needs enough legitimacy and continuity to function over time. At **I4**, municipal governance must reduce structural barriers that providers cannot solve alone, such as weak access to premises, fragmented logistics, unclear rules, or missing incentives.

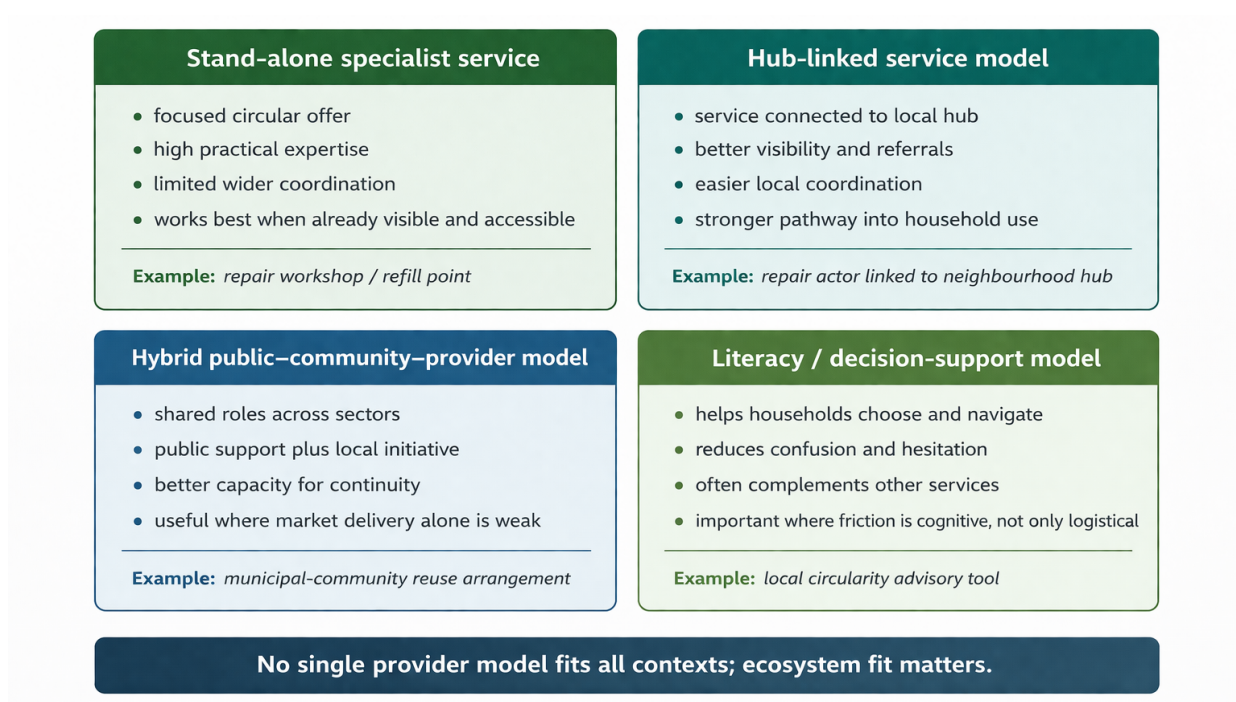


Figure 4: Local service-provider models and ecosystem fit

Annex A gives this chapter a concrete household-side grounding. It translates barriers into required effort reduction, readiness-to-do, and corresponding service wish-list responses. These include, for example, one clear entry point, local signposting, visible repair or refill options, plain-language guidance, predictable pricing, booking options, and other features that reduce search effort, uncertainty, and coordination burden. In this way, Annex A operationalises the GoA 1.4 wish list for circular services and shows what a locally fitting service provider model should offer from the household point of view.

Annex B adds the provider-side perspective by showing that service uptake and viability often depend less on environmental motivation than on affordability, convenience, practical fit, logistics, premises, skills, and regulatory clarity. Together, Annex A and Annex B reinforce the same conclusion: a circular service model is not defined by its label alone, but by whether the surrounding ecosystem makes the circular pathway workable in everyday life. D1.4 should therefore treat local service provider models as context-sensitive, ecosystem-embedded configurations.

5. Business Model Reflections (Without Growth Bias)

This chapter is included because the Approved Application Form states that D1.4 should reflect on business models from a service-provider perspective while keeping the main focus on neighbourhood circularity rather than profit or growth. In D1.4, this reflection remains analytical, not advisory, and follows from the wider ecosystem logic of households, services, hubs, and municipal support.

Business-model reflections in this chapter are informed by two project-based evidence layers: household-barrier evidence synthesised in Annex A and qualitative service-provider interview conclusions synthesised in Annex B, complemented by indicative ecosystem mapping in Annex C.

A first tension concerns **affordability versus service viability**. Earlier chapters show that household uptake depends on affordability, predictability, trust, and low enough effort. Annex A supports this through the household-derived service wish list, while Annex B shows that providers often face cost pressures related to premises, logistics, spare parts, skills, and demand activation. This means that the conditions that improve household usability may weaken provider viability unless wider support is present.

A second tension concerns **stability versus scaling**. D1.4 treats circular services as locally embedded and place-dependent. A service may be highly relevant because it fits neighbourhood routines, trusted relationships, and local access patterns, even if it does not scale easily. Annex C supports this by showing uneven local service landscapes and a stronger current empirical base in lifespan-extension services than in one universally scalable model.

A third tension concerns **trust versus competition**. Circular services often require guidance, predictability, diagnosis, and visible responsibility if households are to use them in practice. Annex A and Annex B both suggest that practical fit matters more than environmental motivation alone. Under these conditions, narrow price competition may work against the trust-building that circular services often require. Annex D supports this by defining circular services also through enabling conditions such as access, trust, affordability, coordination, and reduced friction.

These tensions help explain the relevance of **hybrid, public-supported, community-based, and non-profit models**. This is consistent with D1.1 and GoA 1.2 / D1.2, where circularity depends on enabling municipal conditions and where hub structures may take municipal, community-led, NGO-led, private, or hybrid forms. For D1.4, the implication is that circular services should be assessed within their wider ecosystem, not through profit-first logic alone.

6. Municipal Support and Structural Enablers

Many barriers to circular services are structural. Service providers cannot solve them alone. For this reason, municipal governance matters. In the Circular Services Model, this is captured especially through **I3** and **I4**. Municipal governance helps determine whether circular services remain fragmented and temporary, or become stable, visible, and accessible parts of everyday life. This is consistent with D1.1, where municipal governance forms one corner of the Urban Circularity Triangle and provides policies, infrastructure, incentives, education, funding, and other enabling conditions for circularity.

6.1 Municipal governance → Hub (I3): mandate, legitimacy and continuity

The hub function often needs support that service providers cannot create by themselves. This support may be physical, digital, or hybrid. Municipal governance can strengthen the hub by giving it a clear role, sufficient legitimacy, and continuity beyond short project periods. In practice, this may include strategic alignment, access to premises, light operational support, and partnership structures that help different actors work together over time. Without this kind of support, hub functions may remain temporary, weakly anchored, or unclear in ownership. In interface terms, weak I3 means weak continuity of the coordination layer itself.

6.2 Municipal governance → Services (I4): enabling instruments for viability and diffusion

Municipal governance can also support circular services more directly. It can reduce provider risk, create enabling conditions for demand, clarify local rules, and improve access to the infrastructure that services need. This may include incentives, procurement roles where relevant, clearer permissions, access to premises or storage, collection points, logistics support, and other forms of practical enablement. Annex B supports the relevance of these measures by showing that providers often face recurring barriers related to premises, storage, logistics, operating costs, spare parts, skills, and regulatory uncertainty. The key point is not that all municipalities should use the same instruments. The key point is that many circular services need enabling conditions outside the service itself if they are to remain viable and spread beyond niche use.

6.3 The enabling role of municipal support in the Circular Services Model

In the Circular Services Model, municipal governance is not treated as an external background condition, but as an enabling layer that shapes whether circular services and hub functions can become stable, visible and usable in everyday life. This applies through policy, procurement, infrastructure, funding and incentives, communication and education, and administrative processes. Figure 5 illustrates this enabling logic before the overall model is synthesised in Section 6.4.

