



SUSTAINABLE
FINANCE
LAB

CIRCULAR SERVICE FINANCE

Innovating Finance for the Circular Service Economy

In this paper

A Community of Practice (CoP) of: ABN Amro, Allen & Overy, ASN Bank, Avans Hogeschool, Circle Economy, EY, InnovestIT, InvestNL, PwC, Rabobank, Startgreen Capital, Stichting DOEN, Unclnc, Windesheim Hogeschool and led by SFL,

co-created innovative financial solutions for circular businesses that aim to do business in a different, circular, way and struggle to attract capital. The CoP looked at the role of the CiSE-platform, a tool that distributes circular value in a

different way. They found that it could support financing in various ways: by enabling data-based financing, but also completely new ways of financing.

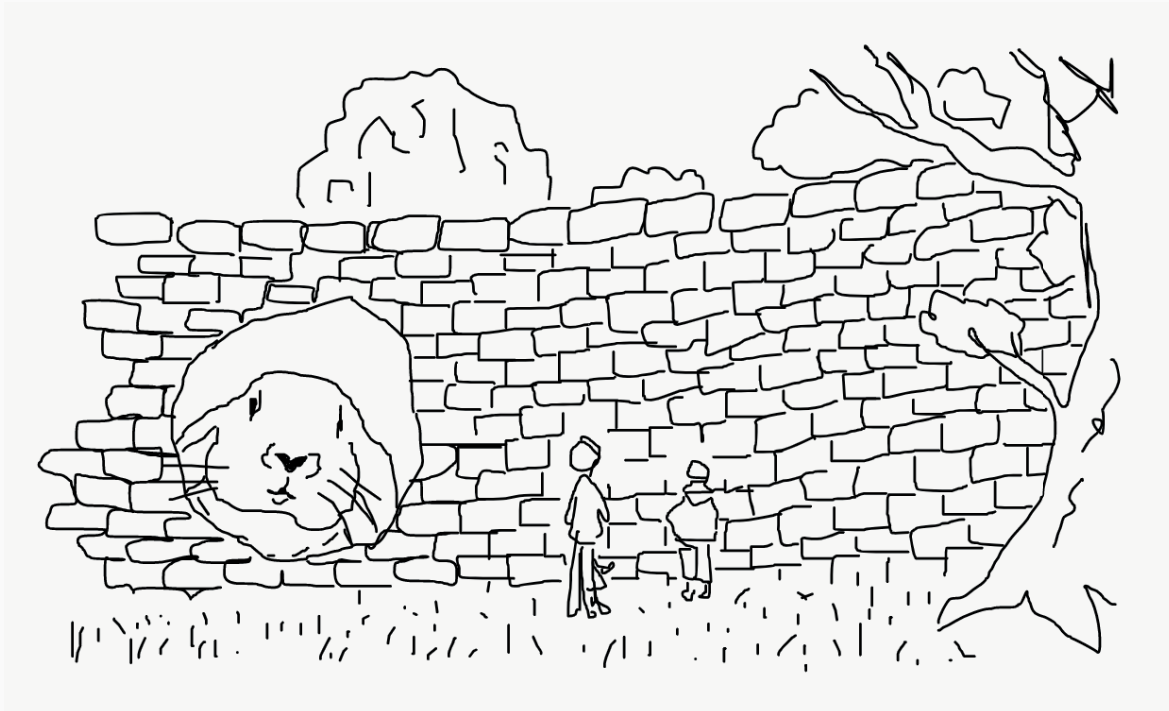
Elisa Achterberg

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INNOVATING FINANCE FOR THE CIRCULAR SERVICE ECONOMY



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Table of contents

KEY TAKE AWAYS	3
EXECUTIVE SUMMARY	4
1 - INTRODUCTION	6
2 - THE CIRCULAR FUTURE COMES WITH HIGH TRANSACTION COSTS	7
THE CIRCULAR SERVICE ECONOMY	
COLLECTIVE CIRCULAR SERVICES	
REDUCING TRANSACTION COSTS	
3 - FINANCE FOR THE CIRCULAR FUTURE	12
1. CiSe FACILITATES DATA-BASED FINANCING	14
2. NEW FINANCING FORMS THAT FIT THE CIRCULAR MODEL	16
3. RADICAL FINANCIAL INNOVATION: A CIRCULAR ASSET CLASS	18
4 - CONCLUSION	24
REFERENCES	26

EXECUTIVE SUMMARY

The Circular Future...

The European Union and the Dutch government both aim for a fully circular economy by 2050. In order to reach that goal, we need to *slow* the resource cycle by extending the life of products and *narrow* it by using fewer materials rather than only closing it by recycling them[1].

That is only possible if revenue models are no longer based on selling as many products as possible but are instead based on durability and optimal use of products. This is achieved by a completely different, circular, business logic—the *circular service* model, in which the user pays for the use of a product rather than for owning it.

...is associated with high transaction costs.

Whether a product is suitable for a long life of intensive use—the premise for business success in circular service models—largely depends on the quality and replaceability of all its parts and thus on the entire supply chain. The circular chain is only as strong as its weakest link. Ideally, all parties in the chain work together to optimize the performance of a product and are compensated for their part in that. This requires a high level of coordination between the companies collaborating in the chain and the end-users. It also means many small transactions between users that are paying for a unit of service, which can be, for example, per minute, per kilometre or per kilo, and must be divided among a large group of stakeholders. This leads to a high administrative burden for the management of contracts, and money material and information flows.

The CiSe platform can drastically reduce these costs...

In 2019, a consortium¹ investigated the role of distributed ledger technology in reducing administration- and coordination costs. We showed that these costs can be drastically reduced and importantly, the trust necessary for collaboration is significantly improved. These efforts resulted in the launch of the Circular Service (CiSe) Platform [2].

¹ The CoP 2019 consisted of Allen & Overy, ABN Amro, Bundles, Circle Economy, Rabobank, De Lage Landen (DLL), ING, Leystromen and Sustainable Finance Lab

CiSe automates payments and contract administration for entrepreneurs with a circular service model and distributes the payments across all chain partners without central party coordination. It creates a transparent ledger with detailed cashflow information per specific product. Large numbers of small transactions take place securely and become affordable. In short, CiSe is an important step towards upscaling circular service models.

In market research with ten circular service businesses, all these entrepreneurs were willing to invest time and effort to take their circular ecosystem to the next level, even if this did not lead to immediate (financial) results. Automating payments and administration was for most not an immediate concern but would become necessary with larger numbers of users. The most important requirement of the platform would be ease financing as it is still very difficult to attract funding for circular service businesses.

...but circular service models are still difficult to finance.

Circular service models have to date proved difficult to finance. Although they are conceptually similar to existing rental or lease constructions (periodic payments and the lessor is responsible for operation), there are some fundamental differences.

Circular assets can appreciate

The products offered in circular service propositions often have a relatively low capital value (e.g. headphones or washing machines as compared to cars and construction machines for lease). Circular assets can also be appreciating assets as they can increase in value and have residual value. This is different from traditional depreciating assets that are depreciated to zero over time or sold at the end of the lease. As residual value is uncertain and there are no valuation models for these types of assets, they are currently unsuitable as collateral in asset-based financing models, such as lease.

Balance sheets are 'blown up'

Entrepreneurs providing circular assets 'blow up' their balance sheets as those appreciating assets stay on the balance sheet for a long time. The business is burdened with the cost of owning thousands or even millions of assets.

Cashflows in hour by hour

Operational risks are quite different too. Cash flows depend on usage, sometimes even per minute, and are therefore highly uncertain. Since the underlying assets are not suitable as a primary source of collateral, underwriting needs to be based on cashflows or contracts. In order to predict future cash flows, a better grip on usage patterns is needed. This requires data.

Liabilities become complex

Finally, liabilities become complex, because responsibility for the used product is shared by users and service providers as product performance depends on several players in the chain.

This CoP: CiSe enables financing circular service models in three ways:

What can CiSe mean for the financing of circular service models? Can this refined data on all (small) transactions at the product level facilitate current forms of financing? Are new forms of financing possible? How can different finance providers make use of this information? This Community of Practice, consisting of **ABN Amro, Allen & Overy, ASN Bank, Avans Hogeschool, Circle Economy, EY, InnovestIT, InvestNL, PwC, Rabobank, Startgreen Capital, Stichting DOEN, Unclnc, Windesheim Hogeschool, chaired by the Sustainable Finance Lab**, identified three ways that CiSe contributes to better financing options for the circular economy:

i. Optimize existing financing models through refined data

The cash flow data generated by CiSe can be used to gain greater insight into usage patterns and asset performance, enabling the development and improvement of risk models, cash flow projections and contract information. Linked to market data, this can provide more certainty for financing a circular service model.

ii. New forms of financing

CiSe also makes fundamentally new forms of financing possible, whereby part of the payment by users flow directly back to the financier. Repayment becomes based on use intensity, so that the finance provider also has an interest in maximum use. The amount of the payment and the duration of the payments may

differ. As with equity participation, payment can be based on a profit model (depending on a certain performance) or, as with debt, payments have a fixed character (as soon as repayment and interest have been achieved, the loan is paid off) or it can be a combination of the two. The difference is that the asset is financed directly, not the company. Payments are per unit of use and therefore dynamic over time and cash flows are generated over the whole life cycle of the asset.

iii. A new circular asset class

The CiSe infrastructure makes a new circular asset class possible. Circular assets can be bundled in a basket to a portfolio of x-million assets, from headphones to washing machines. The return is financed from the cash flows generated by the circular assets. CiSe could act as an investment vehicle, enabling everyone to participate in this fast-growing sector. Greater diversity is possible: from users investing their savings to institutional investors investing directly in circular assets. A different perspective on scale is also possible: assets are bundled beyond individual entrepreneurs, manufacturers, or even supply chains, into portfolios of assets with risk profiles matching the preferences of the investor.

Let's experiment!

This could be the future of circular financing! The next step is to start experimenting by having circular service businesses use the CiSe platform for payment and contract handling, piloting different types of assets. Finance providers can encourage them to participate. They have many trusted clients and a need for an infrastructure to facilitate circular finance. With the data that is generated, models can be developed to more accurately predict usage and cash flow patterns and provide insights into the financial life cycles of circular assets. New financial models can then be structured and piloted. Will you experiment with us?