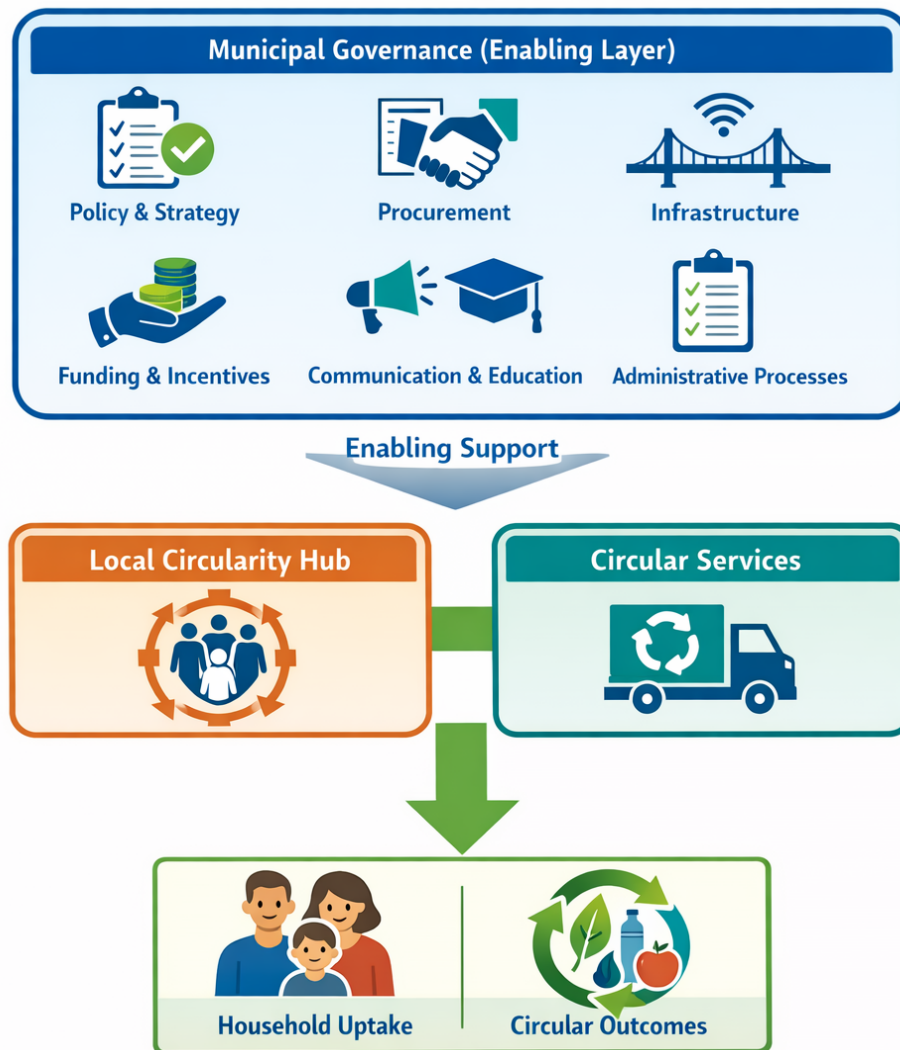


Figure 5: Municipal governance as an enabling layer in the Circular Services Model

Seen in this way, municipal support is not a separate supplement to circular services, but part of the enabling structure through which circularity becomes workable in local everyday life.

6.4 Synthesised Circular Services Model

Figure 6 summarises the overall logic of the Circular Services Model. **Service usability and ecosystem support** jointly shape **readiness-to-do** and thereby household circularity. Both conditions are jointly necessary: if either remains weak, household circularity also remains limited.

Synthesised Circular Services Model

Service usability and ecosystem support shape readiness-to-do and thereby household circularity.

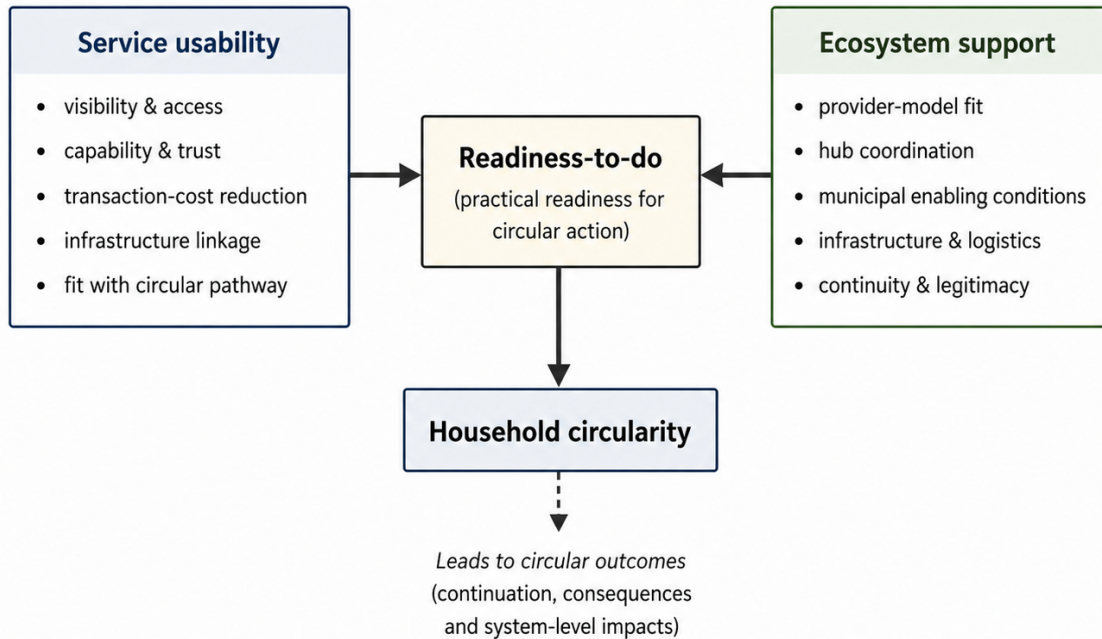


Figure 6: Synthesised Circular Services Model

The figure 6 should therefore be read as a **synthesising and diagnostic model**, not as a fixed blueprint. It brings together the main argument developed across D1.4: circular services support household circularity only when they are usable in practice and when the surrounding local ecosystem provides sufficient enabling support.

The more detailed operationalisation of readiness-to-do has been presented in Section 3.6 and Annex A. In this chapter, the concept is used only to express whether the enabling conditions identified in the Circular Services Model translate into practical household action.

7. Boundary Conditions and Limits of the Circular Services Model

The Circular Services Model is also diagnostic. It helps explain why circular services remain weak or marginal when either service usability or ecosystem support is insufficient. These weaknesses can be examined through the four interfaces of the Urban Circularity Triangle.

Where I1 (Home–Services) is weak, households may not become ready to act even if circular services formally exist. Circular options may remain too invisible, uncertain, inconvenient, or difficult to trust in everyday decision-making. In such cases, service usability remains weak and household circularity stays limited.

Where I2 (Town–Services) is weak, circular services may exist locally but remain fragmented, poorly connected, or difficult to navigate as part of the surrounding ecosystem. Individual providers may operate, but their services do not form a coherent local landscape that households can easily access. In such cases, ecosystem support remains weak even where some service offers are available.

Where I3 (Hub–Services) is weak, hub functions such as coordination, aggregation, visibility, continuity, or shared access remain unstable or absent. This weakens the connective layer that can help services reach households more effectively and consistently. In such cases, ecosystem support becomes too thin to sustain circular practices beyond isolated or niche solutions.

Where I4 (Town–Hub) is weak, municipal enabling conditions such as legitimacy, premises, procurement support, incentives, public communication, or integration into local strategies remain insufficient. In such cases, otherwise promising service arrangements may remain short-term, small-scale, or difficult to stabilise. Ecosystem support remains incomplete even where individual services are relatively usable.

The model should therefore be read not as a fixed blueprint, but as a diagnostic framework for identifying whether limited household circularity results mainly from weak service usability, weak ecosystem support, or both.

Conclusions: Services as Enablers of Household Circularity

This deliverable has elaborated the Circular Services Model as the service-side contribution to the Urban Circularity Triangle in Circ@Home. Its main argument is that circular services matter not simply because they exist, but because they make circular options usable in everyday life and support households in acting on them.

The model shows that household circularity depends not only on motivation, but on whether circular options are made usable through services and supported by the wider local ecosystem. For this reason, a service is circular in Circ@Home not by label alone, but by the function it performs in enabling workable circular action.

The contribution of D1.4 is not a fixed service blueprint, but a conceptual and analytical framework for understanding what service conditions help households become more circular across different local contexts. As such, it provides a basis for further piloting, evaluation, and refinement in Circ@Home.

REFERENCE LIST

The reference list below provides the common source base for D1.4 and its annexes.

Project sources [P01–P03] refer to Circ@Home deliverables used as conceptual and analytical inputs in the development of the Circular Services Model.

Secondary sources [S01–S18] refer to external literature and supporting background sources used in the interpretation of household barriers, service conditions, and circular-service enabling mechanisms.

Project Sources (Circ@Home Deliverables)

[P01] D1.1 The project's framework concept

[P02] D1.2 The Circ@Home local circularity hub model: Concept and guidance

[P03] D1.3 Concept and guide for households: How to become a circular household?

External Literature and Supporting Sources

[S01] Korsunova, A., Heiskanen, E. and Vainio, A. (2023) 'Consumer decision-making on repair in a circular economy: A process model based on experiences among young adults and stakeholders in Finland', *Journal of Cleaner Production*, 405, 137052. <https://doi.org/10.1016/j.jclepro.2023.137052>

[S02] Korsunova-Tsaruk, A., Horn, S. and Vainio, A. (2021) 'Understanding circular economy in everyday life: Perceptions of young adults in the Finnish context', *Sustainable Production and Consumption*, 26, pp. 759–769.

[S03] Eesti Uuringukeskus OÜ (2025) *Roheline linn ja ringmajandus: Tallinna elanike küsitlus 2025*. Commissioned by Tallinna Strateegiakeskus. Tallinn: Tallinna Strateegiakeskus. Available at: uuringud.tallinn.ee (Accessed: 5 March 2026).

[S04] LietoVĒlReiz.lv (2022) *Patērētāju elektrotehnikas lietošanas paradumu novērtējums* [Assessment of consumer electrical appliance usage habits]. Available at: lietovelreiz.lv (Accessed: 5 March 2026).

[S05] Eco Baltia Vide (2024) *Atskaite: Elektrotehnika 2024* [Assessment of consumer electrical appliance usage habits, May–June 2024]. Riga: Eco Baltia Vide. Available at: ecobaltiavide.lv (Accessed: 5 March 2026).

[S06] Waste to Resources Latvia (2024) 'Nomas pakalpojumi Latvijā – ar izaugsmes potenciālu', *Waste to Resources Latvia*, 23 February. Available at: wastetoresources.kem.gov.lv (Accessed: 5 March 2026).

[S07] Waste to Resources Latvia (2023) 'A study of the consumer habits in the use of second-hand goods in Vidzeme is completed', *Waste to Resources Latvia*, 27 April. Available at: wastetoresources.kem.gov.lv (Accessed: 5 March 2026).

[S08] Neumann, N., et al. (2024) 'Driving a Circular Economy: Nudging and innovative strategies for promoting post-consumer recycled plastic home-appliances', *Circular Economy and Sustainability*. <https://doi.org/10.1007/s43615-024-00487-y>

[S09] Steinhorst, J. and Beyerl, K. (2021) 'First reduce and reuse, then recycle! Enabling consumers to tackle the plastic crisis – Qualitative expert interviews in Germany', *Journal of Cleaner Production*, 313, 127782. <https://doi.org/10.1016/j.jclepro.2021.127782>

[S10] Lundberg, P., Vainio, A., Viholainen, N. and Korsunova-Tsaruk, A. (2024) 'Consumers and self-repair: What do they repair, what skills do they have and what are they willing to learn?', *Resources, Conservation & Recycling*, 206, 107647. <https://doi.org/10.1016/j.resconrec.2024.107647>

[S11] Viholainen, N., Lundberg, P. and Korsunova, A. (2025) 'Circular consumption as a system of interlinked practices and the implications for normalizing circularity', *Circular Economy and Sustainability*, pp. 1–22. <https://doi.org/10.1007/s43615-025-00587-3>

- [S12] Korsunova, A., Kurilova, M., Viholainen, N., Lundberg, P., Nenko, O. and Galaktionova, A. (2025) 'Digital platforms for nurturing circular neighbourhood spirits', *Consumption and Society*, 4(2), pp. 296–315. <https://doi.org/10.1332/27528499Y2025D000000048>
- [S13] Fehrer, J.A., Kemper, J.A. and Baker, J.J. (2024) 'Shaping circular service ecosystems', *Journal of Service Research*, 27(1), pp. 49–68. Available at: <https://doi.org/10.1177/10946705231188670>.
- [S14] Güsser-Fachbach, I., Lechner, G., Ramos, T.B. and Reimann, M. (2023) 'Repair service convenience in a circular economy: The perspective of customers and repair companies', *Journal of Cleaner Production*, 405, 137763. Available at: <https://doi.org/10.1016/j.jclepro.2023.137763>.
- [S15] Karpen, I.O., Edvardsson, B., Tronvoll, B., Jaakkola, E. and Conduit, J. (2023) 'Circular service management: toward conceptual understanding and service research priorities for a more sustainable future', *Journal of Services Marketing*. Available at: <https://doi.org/10.1108/JOSM-06-2023-0269>.
- [S16] OECD (2019) *Business Models for the Circular Economy: Opportunities and Challenges for Policy*. Paris: OECD Publishing. Available at: <https://doi.org/10.1787/g2g9dd62-en>.
- [S17] Tukker, A. (2015) 'Product services for a resource-efficient and circular economy – a review', *Journal of Cleaner Production*, 97, pp. 76–91. Available at: <https://doi.org/10.1016/j.jclepro.2013.11.049>.
- [S18] Yang, M., Smart, P., Kumar, M., Jolly, M. and Evans, S. (2018) 'Product-service systems business models for circular supply chains', *Production Planning & Control*, 29(6), pp. 498–508. Available at: <https://doi.org/10.1080/09537287.2018.1449247>.

D1.4 - Annex A: From household barriers to effort reduction, readiness-to-do, and service wish list

1. Purpose of the annex

This annex supports the development of the Circular Services Model by **translating household barriers** into a service-oriented analytical interpretation. It shows how barriers identified in the Circ@Home context can be understood not only as obstacles to circular action, but also as indicators of which service properties and enabling conditions may need to be strengthened.

2. Analytical approach

The table below has been developed through a qualitative synthesis process. First, household-related **barriers were identified** from the Circ@Home evidence base, especially GoA 1.3 and D1.3, and complemented with selected literature sources. Second, these **barriers were organised according to the functional property families** introduced in D1.4, Chapter 4: Visibility and access, Capability and trust, Transaction-cost reduction, and Infrastructure linkage. Third, **each barrier was interpreted through three analytical dimensions**: the type of effort reduction required, the implied level of readiness-to-do, and the corresponding service wish-list response.

3. Source base and interpretation logic

Barrier entries marked with [P03] are derived from the Circ@Home household evidence base presented in GoA 1.3 and D1.3. Entries marked with [S01]–[S12] are literature-based barriers derived from external supporting sources listed in the main reference list of D1.4. The table should therefore be read as an analytical synthesis tool that connects household observations and literature-based insights with possible service implications.

4. How to read the table

Annex A

The table is not intended as a quantitative ranking of barriers or as a statistically representative account of household behaviour. **Its purpose is interpretive and conceptual.** It is designed to show how observed barriers can be translated into practical implications for service design, effort reduction, enabling conditions, and service-side responses that may support household uptake of circular services.