1 - INTRODUCTION

WHY THIS COMMUNITY OF PRACTICE?

To achieve the ambitious goal of a fully circular economy in 2050 we need new revenue models (PBL 2021). Models that are no longer based on selling as many products as possible but based on durability and optimal use of products. A promising business model that provides the best incentives for this are circular service models, such as Product-as-a-Service or pay-per-use models, in which paid is for the use of a product rather than owning it.

Whether a product is suitable for a long life of intensive use – the premise for success in circular service models - largely depends on the quality and replaceability of its parts and thus on the entire supply chain. The circular chain is only as strong as its weakest link. Ideally, all parties in the chain work together to optimize the performance of a product and are compensated for their part in the functioning of the product. This requires a high level of coordination between collaborating companies and end-users. It also involves many small transactions, paid by many users, to be divided among a large group of stakeholders. This combines to high administrative burden for the management of contracts, money- material- and information flows. These administration costs and coordination costs can be drastically reduced by using distributed ledger technology, see box.

INNOVATE FINANCE FOR THE CIRCULAR SERVICE ECONOMY

This white paper is a result of the Community of Practice 2020/2021 and is a follow-up to the COP 2019 (see box). This CoP investigated the possibilities of CiSe to improve finance for circular service companies. The community consisted of a mix of financial expertise: various types of investors, experts in project and asset-based finance, accounting, crowdfunding, purchase-to-pay automation, supply chain finance and legal expertise.

Although circular service propositions are not yet perfectly circular and often still small, we believe that it is important to start taking steps to improve and facilitate growth of this new circular business logic. Reduc-

ing transaction costs and standardizing contracts through the Circular Service (CiSe) platform are an important first step. However, these businesses are still difficult to finance, an important barrier for them to strengthen and grow.

Through handling payment and contract administration, the CiSe Platform generates minute cash flow data. These cashflows are earmarked per product and detail all payments from users to stakeholders in the value chain. Products can be cars, scooters, phones, anything from small consumer goods to large business appliances.

This CoP came together to answer the following questions:

- Can detailed cashflow data and contract information provide finance providers with more confidence to support current financing models?
- How can different finance providers – such as banks, impact investors, or even institutional investors - use this data?
- What new forms of financing are possible?

THIS WHITE PAPER

This paper gathers and summarises the findings of the CoP. In chapter 1 the circular service economy is described and illustrated with concrete business cases and followed by a summary of how the CiSe platform works. In chapter 2 the financing challenges of circular service companies are discussed—together with the results of this CoP: three ways CiSe could improve access to finance for circular service models. In chapter 3 we discuss our conclusions.

CoP 2019 “THE CIRCULAR SERVICE PLATFORM”

The CoP 2019 investigated the role of distributed ledger technology in reducing administration- and coordination costs. Not only can these costs be drastically reduced, it can also create the necessary trust for collaboration. These efforts resulted in the launch of a testable prototype of the Circular Service (CiSe) Platform. The lessons learned and the underlying legal Code of Conduct can be found in a [white paper](#).



2. THE CIRCULAR FUTURE COMES WITH HIGH TRANSACTION COSTS

THE CIRCULAR SERVICE (CiSe)-ECONOMY

In the linear economy we extract raw materials from the earth, make them into products and sell them to users. After a short life these products are thrown away, destroying all added value, and destroying the environment. The revenue model: sell as many (nearly broken) products as possible—a race to the bottom. This model rests on the flawed assumption of infinite access to raw materials. We need a new economic mindset: a circular mindset.

In a circular economy, resources are treated with care and remain functioning as long as possible. They are repeatedly re-entered into the system to create value again and again. This is not just about preventing waste by recycling, but about minimizing energy and resources while keeping resource value as high as possible for as long as possible. This is illustrated in the Value Hill, in Figure 1.

There is a new business logic for this circular future: circular service models (Achterberg 2019). In a circular service model, a product is offered as a service. The end-user pays for the usage of the product, and the service providers remain owner and responsible for the product(s) required to offer the service. The aim is to maximise long-term cash flows while minimizing costs for maintenance, resources, energy, and consumables.

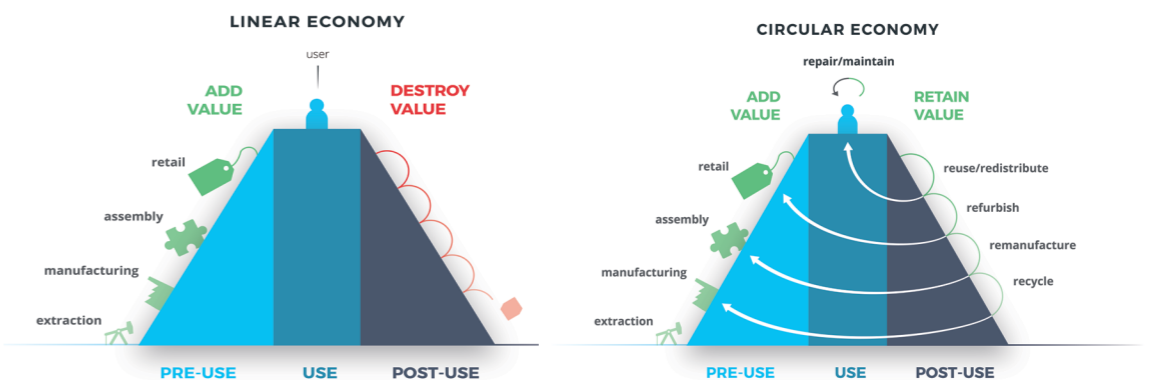


Figure 1 - The Value Hill. Source: Achterberg, Hinfelaar, and Bocken (2016)

69

Currently, circular service models are mostly adopted by sustainably conscious consumers, expats, or students [ref]. An important barrier for reaching a larger market is that circular service businesses need to operate in a linear market, in which cheap disposable products are the standard. To aggravate matters, high transaction costs and short-termism in financial markets make it impossible to offer excellent circular services for a competing price. Therefore, lowering transaction costs and persuading financiers to consider long term cash flows are key for the circular market to develop.

Circular service models, such as *pay-per-use* business models currently grow fast in the mobility sector but are also gaining traction in other sectors as retail and consumer goods[3]. A significant barrier for success is the current non-aligned incentives of supply chain partners still operating with a linear mindset. A collective circular mindset and service model is needed, in which services are offered collectively by supply chain partners. But this does require an infrastructure to provide the necessary transparency, trust, and administration.

COLLECTIVE CIRCULAR SERVICES

A circular state integrates many products and services. A full-service proposition involves hardware (e.g. washing machine), consumables (e.g. laundry detergent, water, energy), and supporting services (e.g. maintenance, logistics). To optimize life-cycle performance, the full-service provider leans heavily on other actors in the chain.

Ideally, the incentives of all parties are aligned to shared responsibility for the functioning of the asset. One way to do that is to compensate each provider for its performance in achieving the pay per use model—a service model throughout the whole network. In a collective circular service, an innovation at one point in the network benefits all participants directly. This is illustrated in Figure 2. All participants need therefore to be ready to share risks and benefits collectively.

We believe that with a pay-per-use business model manufacturers are stimulated to design devices for long-term use. At the same, users can be incentivized to use the devices as economically as possible”.

– Nancy Bocken, Co-founder, Homie

HOMIE: PAY-PER-WASH

Homie offers washing machines and dryers in a pay-per-use model. Prices differ according to sustainability of the washing program: €1 for a 30°C wash, €1,50 for 40°C and €2,50 for 90°C. Nudging users towards more sustainable consumption is at the core of Homie’s mission. A tracker is placed in all washing machines, which, connected to the customers’ WiFi network, enables Homie to monitor usage remotely and charge the user accordingly. In addition, Homie envisions stimulating manufacturers to develop products suitable for long-term (re-)use. Homie recently extended their business proposition with pay-per-use refrigerators, freezers, vacuum cleaners, ovens, irons, and ironing boards.

Homie’s business model has been studied by a number of academic research projects. In a longitudinal study to assess whether consumption patterns of washing significantly changed after implementing a pay-per-use business model, N. Bocken et al. (2018) found that the total number of washes and washing temperature decreased significantly.