Table: From household barriers to effort reduction, readiness-to-do, and service wish-list responses

D1.4, Chapter 4 functional property family	Barrier	Required effort reduction	Readiness to do – interpretation	Wish list service response
4.1 Visibility & access	[P03, S12] Services are hard to find, fragmented across channels, or embedded in unclear tools and digital environments.	Reduce search, comparison, and start-up effort.	Low when households must independently search and interpret fragmented options; higher when there is one clear entry point.	Local service directory, hub-mediated visibility, shared entry point, signposting, simple one-stop guidance.
4.1 Visibility & access	[P03] Circular options are not visible or easily reachable at the moment of need.	Reduce travel and effort needed to identify a circular option at the decision moment.	Low when circular alternatives require separate searching or travel; higher when they appear in everyday routines and routes.	Visible repair, refill, borrowing and local food/reuse options, availability information, service prompts at the point of need.
4.2 Capability & trust	[P03, S02] Circular economy may be understood only narrowly, and terminology can make action difficult to interpret.	Reduce learning effort and conceptual ambiguity.	Moderate to low when households must first understand abstract concepts; higher when the pathway is concrete and understandable.	Plain-language descriptions, practical examples, three-level logic, “what to do now” guidance.
4.2 Capability & trust	[P03, S08] Households may distrust services, labels,	Reduce perceived risk and uncertainty	Low when quality and responsibility remain unclear;	Warranty, visible responsibility allocation, quality criteria,

Annex A

D1.4, Chapter 4 functional property family	Barrier	Required effort reduction	Readiness to do – interpretation	Wish list service response
	second-hand actors, or recycled-content products when quality or responsibility is unclear.	about quality, safety, and accountability.	higher when trust-building cues are present.	hygiene/safety clarity, reviews, assurance labels, third-party validation.
4.2 Capability & trust	[S01, S10, P03] Repair and other circular actions may be hindered by lack of confidence, weak skills, unclear diagnosis, or uncertainty about whether the effort is worthwhile.	Reduce uncertainty and lower the skill threshold needed to proceed.	Low when households do not know what will happen or whether they can manage; higher when guidance and support are clear.	Pre-diagnosis, repairability assessment, staged quotes, repair tutorials, assisted repair, skill-building workshops, decision aids.
4.3 Transaction-cost reduction	[P03] Lack of time, everyday rush, and family pressures make circular options feel too demanding.	Reduce steps, waiting time, and coordination burden.	Low when circular action takes too much time or disrupts routines; higher when the service fits everyday life.	Long opening hours, fast processes, booking options, pick-up/return services, several services in one place, family-compatible design.
4.3 Transaction-cost reduction	[P03, S09, S11] Convenience, impulse buying, and established practice bundles reinforce the linear default.	Reduce friction at the decision moment and make circular options easier within existing routines.	Low when circular action requires more effort than the default linear route; higher when the circular route is easier and more salient.	Easy-start services, reminders, pause-and-compare prompts, repair-before-replace prompts, refill/reuse defaults, integrated service bundles.

Annex A

D1.4, Chapter 4 functional property family	Barrier	Required effort reduction	Readiness to do – interpretation	Wish list service response
4.3 Transaction-cost reduction	[P03, S01] Repair or other circular options may involve unclear prices, unclear outcomes, and fear of making the wrong decision.	Reduce price and outcome uncertainty.	Low when households cannot assess likely cost or result; moderate to high when risk is reduced.	Price ranges, pre-diagnosis, staged quotes, transparent comparison, incentives or vouchers, clear process information.
4.3 Transaction-cost reduction	[P03] Food-related circular action may be hindered by over-purchasing, poor storage, best-before confusion, and planning burden.	Reduce planning and interpretation effort.	Moderate when support is easy to use; low when better food management requires extra planning effort.	Storage guidance, “use first” meal ideas, best-before Q&A, pantry/fridge support tools, reminder functions, community food-sharing.
4.4 Infrastructure linkage	[P03] Sorting, collection, and waste pathways may be unclear, fragmented, distant, or poorly connected to local services.	Reduce travel and dependence on fragmented local pathways.	Low when circular action depends on confusing local systems; higher when pathways are close, clear, and repeatable.	Clear sorting guidance, nearby collection points, pick-up/drop-off solutions, shared collection, hub-linked material flows.
4.4 Infrastructure linkage	[P03] Limited space at home can make storing, sorting, or waiting for service use difficult.	Reduce household storage and temporary holding burden.	Low when circular options require space that households do not have; higher when the system minimizes home storage needs.	Frequent pick-up/drop-off, compact collection arrangements, faster turnover, shared interim storage, hub-based buffering solutions.

Annex A

D1.4, Chapter 4 functional property family	Barrier	Required effort reduction	Readiness to do – interpretation	Wish list service response
4.4 Infrastructure linkage	[P03] Circular service provision may remain weak where local infrastructure, coordination capacity, or enabling institutional conditions are missing.	Reduce dependence on ad hoc arrangements and strengthen continuity.	Household readiness may exist, but uptake remains weak if the surrounding service system is missing or unstable.	Shared logistics, local coordination through hubs, access to premises, repeatable local pathways, municipal enabling support.
4.4 Infrastructure linkage	[P03] Legal or regulatory uncertainty can weaken service provision even where household willingness exists.	Reduce institutional risk and ambiguity for providers.	Household readiness may exist, but service availability remains weak if providers hesitate.	Regulatory clarity, municipal guidance, clarified roles and responsibilities, enabling governance arrangements.

REFERENCES

This annex uses the same reference base as the main D1.4 report.

Project sources are cited as [P01–P03] and external literature sources as [S01–S18], as defined in the main reference list of D1.4.

The citation codes are retained here in order to preserve traceability between barrier interpretations, project evidence, and literature-based support.

D1.4 - Annex B: Conclusions of the GoA 1.4 service provider interviews

This document presents the key findings from ten semi-structured interviews with service providers operating in various cities in the Baltic Sea region, including Kiel, Hamburg, Valmiera, Riga, Tallinn, Lahti, Kerava and Oulu. The cases selected represent a variety of circular service models, including repair, reuse, rental, recycling and food-related initiatives. This allows for a comparative perspective to be taken across different local contexts and sectors.

The analysis aims to identify common patterns, challenges and enabling factors that shape the implementation of circular economy practices at the service level. Although the cases vary in terms of their scale, organisational structure, and level of market integration, collectively they offer valuable insights into how circularity is understood, practised, and maintained in practical settings.

Rather than focusing on individual cases, the conclusions synthesise findings that emerged across the interviews. These findings emphasise the varying significance of circularity within business models, the motivations and behaviours of customers, the operational constraints encountered by service providers, and the impact of public authorities in facilitating (or hindering) circular initiatives.

Role of circularity across different service models

Across the cases, a broad spectrum emerges regarding the role of circularity within different service models. In some cases, circularity forms the very core of the business model. Services such as recycling or rental are not complementary activities but constitute the primary value proposition and economic foundation of the organisation.

In other cases, circularity is integrated but remains secondary. For example, a retail company may incorporate repair or rental services as important elements of its offering. While these activities contribute to circular practices, they account for only a small share of total revenue and do not define the overall business logic. At the same time, some service providers adopt hybrid models, where circular activities are combined with other functions such as cafés, events, or educational activities, embedding circularity within broader community-oriented practices rather than purely economic ones.

Finally, there are initiatives where circularity appears primarily as a voluntary or socially embedded practice. In these cases, circularity is driven less by formal economic strategy and more by community engagement or social mission (e.g. waste prevention, food rescue, soil regeneration, awareness raising, offering low-threshold services). The circular dimension is present and meaningful, yet it is rooted in social values rather than in market-based business models.

Circular practice often exists without circular identity

Circularity is often practiced without being consciously framed as part of the circular economy (CE). Repair businesses, second-hand stores, and reuse initiatives often perceive their work as practical problem-solving rather than explicitly delivering circularity as a stated objective.

A similar pattern can be observed among customers: circular services are rarely chosen primarily for environmental reasons. Instead, practical considerations dominate. Key drivers of user engagement include price, convenience, limited storage space, temporary demand, and emotional attachment to possessions.

The additional interviews further reinforce that **price sensitivity is a central factor**, but also highlight that customers evaluate services based on a combination of **price, quality, and aesthetics**. For example, even low-cost second-hand products may not be attractive if their appearance does not

meet expectations. Likewise, even sustainability-oriented consumers are often reluctant to pay higher prices for circular products .

Environmental benefits are therefore typically regarded as an added advantage rather than the main motivation. Relying solely on voluntary behavioural change driven by sustainability values is unrealistic. To succeed, circular services must compete on practical value — usability, accessibility, and affordability — rather than appealing primarily to moral or environmental responsibility.

Structural and operational challenges in circular services

Different service models fulfil distinct circular functions and face specific constraints. At the same time, policy and regulatory frameworks are often designed for linear or large-scale systems, placing small-scale circular models at a structural disadvantage.

Several cases illustrate that many circular activities are **labour-intensive and operationally complex**. For example, repair services are limited by product quality and the availability of spare parts, and repairing low-value goods may be economically unfeasible due to high labour costs. Similarly, food rescue initiatives depend on unstable supply streams and require significant effort in sorting and processing, making them more complex than linear production systems. Examples of service-specific challenges include:

- Rental and reuse models are sensitive to logistics and scale.
- Repair services face skill shortages and product design limitations
- Reuse and second-hand retail require labour-intensive sorting and storage
- Foodsharing and food rescue initiatives face regulatory and infrastructural barriers

These challenges highlight that circular models are not only emerging but are also structurally disadvantaged compared to linear systems, rather than simply underdeveloped.

The role of public authorities in supporting circular service providers

Public support for circular initiatives takes several forms, however, its overall impact remains uneven and, in many cases, limited. Interviewees identified a range of existing support mechanisms currently in place:

- Public authorities acting as customers (an indirect but important form of support)
- Provision of premises and infrastructure
- Structural support, such as municipal ownership or core funding
- Labour market and social support instruments
- Business development and advisory services (although these are often underused)

Despite these measures, interviews reveal an important nuance: public intervention can be both insufficient and inconsistently distributed. In some cases, subsidies provided to certain actors (e.g. start-ups) may distort competition and create unequal market conditions. At the same time, many circular initiatives lack access to basic financial support, tax incentives, or operational subsidies needed for scaling.

Interviewees highlighted several forms of support that are either missing or would significantly strengthen circular initiatives:

- Economic incentives (e.g. repair vouchers, tax reductions)
- Support covering operating costs, not only investments
- Affordable municipal spaces
- Procurement policies prioritising circular services
- Clearer regulatory frameworks
- Greater visibility and communication support

Annex B

Overall, municipalities are most commonly perceived as customers or regulators. Their role as active coordinators of local circular economy ecosystems—facilitating collaboration and enabling systemic change—remains largely underdeveloped.

Emerging cultural shift toward circularity

Despite persistent economic and structural barriers, the interviews indicate a gradual **normalisation of circular practices**. Public awareness of issues such as food waste has increased significantly, and circular products and services are becoming more socially accepted and, in some cases, even “trendy”.

However, this cultural shift has not yet translated into widespread behavioural change, as economic considerations—particularly price—continue to dominate decision-making.

D1.4 - Annex C: Mapping of Circular Service Options

C.1 Purpose and scope

This annex provides an indicative baseline mapping of circular service options visible across the pilot ecosystems. Its purpose is to show how the mapped service landscape relates to the project's three circular pathways and how these services can be interpreted from a provider-side perspective. It is a mapping annex, not an evaluation of service quality, accessibility, affordability, uptake, viability, or impact.

C.2 The mapping methodology, data sources, and the approach used across the pilot locations

The initial dataset of mapped services originated from a combined exercise conducted under GoA 1.2 and GoA 1.4, where each project location identified stakeholders and initiatives relevant to the project. Those included also some services which were consolidated into a single, general service mapping file. This file served as the foundation for the work and enabled the preliminary classification and organization of services. Building on this, further mapping was carried out by reviewing contributions from other partners and locations. Services were then systematically aligned with the nine R-strategies (Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Recycle, Rot, Recover), as well as with three overarching strategies (Buy less and use smarter; Extend product life; Use waste as a resource) and the household categories developed under GoA 1.3, ensuring a clear connection between services and household contexts. This alignment was undertaken to ensure consistency and coherence across the dataset. Additional data was collected across eight project locations, with 1–2 project partners per site contributing.

A total of 170 services were mapped across eight project locations, representing 37 distinct service types. These service types were initially grouped into eight categories from a consumer perspective, which were adapted into the more accurate circular economy terminology of “service models.” (see the image 3). The majority of services fall under the service models “Repair and maintenance” (68) and “Reuse” (46) which stands for services/stores for second-hand products and reusable packages services. Within the renting, sharing, and leasing models a total of 32 services were identified.

Annex C

	A	B	C	D	E	F	G	H	I
1	City	Household category	R-strategy	R-strategy_2	Service model type	Service category	Service	Name	Web
20	Kerava		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Peräkärryvuokraus - Puuro Kerava	https://www.puuro.fi/perakarryn-vookraus
21	Kerava		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Peräkärryvuokraus - Motonet Kerava	https://www.motonet.fi/palvelut/motokarri
22	Kiel	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Dish/tableware rental	Spülbar	https://spuelbar-kiel.de/
23	Kiel	Home & Living Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Lending library	Rent	Library of things	Library of Things (Bücherhallen)	
24	Oulu	Textiles & Clothing	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Clothing rental	Partioaitta Oulu	https://www.partioaitta.fi/myymalat/oulu/
25	Oulu	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	Partioaitta Oulu	https://www.partioaitta.fi/myymalat/oulu/
26	Oulu	Home & Living Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Sharing	Rent	Rent platform for individuals	Hygglö	https://www.hygglo.fi/
27	Oulu		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Vatupassi (owned by Avesco Group), Ramirent	https://www.vatupassi.fi/en/
28	Riga	Textiles & Clothing	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Clothing rental	IRVE	www.irve.lv
29	Riga	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	PUPU MAISS	https://pupumaiss.lv/
30	Riga	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	STORENT	www.storent.lv
31	Riga	Leisure & Hobbies	1. Buy less/better	4. Reuse	Renting and leasing	Rent	Event equipment rental	SKANAGAISMA LV	https://www.skanagaisma.lv/lv
32	Tallinn	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Sharing	Rent	(Self-service) laundry	Laundromat OÜ	https://laundromat.ee/en
33	Tallinn	Home & Living	1. Buy less/better	2. Rethink	Sharing	Rent	Bike rental	Bolt	https://bolt.eu/en-ee/scooters/
34	Tallinn	Home & Living	1. Buy less/better	2. Rethink	Sharing	Rent	Car rental	Bolt drive	https://bolt.eu/en-ee/drive/
35	Tallinn	Home & Living Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Sharing	Rent	Rent platform for individuals	Rentif	https://rentif.com/
36	Tallinn	Leisure & Hobbies	1. Buy less/better	2. Rethink	Sharing	Rent	Scooter rental	Bolt	https://bolt.eu/en-ee/scooters/
37	Tallinn	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Rendipesa.ee	https://rendipesa.ee/
38	Tallinn	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Rendise.ee	https://rendise.ee/
39	Tallinn	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Baby Gear rental	Rent4Kids	https://www.rent4kids.ee/
40	Tallinn	Home & Living Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Sharing	Rent			https://rentster.ee/et/
41	Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Sharing	Rent	(Self-service) laundry	"Latvian Red Cross" Vidzeme Committee Valmiera	https://www.facebook.com/DienasCentrs/
42	Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Sharing	Rent	Bike rental	X centrs	https://xcents.lv/
43	Valmiera	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	AK Car Rent, Ltd.	
44	Valmiera	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Timberauto, Ltd.	
45	Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	Ltd. Volanti	http://www.atputauzaka.lv/
46	Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	Ltd. PRIMA L.L.	
47	Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	Pašnodarbinātā persona Linda Skuja	https://www.nomavalmiera.lv/
48	Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	X centrs	https://xcents.lv/
49	Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	EKO Risinājumi Laivu noma	https://salacaskano.lv/
50	Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	Ltd. PRIMA L.L.	
51	Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	X centrs	https://xcents.lv/
52	Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Valmieras domradis, Ltd.	
53	Hamburg	Leisure & Hobbies	2. Expand the if...	4. Reuse	Renting and leasing	Rent	Event equipment rental	Hanseatische Materialverwaltung	https://www.hanseatische-materialverwaltung.de/
54	Riga	Textiles & Clothing	3. Use as a reso...	4. Reuse	Sharing	Rent	(Self-service) laundry	SMARZO	https://smarzo.lv/velas-mazgatavas/velas-mazgatava-riga-rimi-lita-iela/
55	Tallinn	Textiles & Clothing	2. Expand the if...	4. Reuse	Repair workshop	Repair workshop (DIY)	Clothes, textiles (DIY workshop)	Lilleküla sewing repair shop	https://www.tallinn.ee/et/ringmajanduskeskus/lillekula-omblusparandustookoda
56	Tallinn	Home & Living	2. Expand the if...	5. Repair	Repair workshop	Repair workshop (DIY)	Metal workshop	Tulika Workshop	https://www.facebook.com/tulika.space
57	Tallinn	Home & Living	2. Expand the if...	5. Repair	Repair workshop	Repair workshop (DIY)	Upholstery (DIY workshop)	Lilleküla upholstered furniture repair shop	https://www.tallinn.ee/et/ringmajanduskeskus/lillekula-pehmemoobli-parandustookoda
58	Hamburg	Consumer electronics & household appliances	1. Buy less/better	1. Refuse	Repair and maintenance	Repair/ maintenance	Library of things	Bücherhalle Hamburg	
59	Kerava		1. Buy less/better	2. Rethink	Repair and maintenance	Repair/ maintenance	Woodwork	Puusepät Jukka Kuusonen ja Ari Hirvonen	https://www.kuusonen.fi/
60	Hamburg	Leisure & Hobbies	2. Expand the if...	5. Repair	Repair and maintenance	Repair/ maintenance	Special equipment repair	Welcome Werkstatt e.V.	https://www.welcome-werkstatt.de/
61	Hamburg	Textiles & Clothing	2. Expand the if...	5. Repair	Repair workshop	Repair/ maintenance	Clothes, textiles (DIY workshop)	Nähtwerkstatt im Goldbekhaus	https://www.goldbekhaus.de/eventmanager/naehwerkstatt-2026-01-29/
62	Hamburg	Home & Living Consumer electronics & household appliances	2. Expand the if...	5. Repair	Repair workshop	Repair/ maintenance	Upholstery (DIY workshop)	Netzwerk Reparatur Initiativen	https://www.reparatur-initiativen.de/
63	Hamburg	Textiles & Clothing	2. Expand the if...	5. Repair	Repair and maintenance	Repair/ maintenance	Dry cleaning	Pop Up Waschsalon Winterhude	https://www.popupstores.de/shop-finden/pop-up-waschsalon.html
64	Hamburg	Textiles & Clothing	2. Expand the if...	5. Repair	Repair and maintenance	Repair/ maintenance	Shoe repair	Schuhreparatur Schwartau	