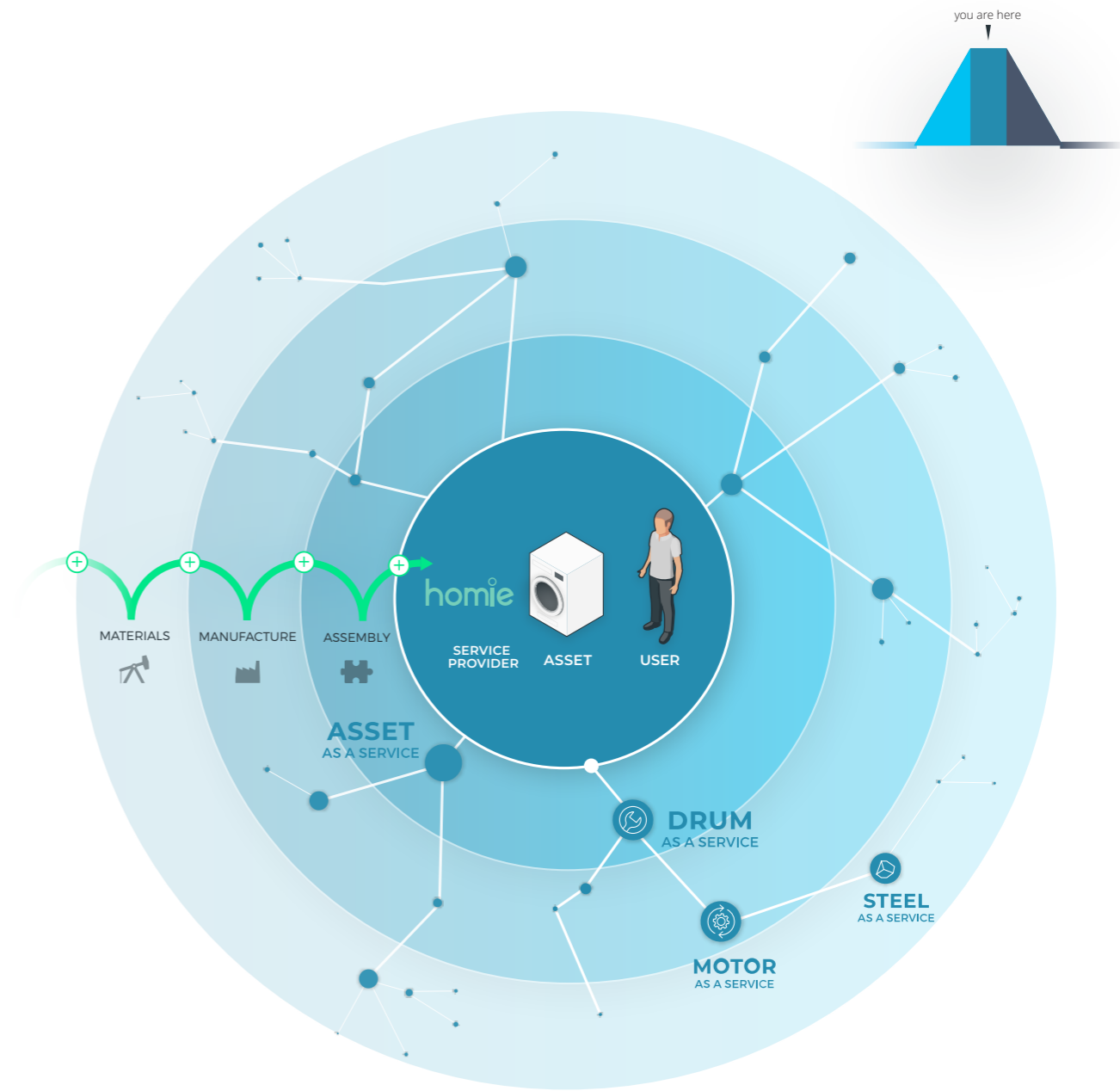


Figure 2 - The top of the Value Hill: Collective Circular Services. Adapted from: Achterberg (2019).

Collective circular services can only work if there is trust and openness in the network. This is where the Circular Service Platform (CiSe) comes in. CiSe is a payment solution for circular service providers. It acts as a decentralized digital administration system allowing improved scaling through replicable and affordable legal structures.

CISE REDUCES COSTS

Let’s take the example of Homie, (see box on the previous page). A user subscribes to the washing service and a digital wallet is created in the user account. The balance in the wallet can be used to distribute payments for units of all the necessary services in the network. The CiSe wallet can be charged sums smaller than €0,01, e.g. to pay the water supplier for one washing cycle. Note that the network is ideally structured so that the portion of the fee dedicated to water use is paid from the wallet to the provider that has the largest influence on water consumption. In other words, incentives are placed at the right place.

After verification, two contracts are cryptographically signed by the user: (1) the use contract states the price and use terms of the washing service and (2) the token contract states the terms of the wallet charges. The washing machine is placed by the service provider, at home or in a shared location. The customer is linked to the asset, for example through scanning a barcode. When the appliance is used within one household, this only needs to happen once. In a shared location this needs to happen every time the asset is used. Now the user can start consuming units of service—doing laundry—and payments from the user's wallet to the service providers are automatic. The customer journey is illustrated in Figure 3.

This payment is automatically distributed, via smart contracts, to all companies involved in the service, see Figure 4.

The design of the platform protects data of all stakeholders involved. CiSe takes a stakeholder (rather than shareholder) perspective. If you participate in the platform, you participate in the commonly shared infrastructure and are jointly responsible for control and governance.

The Code of Conduct of the platform requires that only circular service entrepreneurs that are actively working on increasing circularity are eligible to join the platform. All are required to contribute to slowing, narrowing, or closing the resource loop. That also means, for example, that all entrepreneurs offering circular washing services are allowed to join—improving competitiveness of the circular market. For more information on the design and technical infrastructure of the platform, refer to Achterberg (2019).

This model has been successfully tested with [coffee makers](#), [cars](#) and milking robots and can be applied to all sorts of service networks, such as electric scooter see box on page 11.



“We try to establish a direct link between energy efficient usage and economic benefits for the customer”

– Nancy Bocken, Co-founder Homie

CUSTOMER JOURNEY

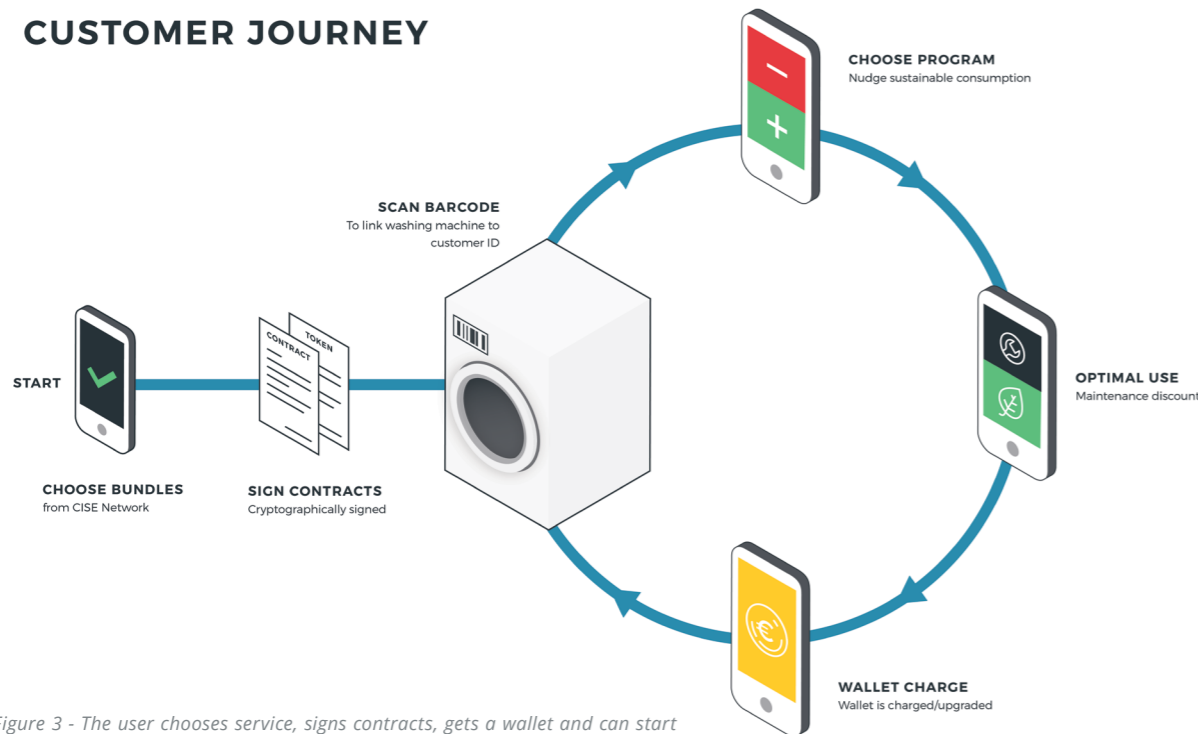


Figure 3 - The user chooses service, signs contracts, gets a wallet and can start using the asset. Adapted from (Achterberg 2019).

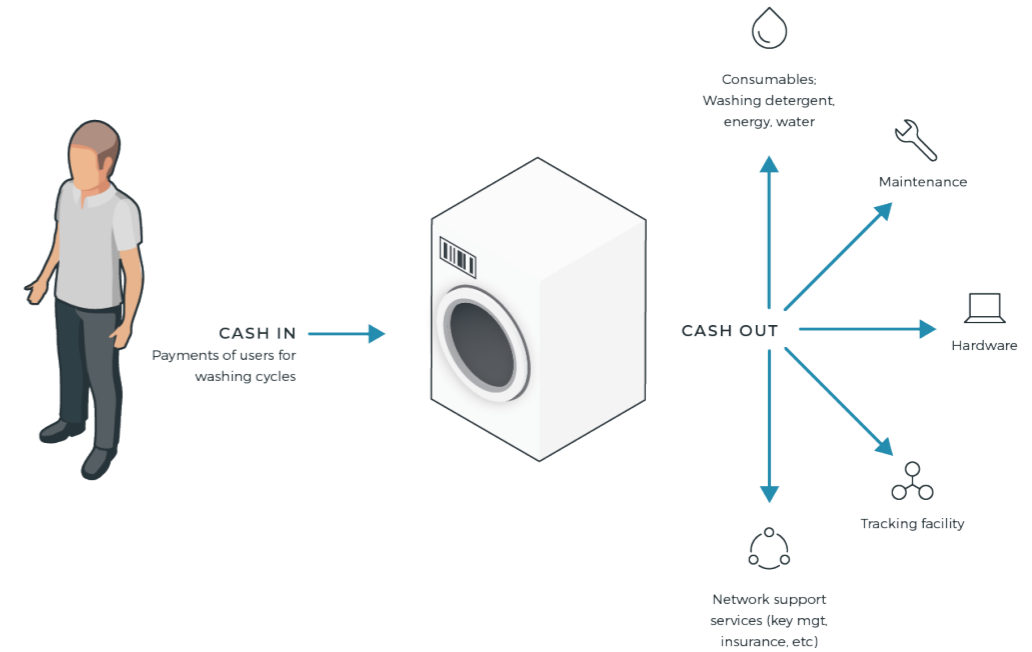


Figure 4 - CiSe a payment platform for the collective circular service economy

In interviews with ten circular service businesses, most indicated that they would invest time and effort for the development of initiatives such as CiSe. They felt responsible for taking the circular ecosystem to the next level—even if this did not lead to immediate financial gain. Most businesses interviewed were scale-ups for which automation of the administration was not an immediate concern but would become indispensable as scale increased.

The sector that seems to be most ready or already engaging in data-driven, Internet of Things (IoT) based

solutions, is Mobility. Mobility services—with large numbers of assets—have inflated balance sheets, have the most uncertainty in payments (e.g. pay-per-minute) and have the greatest diversity in users. Their pay-per-use propositions need to track and record actual use, so they rely on a technological infrastructure.

That said, by far the most important consideration for these entrepreneurs is the potential for a CiSe platform to ease attraction of funds to grow their business. Funding is still the largest barrier to scale.