Annex C

A	B	C	D	E	F	G	H	I
City	Household category	R-strategy	R-strategy_2	Service model type	Service category	Service	Name	Web
Hamburg	Fresh products	2. Expand the lif...	4. Reuse	Circular food systems	Food	Surplus food sharing/selling	Too Good to go	https://www.toogoodtogo.com/de/about-us
Riga	Leisure & Hobbies	3. Use as a reso...	2. Rethink		Food	Communal gardening	eS14	https://www.es14.lv
Kerava		1. Buy less/better	2. Rethink		Recycling services	Second hand clothes	Index Kerava, tekstiilinkeräys	https://about.index.com/fi/kestava-kehitys/miten-sina-voit-vaikuttaa/uude
Kerava		1. Buy less/better	2. Rethink		Recycling services	Second hand clothes	Kiertokapula Kerava	https://www.kerava.fi/asuminen-ja-rakentaminen/asuminen/jatehuolto-ja-
Oulu		1. Buy less/better	1. Refuse		Recycling services	Package return service	Palpa (Suomen palautuspakkaus Oy)	https://www.palpa.fi/english/
Lahti		2. Expand the lif...	5. Repair		Recycling services	Package return service	Rinki - eco take-back point network	https://rinki.fi/
Kerava	Textiles & Clothing	1. Buy less/better	2. Rethink	Reuse services	Second-hand	Second hand clothes	Kierrätyskeskus	https://kierratyskeskus.fi/
Kerava		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Teboli Kannisto	https://www.teboli.fi/asetat-ja-palvelut/asetat/kerava-kannisto
Kerava		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Paku Ovelle	https://www.pakuovelle.com/vuokraa-pakettiauto-keravalla
Kerava		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Peräkärryvuokraus - Puuilo Kerava	https://www.puuilo.fi/perakarryvuokraus
Kerava		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Peräkärryvuokraus - Motonet Kerava	https://www.motonet.fi/palvelut/motokarry
Kiel	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Dish/tableware rental	Spülbar	https://spuelbar-kiel.de/
Kiel	Home & Living Consumer electronics & household ...	1. Buy less/better	2. Rethink	Lending library	Rent	Library of things	Library of Things (Bücherhallen)	
Oulu	Textiles & Clothing	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Clothing rental	Partioaitta Oulu	https://www.partioaitta.fi/myymalat/oulu/
Oulu	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	Partioaitta Oulu	https://www.partioaitta.fi/myymalat/oulu/
Oulu	Home & Living Consumer electronics & household ...	1. Buy less/better	2. Rethink	Sharing	Rent	Rent platform for individuals	Hygglo	https://www.hygglo.fi/
Oulu		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Vatupassi (owned by Avesco Group), Ramiren	https://www.vatupassi.fi/en/
Riga	Textiles & Clothing	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Clothing rental	IRVE	www.irve.lv
Riga	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	PUPU MAISS	https://pupumaiss.lv/
Riga	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	STORENT	www.storent.lv
Riga	Leisure & Hobbies	1. Buy less/better	4. Reuse	Renting and leasing	Rent	Event equipment rental	SKANAGAIMA LV	https://www.skanagaima.lv/
Tallinn	Consumer electronics & household appliances							
Tallinn	Textiles & Clothing	1. Buy less/better	2. Rethink	Sharing	Rent	(Self-service) laundry	Laundromat OÜ	https://laundromat.ee/en
Tallinn	Home & Living	1. Buy less/better	2. Rethink	Sharing	Rent	Bike rental	Bolt	https://bolt.eu/en-ee/scooters/
Tallinn	Home & Living	1. Buy less/better	2. Rethink	Sharing	Rent	Car rental	Bolt drive	https://bolt.eu/en-ee/drive/
Tallinn	Consumer electronics & household appliances							
Tallinn	Leisure & Hobbies	1. Buy less/better	2. Rethink	Sharing	Rent	Rent platform for individuals	Rentif	https://rentif.com/
Tallinn	Home & Living	1. Buy less/better	2. Rethink	Sharing	Rent	Scooter rental	Bolt	https://bolt.eu/en-ee/scooters/
Tallinn	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Rendipesa.ee	https://rendipesa.ee/
Tallinn	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Rendiise.ee	https://rendiise.ee/
Tallinn	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Baby Gear rental	Rent4Kids	https://www.rent4kids.ee/
Tallinn	Home & Living							
Tallinn	Consumer electronics & household appliances							
Tallinn	Leisure & Hobbies	1. Buy less/better	2. Rethink	Sharing	Rent			https://rentster.ee/et/
Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Sharing	Rent	(Self-service) laundry	"Latvian Red Cross" Vidzeme Committee Valn	https://www.facebook.com/DienasCentrs/
Valmiera	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Bike rental	X centrs	https://xcentrs.lv/
Valmiera	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	AK Car Rent, Ltd.	
Valmiera	Home & Living	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Car rental	Timberauto, Ltd.	
Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	Ltd. Volanti	http://www.atputauzaka.lv/
Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	Ltd.PRIMA L.L.	
Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	Pašnodarbinātā persona Linda Skuja	https://www.nomavalmiera.lv/
Valmiera	Consumer electronics & household appliances	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Event equipment rental	X centrs	https://xcentrs.lv/
Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	EKO Risinājumi Laivu noma	https://salacaskanoe.lv/
Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	Ltd.PRIMA L.L.	
Valmiera	Leisure & Hobbies	1. Buy less/better	2. Rethink	Renting and leasing	Rent	Recreation equipment rental	X centrs	https://xcentrs.lv/
Valmiera		1. Buy less/better	2. Rethink	Renting and leasing	Rent	Tool rental	Valmieras domradis, Ltd.	
Hamburg	Leisure & Hobbies	2. Expand the lif...	4. Reuse	Renting and leasing	Rent	Event equipment rental	Hanseatische Materialverwaltung	https://www.hanseatische-materialverwaltung.de/
Riga	Textiles & Clothing	3. Use as a reso...	4. Reuse	Sharing	Rent	(Self-service) laundry	SMARZO	https://smarzo.lv/velas-mazgatavas/velas-mazgatava-riga-rimi-lilla-ig
Tallinn	Textiles & Clothing	2. Expand the lif...	4. Reuse	Repair workshop	Repair workshop (DIY)	Clothes, textiles (DIY workshop)	Lilleküla sewing repair shop	https://www.tallinn.ee/et/ringmajanduskeskus/lillekula-omblusparandusto
Tallinn	Home & Living	2. Expand the lif...	5. Repair	Repair workshop	Repair workshop (DIY)	Metal workshop	Tulika Workshop	https://www.facebook.com/tulika.space
Tallinn	Home & Living	2. Expand the lif...	5. Repair	Repair workshop	Repair workshop (DIY)	Upholstery (DIY workshop)	Lilleküla upholstered furniture repair shop	https://www.tallinn.ee/et/ringmajanduskeskus/lillekula-pehmemoobi-para
Hamburg	Consumer electronics & household appliances	1. Buy less/better	1. Refuse	Repair and maintenanc...	Repair/ maintenance	Library of things	Bücherhalle Hamburg	
Kerava		1. Buy less/better	2. Rethink	Repair and maintenanc...	Repair/ maintenance	Woodwork	Puusepät Jukka Kuusonen ja Ari Hirvonen	https://www.kuusonen.fi/
Hamburg	Leisure & Hobbies	2. Expand the lif...	5. Repair	Repair and maintenanc...	Repair/ maintenance	Special equipment repair	Welcome Werkstatt e.V.	https://www.welcome-werkstatt.de/
Hamburg	Textiles & Clothing	2. Expand the lif...	5. Repair	Repair workshop	Repair/ maintenance	Clothes, textiles (DIY workshop)	Näherwerkstatt im Goldbekhaus	https://www.goldbekhaus.de/eventmanager/naehwerkstatt-2026-01-29/
Hamburg	Home & Living							
Hamburg	Consumer electronics & household appliances							
Hamburg	Leisure & Hobbies Textiles & Clothing	2. Expand the lif...	5. Repair	Repair workshop	Repair/ maintenance	Upholstery (DIY workshop)	Netzwerk Reparatur Initiativen	https://www.reparatur-initiativen.de/
Hamburg	Textiles & Clothing	2. Expand the lif...	5. Repair	Repair and maintenanc...	Repair/ maintenance	Dry cleaning	Pop Up Waschsalon Winterhude	https://www.popupstores.de/shop-finden/pop-up-waschsalon.html
Hamburg	Textiles & Clothing	2. Expand the lif...	5. Repair	Repair and maintenanc...	Repair/ maintenance	Shoe repair	Schuhreparatur Schwartau	

Image 1: A snapshot of the circular service options mapping

C.3 Classification logic

The mapping is organised through three circular pathways as outlined in the image 2:

1. **Buy less and use smarter**
2. **Expand the lifespan**
3. **Use waste as a resource**

This pathway logic groups services according to the type of circular household action they enable. It keeps the interpretation practical and service-oriented. The three pathways can also be understood as a service-relevant grouping of broader circular economy strategies: prevention and smarter use, value retention through longer use, and downstream recovery of residual value.

From the provider perspective, these pathways correspond to different service roles:

- **prevention-oriented services**
- **life-extension services**
- **recovery-oriented services**
- **cross-cutting literacy or decision-support services** that support all three pathways by reducing ambiguity, search effort, and practical friction.

In addition to this

Annex C

	A	B	C	D	E	F	G	H	I	J
1	What services are needed to implement different R strategies in households?	Buy less and use smarter			Expand the lifespan			Use waste as a resource		
2		1. Refuse	2. Rethink	3. Reduce	4. Reuse	5. Repair	6. Refurbish	7. Recycle	8. Rot	9. Recover
3	Description (from D1.1 and 1.3 whitepaper)	Avoid unnecessary or wasteful food practices (e.g., impulse purchases, overpackaged foods), use packaging-free shops or your own containers to buy food.	Change the way you think about food and food consumption (e.g. rethink your shopping routine by planning meals in advance, rethink how you interpret expiry dates to avoid throwing food away).	Cut down excessive food consumption to prevent food waste before it happens (e.g. buy only what is needed, freeze extra food).	Give food and food-related items a second life through creative or practical reuse (e.g. reuse food leftovers in creative meals – cook with scraps, share food with friends).	In the case of food, repairing can be interpreted as restoring the value of damaged but edible food (e.g., removing bruised parts of fruit for juice production, making wilted lettuce fresh again).	Similarly to repairing, refurbishing aims to preserve the value of food products that might otherwise be discarded due to appearance or nearing expiration (e.g., make croutons from stale bread).	Turning food packaging back into secondary raw material	Turn organic waste into soil (e.g. participate in local/neighbourhood food waste composting and use initiatives, urban agriculture and community gardens, use compost locally).	Use waste to recover energy, i.e. burning in waste-to-energy incineration plants, as the last option.
4	Fresh products	Package-free option shops	Surplus food sharing/selling Community fridges meal planning app?		Community fridges Cooking classes Package-free option shops		Cooking classes/workshops on the topic	Recycling services (collecting/sorting points near home/collecting from home)	Community garden/worm composter/waste management services	Waste management services (collecting points near home/collecting from home)
5	Frozen products		Surplus food sharing/selling Community fridges		Community fridges Cooking classes Package-free option shops				Community garden/worm composter/waste management services	
6	Dry products	Package-free option shops	Surplus food sharing/selling Community fridges		Community fridges Cooking classes Package-free option shops				Community garden/worm composter/waste management services	
7	Beverages	Package-free option shops	Surplus food sharing/selling Community fridges		Community fridges Cooking classes Package-free option shops					
8	Ready meals & convenience	Package-free option shops	Surplus food sharing/selling Community fridges		Community fridges Package-free option shop				Community garden	
9	Take-away, delivery services and out of Home	Reusable packages services Package-free option cafe	Surplus food sharing/selling Community fridges		Community fridges Reusable food container providers/package-free option cafe				Community garden	
10	Description (from D1.1)	Say no to unnecessary, low-quality, or short-lived household goods (e.g. avoid trend-based impulse buys, low-quality "fast fashion" clothing, avoid fast furniture).	Shift your mindset to prioritise quality and longevity (e.g. rethink your wardrobe: invest in timeless, high-quality, versatile pieces instead of fast fashion).	Cut back on the quantity and frequency of purchases to avoid unnecessary waste (reduce clothing purchases to what you need).	Find new functions or second lives for items instead of throwing them away (e.g. donate clothes and functional items to reuse centres or friends).	Maintain and fix items to keep them in use for as long as possible (e.g. go to a repair café or community circular centre to fix and repair items).	Restore a used product to good condition by cleaning, repairing, and updating it (e.g. refurbished laptop).	Turn discarded items back into secondary raw materials (e.g., participate in the source separation and separate collection system of your municipality).		Material recycling – Turn discarded items back into secondary raw materials (e.g., participate in the source separation and separate collection system of your municipality).
11	Drugstore & Body Care	Eco-shops Package-free option shops						Recycling services (collecting/sorting points near home/collecting from home)		Waste management services (collecting points near home/collecting from home)
12	Textiles & Clothing	Educational workshops, Movienights like TRUE COST	Quality clothing shop Tutorials for Repair and DIY and Care		Reuse stores	Repair workshop (DIY) Repair service for clothes, shoes, bags		Recycling services (collecting/sorting points near home/collecting from home)		Waste management services (collecting points near home/collecting from home)
13	Home & Living		Car rental Bicycle/scooter rental Dish/tableware rental		Reuse stores	Repair workshop (DIY) Repair service for furniture	Educational workshops for repairing/refurbishing furniture	Recycling services (collecting/sorting points near home/collecting from home)	x	Waste management services (collecting points near home/collecting from home)
14	Consumer electronics & household appliances		Library of things Tool rental		Reuse stores	Repair workshop (DIY) Repair service		Recycling services (collecting/sorting points near home/collecting from home)		Waste management services (collecting points near home/collecting from home)

Image 2: A snapshot of the circular service options mapping - the three-level approach