FELYX: ELECTRICAL SCOOTER SHARING

“If you calculate well, paying per use is cheaper than owning some thing, considering depreciation, maintenance, services and all that”

– Shawn Pantophlet, Corporate Finance manager at Felyx

Felyx offers shared electric scooters to consumers (B2C). With an app you can locate, reserve, and activate the nearest e-scooter. You pay per driven minute. When you want to park the scooter and return to it later, a reduced parking fee is charged. A scooter can also be reserved, of which the first 15 minutes are free. Felyx currently operates in 12 cities, in 3 countries with a fleet of 5,500 scooters.

As with other sharing propositions, the scooter's use determines its revenues. The most important part of Felyx's operations, then, is to make sure that the scooter is clean, that the tires have the correct pressure, and that the battery is always fully charged. Felyx is a data driven company. All scooters are connected and provide real time data on all relevant metrics.

WHAT DOES CISE YIELD?



FOR CIRCULAR SERVICE PROVIDERS

- A *circular service* business model becomes easier to implement;
- CISE facilitates to collaborate with suppliers who are also encouraged to take responsibility for product performance and waste;
- End-users can be encouraged to adopt sustainable behavior;
- It becomes easier to tap funding sources for a *circular service* model;
- It contributes to changing and improves competition with the current linear business logic;
- (Small) entrepreneurs can easily enter the market through standardization of legal, social and financial infrastructures;



FOR SOCIETY

- A more citizen-based financial system becomes possible as citizens are empowered as lenders and investors to participate directly in circular assets;
- A larger group of people will have access to sustainable (durable and circular) products without the need to incur debts;
- Flexibility and mobility are increased by contracts that can be terminated;
- Opportunities for improved insurance of (basic) assets (such as a washing machine) arise;
- Opportunities for offering new bundles of services arise, such as combining energy and internet in the same service;
- Revenues and risks are made transparent and are more fairly distributed;



FOR FINANCIERS

- Using the generated data, insight is gained into usage patterns and asset performance, providing more accurate cashflow projections and risk estimations;
- More certainty is provided to finance *circular service* models;
- Complex ownership relationships become transparent, traceable and controllable;
- New financing forms can be created that extend the circular incentive to the financier and allows finance providers to invest directly into circular assets;
- New ways are created to diversify risks and create a large circular asset portfolio;

The following chapter sets out how finance providers can use the CISE platform for innovating finance for the circular service economy.

3 - FINANCE FOR THE CIRCULAR FUTURE

FINANCING CISE MODELS IS STILL A CHALLENGE

While previous research shows that the Dutch financial sector can play a critical role in accelerating the circular transition (EMF 2020; Achterberg & van Tilburg 2016), there is still a large funding gap for circular innovation (e.g. Corbin et al. 2021; European Investment Advisory Hub et al. 2019; van Tilburg et al. 2018). Circular service models, specifically, have proven to be difficult to finance.

One of the main hurdles for circular service models is the need for capital to finance operating assets. While incoming cashflows are spread over time (i.e., the product is no longer sold, but fees are paid by the customer for using the product), initial investments in the operating product are still needed. Although this conceptually may seem similar to existing rental or lease structures (a periodic or a use fee is charged for a product), there are some fundamental differences.

1. Circular assets can appreciate

Circular assets are appreciating assets as they can increase in value (through upgrades and maintenance) and have a residual value when they re-enter the supply chain. This is different from traditional depreciating assets that are depreciated to zero over time. To aggravate matters, the products offered in circular service propositions often have a relatively low capital value (e.g. headphones or washing machines versus more traditionally leased assets such as cars or construction machines). Due to the absence of suitable valuation models to estimate the (residual) value of the underlying asset, circular assets are currently often perceived as unsuitable as collateral.

2. Cashflows are usage based

Operational risks are different too. When the underlying assets are unsuitable collateral, underwriting needs to be based on cash flows or contracts. However, incoming cash flows depend on the amount and periodicity of usage—which depend on changeable behaviour patterns—and are therefore more uncertain. Financing requires better predictions of future cash flows and user behaviour.

3. Liabilities are complex

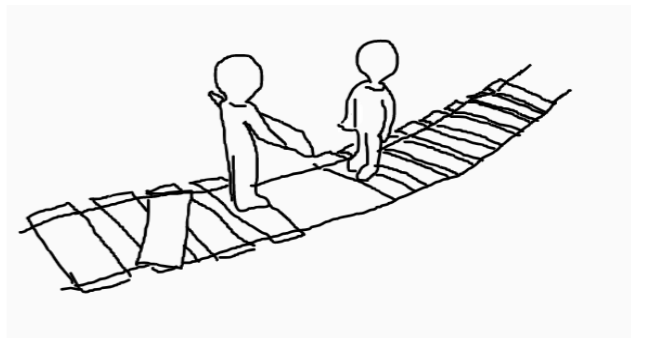
The more stakeholders involved; the more complex liabilities become. In a linear sales model, ownership and responsibility are simply pushed forward, up the Value Hill towards the peak, the end-user. When functioning of the asset becomes a shared responsibility between multiple stakeholders (the whole supply chain, service providers and users), liabilities need to be clearly stated, communicated, and enforced.

4. Balance sheets blow up

Providing assets in a usage model expands the balance sheet—those assets stay on their balance sheet. As a result, they are burdened with the cost of owning thousands or even millions of assets.



“Investors, let’s bridge the gap between linear and circular – else, there will be no bridge left!”
- **Guy de Sevaux**, Senior Advisor Circular Economy & **Maud Hartstra**, Business Developer, Invest-NL



FINANCE NEEDS TO ADAPT

More knowledge is needed of changing asset values, usage and cash flows, responsibilities in the supply chain and the impact of scaling on balance sheets in order for financiers to better assess the risks and opportunities. Until then the lack of access to affordable capital to invest in scale will cause circular service businesses to struggle to be profitable. Although many of these businesses are still in an early phase, are small and are not yet perfectly circular it is important to start taking steps to facilitate this new business logic.

Some finance experts believe that the most likely financing model for circular service models is for manufacturers to keep fleets of circular assets on their own books and lease them to operators. However, we believe that, in order to reach the necessary ticket size and diversification, the perspective needs to shift beyond the individual entrepreneur or manufacturer—even beyond supply chains.

Manufacturers are often merely assemblers: many other actors are involved in the manufacturing process to provide components, parts and processes leading to a final usable product. Responsibility for longevity, circularity and environmental impact therefore needs to be taken by the actors with the biggest influence on that. Two scenarios are possible: (1) manufacturers grow large and integrate their entire supply chain vertically or (2) an infrastructure is developed that allows all actors to connect, facilitating collaboration between small and large players and sharing risks and returns. CiSe facilitates the second scenario which has the advantage of preserving competition and does not lead to a further concentration of power in society. But this does require a new vision and innovations in finance to fit this equitable and inclusive circular future.

HOW CiSe SUPPORTS FINANCE

But what can CiSe do for the financing of circular service models? Can this more granular and specific data on small transactions support current forms of financing? And which new forms of financing are possible? How can different finance providers make use of this information?

As we will see in the following sections, the Circular Service platform can play an important role in revolutionizing finance for the circular economy. This CoP distinguished three ways for CiSe to support financing circular service businesses. They range from optimization of current financing forms to more radical financial innovation:

- 1. CiSe facilitates data-based financing**, improving existing financing models by using data that is generated by CiSe to create insights in usage patterns, cashflows, asset performance and circular impact.
- 2. CiSe enables new financing forms that fit the circular model** by directly transferring part of the payment from users to the financier. Repayment schemes can be based on a profit model (as for equity) or fixed properties (as for debt). The main differences are that (i) not the company, but the asset is financed directly, (ii) repayments are per cycle of use and dynamic through time, (iii) cashflows are generated over a long period of time
- 3. More radical financial innovation is possible by creating a circular asset class.** As circular assets share similar properties, they can be bundled into a new asset class. CiSe can act as an investment vehicle to create a portfolio of x-million assets, from headphones to washing machines that generate continuous cashflows. Everyone can participate in this fast-growing sector: from users who want investing their savings to institutional investors who can invest directly in circular assets.

In subsequent paragraphs we elaborate these three.

CiSe FACILITATES DATA-BASED FINANCING

The ledger underlying the platform records usage, user and payment data generated by a specific asset. This data can be used in models and presented to create insights for investors to support financing decisions and enhance the *financeability* of circular service companies. The data provides more information on assets and user behaviour as well as insights into the revenue generating capacity of assets.

Bundles, a pay-per-use washing service, has developed smart ways to extract valuable information about the usage of its washing machines, solely from energy information. By analysing energy patterns, insights were gained into user behaviour and asset performance, see box.

The COP addressed the following questions: **what can payment patterns tell us about the risks and opportunities of investing in circular assets?** How should this information be displayed? How can financiers make use of this data?

The findings are summarized in this chapter.

To think beyond traditional financial models, we need to be creative. The minimum data generated by CiSe is simple:

- 1. Unit** of service: washing program, coffee type, minutes/kilometers driven, lux, etc.
- 2. Price** per unit of service and corresponding distribution scheme to compensate all service providers.
- 3. Time** of consumption: when the unit of service is consumed.
- 4. Who** is paying (the user), and who gets paid (service providers).
- 5. What** asset is providing the unit of service.

With this simple, short list of data points, valuable information can be extracted, of which examples will be given below. When combined with external data, intelligence on circular markets can be developed.

Note that privacy and security are of utmost importance when collecting data. Data handling must above all be secure so that entrepreneurs feel comfortable doing their administration in CiSe and so that there is sufficient trust to stimulate collaboration between service partners and sufficient trust to finance them.

What energy patterns tells about a washing machine

Bundles is a company that provides customers with the service of 'clean laundry' through access to a long-life washing machine. Customers are charged a fixed fee per month and a variable fee per washing cycle (pay-per-use). Washing machines can be shared within a community or used by single households.

As Bundles is responsible for installation, maintenance and replacement of the machines, intelligence on asset performance is essential. Just monitoring energy usage provides valuable information. By analysing energy patterns information is gathered on dosage, sorting, washing programs and other relevant information. For example, a specific energy pattern reveals that the machine is pumping. When the pumping time is too long, this means that too much laundry detergent is used. This can be directly communicated to a user. Similarly, sudden increases in energy usage signal a maintenance event, such as the need to replace a filter. All this information is derived solely from energy usage.

Statistics gathered from the machine are translated into tips and insights to reduce the overall cost of doing laundry, including energy, water and detergent consumption.

FINANCIAL DATA DASHBOARDS

Information needs of financiers change through the various financing stages: *screening* for opportunities, *valuing* the investment's collateral and *monitoring* investment performance and risk exposure.

From the data generated by CiSe, dashboards can be developed to display performance of assets and users. If information is not (yet) available for a specified asset, due to a lack of history, estimates can be based on benchmarks of similar assets and user types. From historic data and benchmarks, future cashflow projections can be modelled, as well as volatility reports or use patterns. Combined with (exogenous) information on market dynamics such as market prices of assets or resource prices, valuable insights can be gained into collateral value and environmental impact.

An example dashboard showing an overview of asset information is depicted in Figure 5.

These dashboards can be developed further so that, post transaction, investment managers and analysts could select assets made possible by their investments and monitor the performance of their own portfolio and operating milestones (e.g. reaching pre-specified targets). Abnormalities and losses can also be monitored. Information can be presented in various levels. For example; portfolio level, sector level, security level or asset level—if there is a need for more detailed information.

CiSe generates new types of information. This opens up an opportunity to develop new perspectives on asset performance, use patterns, contract information and (re-)marketability of assets. This can improve risk models and corresponding risk profiles for an optimal financing mix.

An overview of information on a selected asset of interest is presented in Figure 6.

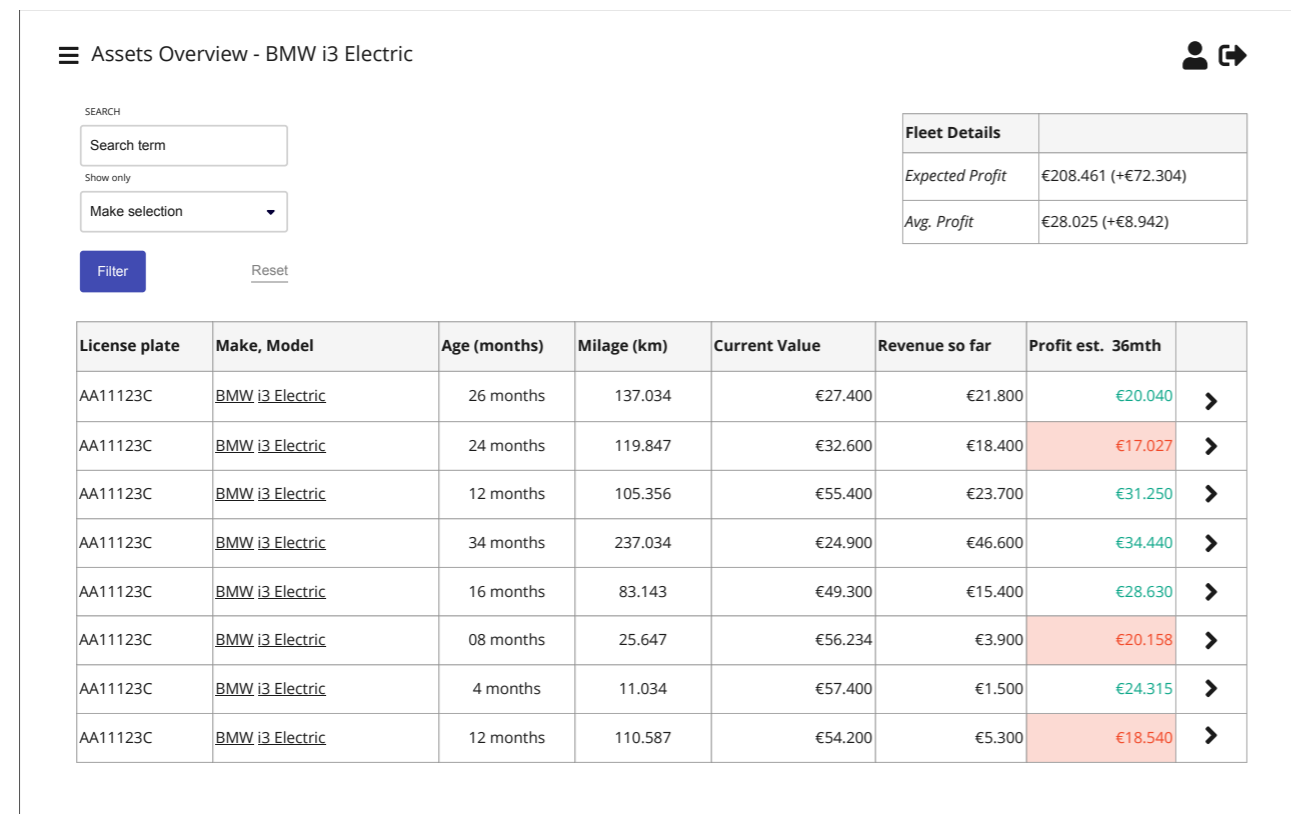


Figure 5 Illustrative dashboard of asset information of electric cars. Design: Unc Inc.

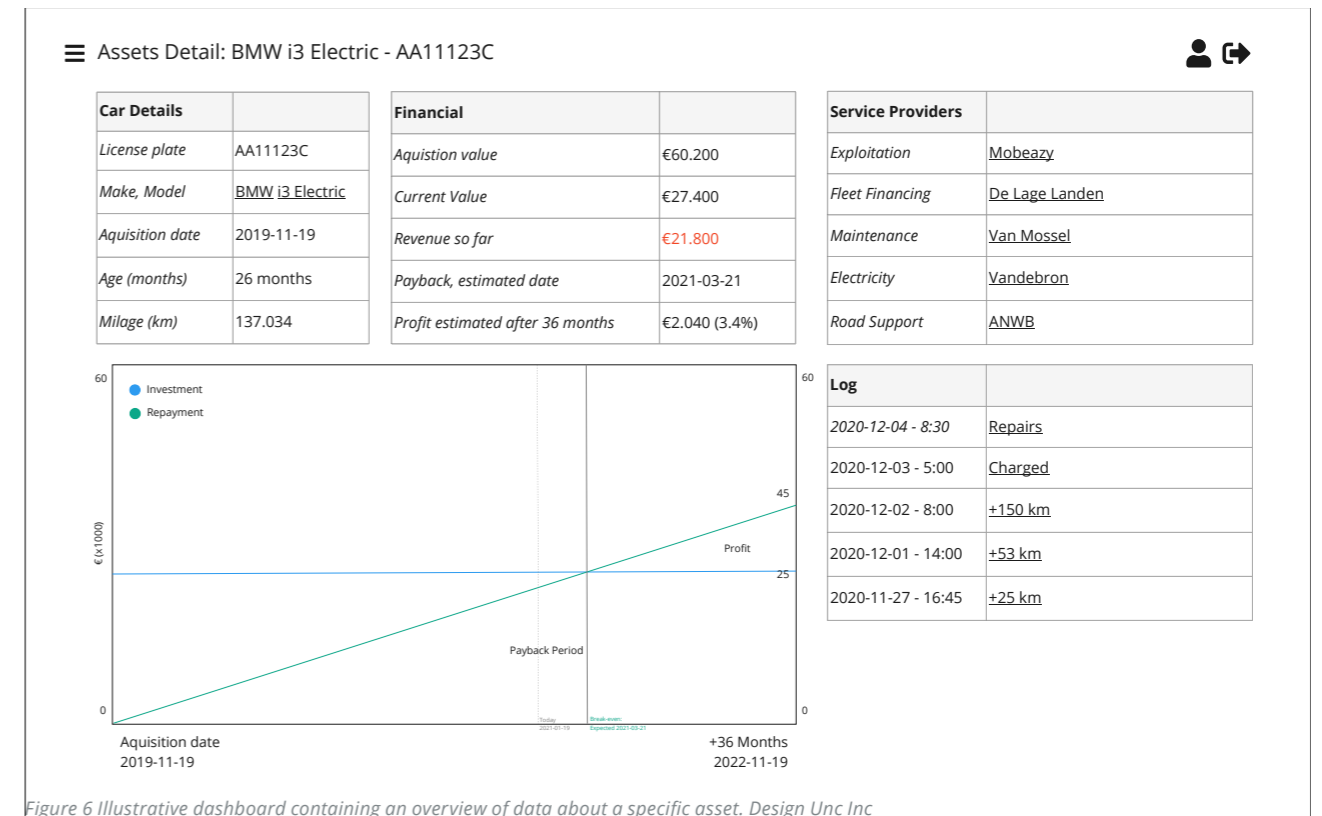


Figure 6 Illustrative dashboard containing an overview of data about a specific asset. Design: Unc Inc

IMPACT INDICATORS

Impact information can also be displayed. For example, analysis on whether price incentives in the proposition lead to targeted sustainable consumption effects.

Narrowing the resource loop

An indicator for narrowing the resource loop is to compare the number of users of the asset to a relevant benchmark (e.g., national average). Sharing of assets by several users indicates a (potential) for fewer assets. Similarly, data on parts replacement of parts can help waste prevention, and is more valuable when compared to a relevant benchmark.

Slowing the resource loop

Asset performance can be compared with market figures, to indicate to what extent the resource loop is slowed as a result of lifetime extension compared to average lifetime of similar assets.

Closing the loop

Repairs and the re-allocation of assets into a new contract can indicate waste reduction or prevention—closing the resource loop.

CO2 consumption in the use phase

CO2 consumption in the use phase of a product can be easily measured by using existing knowledge of CO2 consumption combining it with usage data generated by CiSe.

FINANCIAL ASSET INFORMATION

Financing details can be specified per asset. E.g. total or periodic revenue generated, information about the financing mix (distribution of finance providers) or the percentage of the fee that is attributed to debt service. Various ratios can be extracted from the data, such as profitability ratios (e.g. return on investment) or other relevant ratios (solvency, risk exposure etc.). This data could be extended with external data on credit scores of users or service providers.

ASSET PERFORMANCE

A dashboard with specific asset information is shown in figure 7. This dashboard displays data such as asset value, age, idle time, a log with relevant maintenance events and can potentially be extended with market information from external databases.