Annex C

(Old) category	New Model Type	Description	Typical Examples	Circular Value / Function	3R hierarchy	9R	Financing scheme?
Rent	1. Sharing	Allow multiple users to access and use the same product, space, or resource, reducing the need for new production and improving utilization rates. Often platform-based or community-driven.	Car-sharing, shared office spaces, community tool sharing	Reduces material demand; increases product-use intensity	1. Buy less/better	2. Rethink	Service fee Membership fee
Rent	2. Renting and Leasing	Provide temporary access to products without transferring ownership. The provider remains responsible for maintenance, repair, and end-of-life, incentivizing product longevity.	Clothing rental, office furniture leasing, construction equipment rental	Extends product life; shifts focus from ownership to service	2. Expand the lifespan	2. Rethink	Service fee Membership fee
Rent	3. Lending Library	Offer structured borrowing systems for items used occasionally. Usually community-based or municipally supported, focusing on accessibility and reuse.	Tool libraries, toy libraries, Library of Things	Promotes resource sharing and access over ownership	1. Buy less/better	2. Rethink	Service fee Membership fee Free (financing comes from other sources such as municipality support, donations, etc.)
Second hand, Reusable Packages	4. Reuse Services	Collect, clean, refurbish, and redistribute used products or materials to extend their life cycles and prevent waste.	Reusable packaging systems, second-hand shops, construction material reuse	Keeps products in use; prevents waste generation	2. Expand the lifespan	4. Reuse	Product sales
Makerspaces	5. Repair Workshop (DIY)	Community spaces where individuals can repair their own items using shared tools and knowledge. Encourages skills, awareness, and behavioral change.	Repair Cafés, (makerspaces?)	Builds repair culture; prevents premature disposal	2. Expand the lifespan	5. Repair	Participation fee; Membership fee; Free (financing comes from other sources such as municipality support, donations, etc.)
	6. Repair and Maintenance Services	Professional services that maintain and repair products to ensure longer functionality. Focus on expertise and reliability rather than user participation.	Electronics repair shops, tailoring and cobbler services, laundry and dry-cleaning, machine maintenance firms	Extends product lifespan; maintains product value	2. Expand the lifespan	5. Repair	Service fee
Food	7. Circular Food Systems	Prevent food waste by redistributing, reprocessing, or sharing surplus edible products among consumers, retailers, and producers.	Foodsharing Tallinn, ResQ Club, community fridges, social restaurants	Reduces food waste; reuses edible resources; supports social inclusion	1. Buy less/better 2. Expand the lifespan	2. Rethink 4. Reuse	Membership fee Free (financing comes from other sources such as municipality support, donations, etc.);

Image 3: A snapshot of terminology adaption: service categories and corresponding service model types

C.4 Sector distinction

The mapping covers both **non-food** and **food-related** circular services.

In the **non-food domain**, circular services are mainly linked to repair, maintenance, refurbishment, resale, second-hand, rental, borrowing, and reuse. In the **food-related domain**, the service logic is more closely connected to food-waste prevention, surplus redistribution, reusable packaging, sorting, and downstream resource recovery. This distinction matters because circularity is produced through different mechanisms in different sectors.

C.5 Table C1. Mapped circular service options by pathway

The table presents typical service types and roles from a provider perspective, indicating how they enable household circular actions.

Pathway	Provider-side role	Typical service types	Main sector relevance	Illustrative examples
Buy less and use smarter	Prevention-oriented service	rental, borrowing, sharing, product-as-a-service, refill services, reusable systems, food-waste prevention services, consumption guidance	Food and non-food	tool library, borrowing service, refill point, reusable takeaway system, meal-planning support
Expand the lifespan	Life-extension service	repair, diagnostics, maintenance, spare-part services, refurbishment, second-hand retail, resale platforms, donation and reuse / redistribution / resale channels, repurposing	Mainly non-food	phone repair, bicycle repair, tailoring, refurbished device resale, second-hand shop

Annex C

Use waste as a resource	Recovery-oriented service	sorting, take-back, return points, collection logistics, recycling services, bio-waste collection, anaerobic digestion, nutrient recovery	Food and non-food	e-waste return point, packaging collection, producer take-back, bio-waste to biogas
Cross-cutting enabling role	Literacy / decision-support service	directories, maps, signposting, advisory services, one-stop support, repairability guidance, digital decision-support tools	Food and non-food	local circular service map, repair decision-support tool, hub-based information point

C.6 Main observations from the mapping

The mapping indicates that all three pathways are present in the mapped pilot ecosystems, but unevenly. The strongest current service landscape is found in **expanding lifespan**, especially in repair and maintenance, second-hand shops, reuse, and related life-extension services. **Buying less and using a smarter** pathway is mostly present in rent and sharing. By contrast **use waste as a resource** is present but less systematically developed in the current household-facing service landscape. Resource-recovery options are relevant, but often less visible as stand-alone services because they are embedded in municipal, retail, or producer-responsibility infrastructures.

From the provider perspective, the mapped ecosystem includes service roles that are not equally visible or equally developed. Life-extension services are often easier to identify as recognisable local offers. Prevention-oriented services may remain more fragmented or weakly signposted, while recovery-oriented services may be highly relevant but embedded in broader infrastructures rather than visible as stand-alone household-facing offers. **Cross-cutting enabling services, such as directories, maps, signposting, and decision-support tools, support all three pathways by helping households find, understand, compare, and start circular options.**

C.7 Limits of the annex

This annex does not provide a full inventory of all circular services and does not assess service effectiveness or impact. Its role is narrower: to provide a structured baseline view of the mapped service landscape and a provider-side interpretation of how visible services relate to the three circular pathways. The mapping is indicative rather than evaluative.

D1.4 - Annex D: Literature-based perspectives on circular services

Purpose of this annex

This annex provides a short literature-based grounding for how circular services are understood in D1.4. It does not aim to present a full literature review. Its purpose is to show that circular services can be interpreted through several complementary perspectives that are relevant for the Circ@Home context.

In D1.4, circular services are not understood only through labels such as repair, reuse, sharing, leasing, take-back, or recycling. They are understood through the functions they perform, the circular outcomes they support, and the conditions through which they enable households to act in practice.

The references used here are therefore treated as complementary conceptual lenses rather than as strict definitions.

Functional understanding of circular services

In D1.4, circular services are understood as service arrangements that help reduce resource use, retain product value, extend product lifetimes, or support circular handling of products and materials. This contribution may be direct, such as through repair or reuse, or indirect, such as through information, guidance, access, matching, or collection functions.

This means that circularity cannot be assessed only by the service type. It is also necessary to ask what the service enables, for whom, and under what conditions. A service may appear circular in name, but remain weak in practice if it is difficult to access, inconvenient, poorly connected to the local ecosystem, or too demanding for households to use.

For this reason, D1.4 combines environmental and service-related perspectives. Circular services are interpreted not only as resource-saving solutions, but also as enabling arrangements.

Complementary perspectives from the literature

Circular business model perspective

This perspective shows that circular services are part of broader business and organisational arrangements that support value retention and resource efficiency. It helps explain that circular services depend not only on household demand, but also on viable models of provision and support structures [S16].

Product-service system perspective

Annex D

This perspective highlights the shift from ownership-centred models towards use-oriented or service-based arrangements. It is relevant because it shows how services can extend product lifetimes and reduce material throughput, but also that not every service model is circular in practice [S17, S18].

Service ecosystem perspective

This perspective shows that circular services depend on wider ecosystems of actors, infrastructures, institutions, and coordination. In the Circ@Home context, this is important because circular services are shaped not only by the provider, but also by information flows, local visibility, trust, logistics, and the wider support environment [S13, S15].

Household-enabling perspective

This perspective focuses on the user side. It highlights that circular services must be usable in practice. Accessibility, convenience, clarity, trust, waiting time, and perceived effort all influence whether households take up circular options [S14].

Synthesis for D1.4

Taken together, these perspectives support a functional understanding of circular services. Circular services should be assessed not only by what kind of service they are, but by what they contribute to circularity and by the conditions through which they enable action in practice.

This is important in the Circ@Home context. The effectiveness of circular services depends not only on their environmental logic, but also on whether they are accessible, trusted, coordinated, and easy enough to use in everyday life.

This interpretation underpins the Synthesised Circular Services Model presented in D1.4, in which **service usability** and **ecosystem support** shape **readiness-to-do**, and thereby influence **household circularity**.

This definition provides a conceptual basis for D1.4. The practical contribution of different service configurations will be further explored through pilot implementation and later validation activities.

In Circ@Home, and within this conceptual model, a circular service refers to a service that helps households or other users reduce virgin resource demand, extend product life, intensify utilisation, recover value, or prevent waste, while making circular action practically feasible through trust, access, affordability, coordination and reduced friction.

References note

This annex uses the same reference base as the main D1.4 report. References cited here as [S13–S18] are listed in the main reference list of D1.4.