This data can be fed into models to project underlying asset value, average residual value and the asset's capacity to continue generating revenue.

USAGE AND USER PATTERNS

User information can be extracted from the data, providing insights into user patterns, historic usage, and predictions of future expected usage. Other possibilities are: information about use of different product types, contract information and analysis of the impact of sustainable pricing schemes, payment behaviour or comparisons to usage of benchmark assets. This is illustrated in Figure 8.

☰ Asset Value: Washing machine Miele WSD 663

5 maintenance events (details) €575 current value (details) 4% of time in use (details)

Asset Details		Financial		Usage	
Type	Washing machine	Acquisition value	€1000	Time idle	96%
Make, Model	Miele WSD 663	Age	5 years 7 months	# of users	2
ID	MIE663.5311	Current market value	€575	# previous contracts	1
Acquisition date	21-01-2016	Average residual value	€600	Total # of uses	620 (details)
Start of current contract	19-04-2019	Material value	€50	Household, Irregular user	more details

Asset value over time

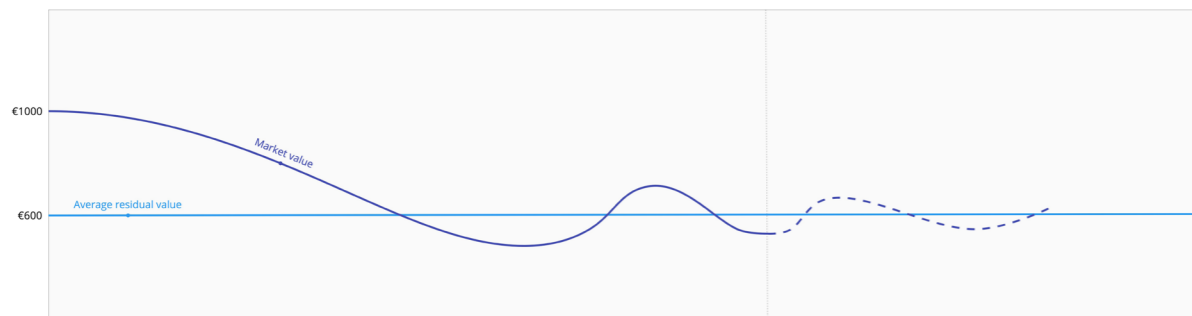


Figure 7 Illustrative dashboard for details on asset value. Design Unc Inc

☰ Assets Detail: User and contract - Washing machine Miele WSD 663



Usage current user		Contract information	
Total # of uses	620	Product type	30 degrees, 40 degrees, 60 degrees, 90 degrees, express
Type of user	Household	Prices	€1; €1.20; €1.40; €1.60; €0.80
User profile	Irregular user	Sustainable consumption	Free wash for maintenance program; Pricing scheme based on sustainability of use;
Total revenue user	€1240	Cancellation period	3 months
Average uses <input type="button" value="Per day"/>	0,6	Loyalty incentives	Automatic extension; Discounts for renewal;
Average time per use	94 min.	Stabilize cashflow	Commitment minimal use: 4 washing cycles a week;
Timely paid	100%		

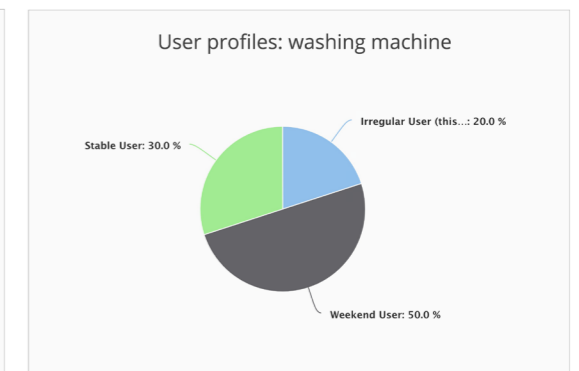
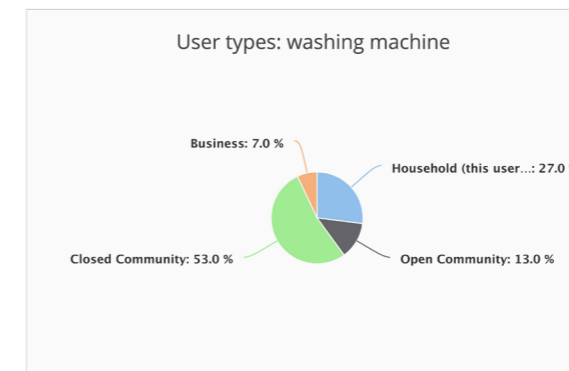
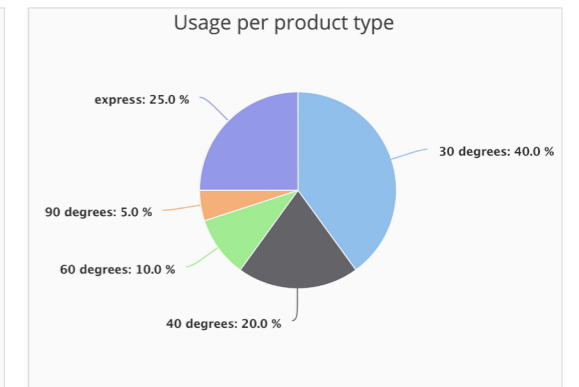
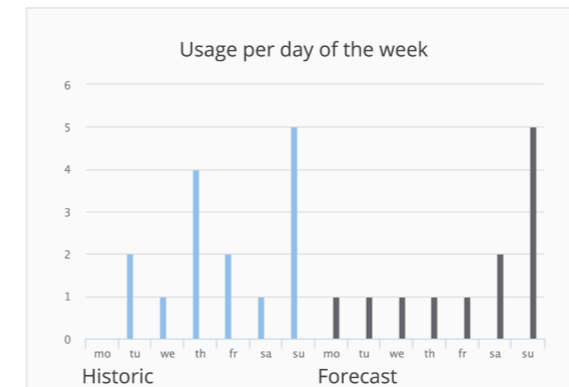


Figure 7 Illustrative dashboard with user data per washing machine. Design Unc Inc

NEW FINANCING FORMS

A number of financing structures appear to fit circular service models. In practice, however, there are issues. In this chapter we discuss the most important ones with their drawbacks. Then we discuss the CiSe financing model, showing how it borrows from existing debt and equity structures to create a new financing form that fits circular service models well.

CURRENT FINANCING FORMS DO NOT FIT

Operating assets (working capital) needed in circular service models can be financed by loan or by extending a line of credit. Asset-based loans are agreements that secure the loan via collateral (e.g. equipment, property, accounts receivables, or inventory) owned by the borrower.

Lease is an example of asset-based finance. In this financing form, underwriting is substantially based on facts and figures about the value of the underlying asset. Assets underlying circular service models, due to their improved circular performance, often lack historical data on their long-term residual value. Circular assets are durable and therefore often more expensive so the time required to repay the initial investment is longer. To make matters worse, in case of default, these assets are often costly to collect, especially in B2C markets. As a result, circular assets are often deemed unsuitable collateral for a lease. This risk can be mitigated if other market players are available to take over the assets as part of a running business. (Toxopeus, Achterberg, and Polzin 2021).

Generally Accepted Accounting Principles (GAAP) require either the transfer of assets to the lessee (capital lease) or require a short lease term (operating lease). In contrast in circular service models ownership and responsibility is retained by the service provider(s) (i.e. no transfer of ownership) and cashflows are anticipated over a long term in which the expected useful life of the assets may be continuously extended. Note that the IFRS 16 Accounting Standard no longer makes a distinction between operational and financial lease. Under the new IFRS rules, the asset will appear

on both balance sheets of lessor and lessee when the asset is part of the core activities of the user (lessee).

Many circular service companies serve the B2C market, so lending policies for consumer credit need to be considered. Consumers must be protected by flexibility to opt out of a subscription if they can no longer afford it, and by credit registration of long-term commitments.

Purchase order financing provides upfront capital for asset finance directly to the asset provider (e.g. the manufacturer). In this financing form, cash flows from the users are paid directly to the finance provider, which deducts financing costs and fees and remits the balance to the service provider. This is similar to the CiSe financing model, as will be discussed below. It is, however, less efficient as payments must be remitted manually.

Project Finance is an example of *cashflow-based financing* and is technically very similar to the CiSe financing model. In Project finance long-term infrastructure or industrial projects are financed using a non- or limited recourse financial structure¹. Financial liabilities are met from cash flows that are generated by the project. Secondary source of collateral are the project's assets, rights, and interests².

The CiSe financing model is similar to the extent that relationships between large groups of stakeholders are long-term and revenue streams are uncertain. Stakeholders involved in providing the circular service can only lay claim to the cashflow that is generated by the specific asset they are invested in, in other words also non-recourse. Finally, a specific product provided in a circular service contract, for example a washing machine, is treated as a limited-liability Special Purpose Vehicle (SPV-an isolated risk entity).

¹ A debtor with a non-recourse loan cannot be pursued for any additional payment beyond the seizure of the asset.
² <https://www.investopedia.com/terms/p/projectfinance.asp#:~:text=Project%20finance%20is%20the%20funding,flow%20generated%20by%20the%20project>

A key difference with project finance, however, is that the underlying assets in circular service models are characterized by a (very) low capital expenditure, unlike large infrastructure projects. Project Finance traditionally requires detailing liabilities in long-expensive—contracts. This is normally only feasible when the underlying assets have a high value. The standardization and automation of contracts provided by CiSe can be used to meet this requirement.

CIRCULAR ASSET FINANCING NEEDS A NEW FORM

To finance operating assets in circular service models, it would be desirable to:

1. Secure the loan primarily with expected cash flows (or contracts). This way, companies are essentially borrowing from a portion of their future cash flows that are generated by the assets. Payment schedules are based on the company's future cash flows. This type of backing is generally used today for companies with few physical assets (e.g. large equipment). The stability and security of those cash flows depend on the underlying contracts and user behaviour.
2. Recognize re-use of the asset, as a secondary source of collateral. In circular supply chains, the underlying assets have value which can and is likely to increase in a growing re-use market.

3. Use a flexible financing form. The growth of circular service propositions depends on the pre-financing of the assets needed for new contracts. A **borrowing base credit** would suit. This is a flexible credit based on a percentage of accounts receivable and inventory. An important advantage of this is that as the number of outstanding assets grows (contracts), the available credit grows too.

DIRECT ASSET FINANCING

The CiSe platform allows for new financing forms with these desired characteristics. Given the core functionality of the CiSe platform to distribute payments to a network of service providers directly, a finance provider could easily be added as a stakeholder. The finance providers then become connected to the asset through a smart contract that directly returns part of the use fee to their corresponding wallets. Finance providers are connected only to the assets they finance, limiting the recovery of that investment to those specific assets. This shifts the focus for the finance providers from the lending companies towards the assets and the network of service providers responsible for keeping the asset functioning. This is illustrated in Figure 7.

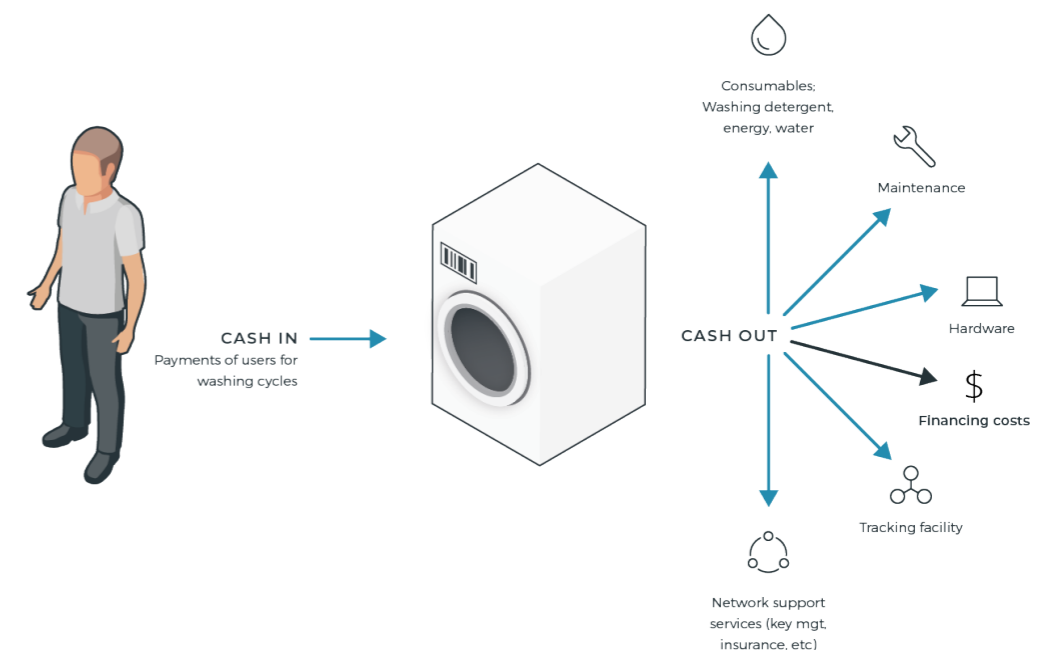


Figure 10 - A Finance provider can also become connected to the asset and directly receive part of the use fee.

WHAT IS DIFFERENT IN THE CISE FINANCING MODEL?

1. Repayment or returns depend on intensity of use

Repayment becomes based on intensity of use, so that the finance provider also has an interest in maximum use of the asset. The amount of the payment depends on how and how often the asset is used and therefore the payback period may differ. Repayments schedules can, as with equity, be based on a profit model, or, as with debt, can have a fixed character. That payments depend on use, means that the characteristics of the contract are slightly different from existing financing products.

2. Not the company but the asset is financed

The CiSe model changes the relationship between the investor and circular entrepreneur fundamentally. Typically, finance is provided to companies that provide the service of an asset. How the asset is operated is up to the entrepreneur. The service provider is responsible for and coordinates payment and management of assets, consumables, and other services.

In the CiSe model, relationships are formed around the asset with the collective goal of operating that asset (generating cashflow) for as long as possible. Cash comes in through a use fee paid by the user and is distributed to service providers and finance providers. The ledger underlying the platform records all cashflows, which can be separated (ringfenced), limiting the income and recovery from investments to specific assets. This enables the diversification of investments on asset level, and it includes the financier in aligning incentives for sustainable performance of the asset; the longer the asset is operated, the better.

3. Anyone can invest

Anyone with a wallet can become a finance provider. The manufacturer, for example, could receive part of the use fee in return for providing the asset, thus financing the asset. Or a consumer with some spare cash, could finance part of his own (or another) asset, receiving part of the use fee in return. Professional finance providers or other investors could also fund part of the asset and be paid from the generated use fee. The financier could close the gaps that are left by manufacturers, service providers and users.

Many intermediate forms are possible. It is essential, however, that all stakeholders with a role to play in keeping the asset functioning, have an actual stake in the asset, to make sure that they have an incentive to keep the asset functioning. Skin in the game also provides an incentive to keep other stakeholders on their toes. For service providers that will likely come down to providing, thus pre-financing, their own part of the operated asset

4. Every asset has its own financing mix with debt-like and equity-like products.

Each asset can have its own financing mix, based on its risk profile and appetite of finance providers. Financial products may or may not have a profit model (risk-bearing), may or may not have a pre-set maturity date, and finance providers may or may not introduce a payment hierarchy. These are common properties of equity and debt. These properties can be applied in three ways:

- i. A fixed model,
- ii. A profit model, and
- iii. A reserve model.

FIXED MODEL: MATURITY DATE DEPENDS ON USE INTENSITY

In a fixed model, the balance of the finance provider is increased with a fixed percentage of the use fee as soon as a use cycle ends, and the wallet of the end-user has been charged. The financing costs can be based on asset annuity and interest. A fixed percentage of the use fee is paid to the finance provider until a certain amount (e.g. principal + interest) is reached. The maturity date is variable and depends on use intensity. The lower the use intensity, the longer the maturity date. This is illustrated in Figure 8.

Note that it is possible in this model that, when use is less than predicted, financial obligations will increase, and the required repayment will not be met.

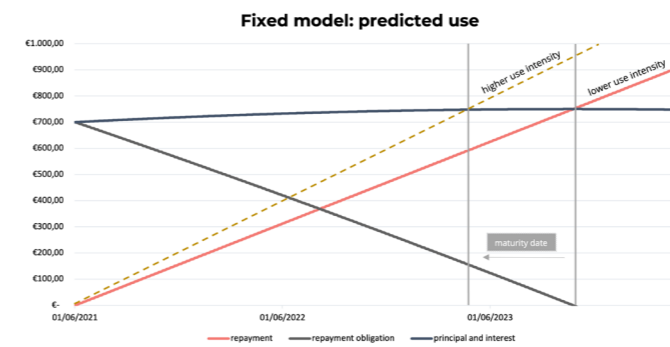


Figure 8 - A fixed percentage of the fee is paid to the finance provider until a certain amount, based on principal and interest, is paid.

PROFIT MODEL: KEEP RECEIVING FEES AFTER PAYBACK PERIOD

Particularly in the beginning, when the service provider is starting business or a new asset is taken into use, risk-bearing capital is required and that requires an upside, or a so-called profit model. An upside can be created in different ways, for example by allowing the maturity to be (much) longer than the financing, so that the finance provider continues to receive fees even after the asset has been repaid. The higher the use intensity, the shorter the payback period and the higher the return on investment. This is illustrated in Figure 9. Another model could be paying out dividends when a certain threshold is reached.

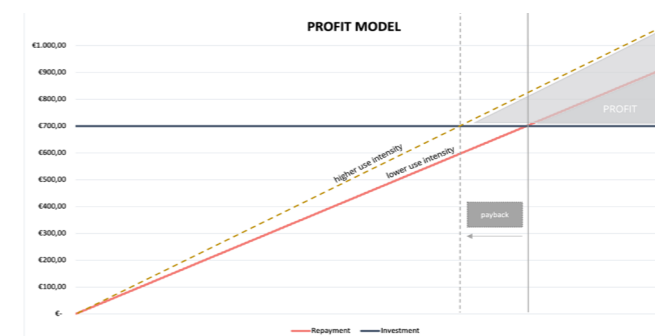


Figure 9 - Profit model that keeps generating cashflow after investment has been paid back.

RESERVE-MODEL: PAYMENT HIERARCHY

A percentage of the generated cashflows from use fees can also be used to create a reserve. The reserve can then be used to pay capital providers when a certain (performance or other) milestone is reached, possibly in a certain hierarchical order, see Figure 10.

Another way a reserve like this can be used is to cover (unforeseen) operational risk or to improve the customer proposition by lowering the use fee to boost demand or to reward sustainable use or other impact indicators. And, perhaps more importantly, as circular markets are not yet very mature, the reserve can be used for a “tech-refresh”: a technological improvement that significantly improves circularity of the asset but requires a large investment.

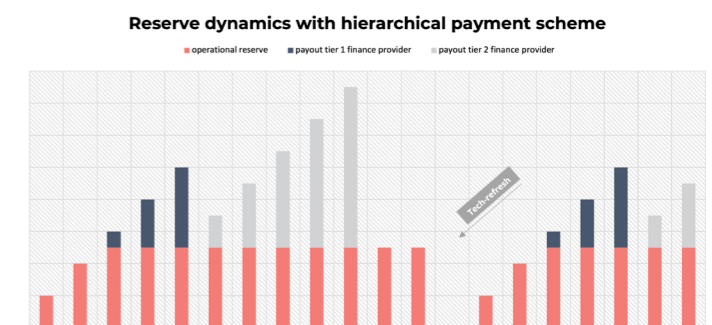


Figure 10 - A reserve can be created that can be used in a variety of ways, such as covering unexpected costs or creating a payment hierarchy between finance providers.

A combination of the above three models is also possible. Profit models and fixed models can be combined. A floating repayment fee can be introduced: e.g. a decreasing percentage if risk decreases, or an increasing percentage when margins increase. These financing models combine equity and debt-like characteristics. Risks are shared by all stakeholders involved in the functioning of the asset, who are all dependent on the cash flow generated from use fees. This shifts the focus of all stakeholders towards designing their efforts in the service of maximal use. The CiSe platform could make these models so much more possible and easier by reducing risks and by providing transparency to all stakeholders.

RADICAL FINANCIAL INNOVATION: A NEW ASSET CLASS

A CIRCULAR ASSET CLASS

A big step towards finance for the circular service economy is to establish circular assets as a new asset class. This would allow many more financiers to participate in circular assets, flexibly, adaptable to individual needs, from small retail investors to the largest institutional investor.

Consider a portfolio of x-million assets, from headphones to bikes to washing machines, with a continuous stream of cash flows. It is impossible for any individual entrepreneur (or manufacturer) alone to create such a portfolio. This can only be achieved through bundling assets beyond supply chains—with a very different view on scale and spreading risks. Minute cash flow data is generated at the asset level, with portfolios that are combined beyond supply chains. Where tickets are currently too small for traditional financiers, CiSe could be the tool to aggregate them.

THE GOAL IS NOT OWNERSHIP, BUT RESPONSIBILITY

Maintaining ownership of the circular assets is not the goal, it is a means for manufacturers and other relevant actors along the supply chain to take responsibility for resource use and longevity. Circular service models provide the best incentives. Without radical financial innovation, however, companies' balance sheets blow up with the burden of the cost of ownership of millions of products. By placing ownership of the assets in a neutral entity, such as a CiSe-fund, investors (and all other stakeholders facilitate the functioning of the asset-based service) get a share of the cash flows that generated from the individual assets they (co-) financed.

AN INVESTMENT VEHICLE FOR CIRCULAR ASSETS

A CiSe-fund could borrow from traditional fund structures and establish a foundation. This foundation holds legal title (ownership) of the circular assets in the fund. There is a fund manager and there are beneficiaries of that fund, based on contractual agreements recorded in smart contracts. These contain all rights and obligations relating to the cash flows generated by the assets. Investors can only receive cash flows from the specific assets to which they are subscribed.

A major advantage of this structure is that it requires setting up a legal entity (foundation) only once. Currently, many circular service pioneers set up multiple entities to manage and ring-fence various risks and activities. A traditional fund structure might work, but inspiration from other structures can also be considered, such as ETF's or mutual funds.

First and foremost, in any fund are the circular goals and incentives. To prevent losing sight of these objectives the context and intention of participating companies must always be considered and impact indicators must be built in. For instance, only circular service companies are eligible to use the CiSe platform.

LEVER CISE AS A MARKETPLACE FOR FUNDING

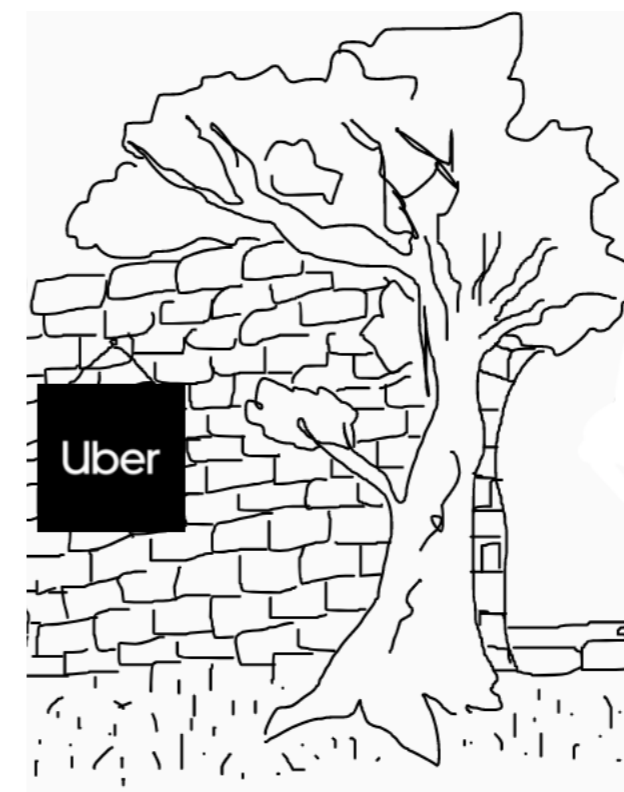
CiSe can act as an intermediary mechanism to bring together supply and demand of finance for circular assets. By communicating funding needs, investors can screen investment opportunities for pre-specified (combinations of) selection criteria, such as risk profile, portfolio size or impact potential.

Standardized deal structuring "modules" can be presented which are common in similar circular asset investments, such as underwriting possibilities (pledging of collateral) or other contract terms to cover remaining risks. With the transparency of information on existing pledges of other finance providers, an optimal financing mix can be found. CiSe provides transparency to allow for extensive due diligence to take place.

Especially the first time that funding is provided this will typically involve undertaking extensive due diligence, bringing in additional perspectives on the investment opportunity as well as external references for verification, to better understand the company and the industry they operate in. But after this has been undertaken, additional financing contracts can be easily added to existing relationships.

LET EVERYONE PARTICIPATE IN THIS FAST-GROWING SECTOR

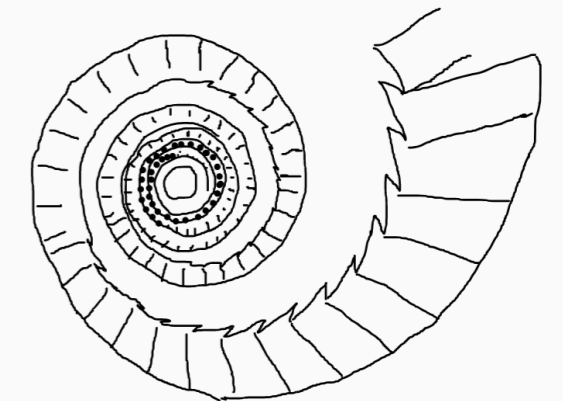
With CiSe as an investment vehicle, everyone can participate in this fast-growing sector. From institutional investors to users investing part of their savings. Finance providers can optimize the financing mix of assets by early participation.



69

"We're in it together. It's complex and everything is connected, but we will persevere and get there in the end."

– Björn Aarts, Business Development Manager Circular Economy, Rabobank



69

"We are thinking many years ahead with this. If you had asked a taxi driver what the (uber) app should look like, they could not imagine it then. For example, you cannot ask the market for the ultimate goal of CiSe, because it does not fit into an existing model. It doesn't do something that's already there. It's going to do something fundamentally different."

– Cees van Ginneken, lawyer, Allen & Overy

CONCLUSION

Circular Service models have proved to be difficult to finance. While incoming cash flows are spread over the medium to long term, investments in the operating product are needed upfront. Although this is similar to existing rental or lease structures, there are some fundamental differences. The CiSe platform can be leveraged to innovate finance for circular service models in various ways.

Asset-based finance is typically not entirely suitable for financing circular service models as underlying circular assets are of low capital value and valuation models cannot handle appreciating assets. By providing detailed asset-specific and time-based data, CiSe can provide better insights into asset performance: asset use, lifetime, maintenance requirements, but also cash flow capacity and resale value of the assets.

The data generated by CiSe can mitigate and provide better insights into operational risks (currently high as cash flows are typically time- and usage-based). CiSe analyzes usage patterns and payment behaviour. It shows the cash flow generating capabilities of specific assets, making it possible to improve cash flow projections and volatility reports.

We have seen that existing financing forms do not fit circular service models well. However, many existing financing structures contain useful characteristics. The CiSe financing model borrows from existing debt and equity structures to create a new financing form that fits circular service models better.

The CiSe platform could function as a new investment vehicle for circular assets. These assets could be owned by a CiSe foundation with investors receiving a share of the cash flows generated from the assets they (co-)finance. A major advantage for both entrepreneurs and financiers of bundling assets into such an investment vehicle, is that it requires setting up a legal entity only once. It frees manufacturers and service providers from owning millions of assets and makes it possible to offer different investment profiles with different risk, return and impact. With responsibilities clearly stated in agreements, there is no need to place ownership with one party (the biggest?) in the supply chain.

Contracts are automated in CiSe and stakeholders are paid directly from the use fee for their part in the functioning of the asset. This can include providing the finance for the asset. By keeping a log of maintenance events or other relevant engagements by asset (also by end-user), liabilities can be recorded and enforced transparently, easing collaboration.

From the data generated by CiSe, other valuable insights can be modelled, such as impact on sustainability of consumption, capacity of providers to extend the lifetime of assets, reducing the number of necessary assets, or even the CO2 footprint in the use phase of a product.

The CiSe platform enables new financing forms, that fit circular service models whilst generating data to create intelligence to improve risk models. In the new CiSe financing model, finance providers become connected to a specific asset—the one they (co-)finance—through a smart contract that directly returns part of the use fee to their wallets. Recovery of the investment is therefore limited to that asset. Repayments are based on use intensity of the asset, the asset is directly financed rather than the company, and anyone with a wallet—from end-users to institutional investors—with a wallet can invest. This enables the diversification of risks on asset level, and it aligns the financier to sustainability goals: the more and the longer the asset is operated, the better.

Circular service models need an infrastructure for sharing data on operations, cash flows and risks, and for facilitating cooperation between “unequal” players, such as SMEs and large companies, or small finance providers and large financiers. The CiSe platform, can play an important role in innovating finance for the circular service economy by creating an investment vehicle for leveraging circular assets as a new asset class. Small tickets can be aggregated into large tickets. Risk models can be improved by using granular data dashboards. Financial products can be adapted to the circular service model.

LET'S EXPERIMENT!

CiSe can solve important parts of the circular financing challenge. And leverage ground-breaking opportunities to radically change finance for the circular future. However, this is not an easy task. We need to start experimenting and build critical mass with collaborative circular service models for different types of assets. We need to start modelling to create the necessary intelligence to structure finance on those service models. Particularly in the transport sector we see circular service models reaching scale or in the process of doing so—models for which CiSe is well suited.

We invite circular service companies considering starting the CiSe journey to join us: let us start experimenting together.

And after that the challenge for financiers is to integrate the data CiSe provides into their current (risk) assessments and to explore and build an innovative investment vehicle that can bring the circular future closer. Any financial wizards wishing to bring their skills a circular future, let us know!

“

Let's get away from the computer and into the lab!”

– **Rens van Tilburg**, Director Sustainable Finance Lab



“

Down the rabbit hole: we just have to dive in and start by taking small steps.

– **Rob Guikers**, Innovation consultant at Rabobank

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