METHODOLOGICAL GUIDE
FOR IMPLEMENTATION
AND MANAGEMENT

CIRCULAR SUPPLY CHAIN: KEY TAKEAWAYS FROM INITIAL EXPERIMENTS

· 2025 ·

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France Supply Chain by Aslog

EN PARTENARIAT AVEC

Citwell
Accelerators of transformation

ABOUT FRANCE SUPPLY CHAIN

MISSIONS

1

Enabling Supply Chains to contribute to a sustainable world for the planet, people and performance.

2

Reinforcing the impact of the Supply Chain on company competitiveness.

3

Promoting Supply Chain professions to develop their attractiveness and recognition.

Since 1972, the association brings together 450 French and international companies of all sizes and in all business sectors, as well as Grandes Ecoles and training organizations. This 5,000-strong network of professionals from all sectors of activity, teachers, researchers and students, pool their ideas and experience to provide Supply Chain players with practical solutions.

LABS AND COMMUNITIES: PLACES FOR SHARING, ACTION AND MUTUAL SUPPORT

The association relies on its working groups to provide its members with a wide range of ressources such as this white paper.

450
Member companies and schools

5 000
Members

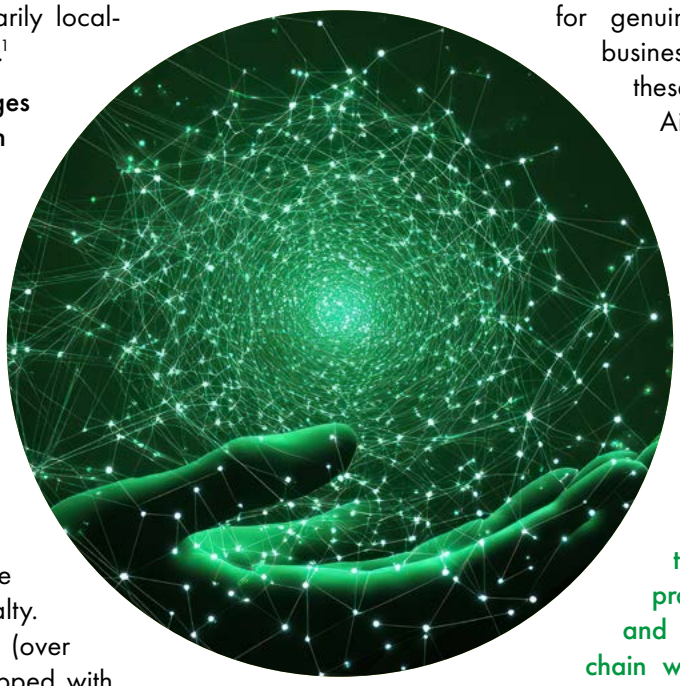
5
Labs

+∞
Self-help communities

EDITORIAL

In our VUCAL world (volatile, uncertain, complex, ambiguous, and limited by finite resources), growing tensions are evident regarding the availability of resources and components-from metals to semiconductors to biomass, which is under increasing pressure from competing uses.

Various French and European laws and regulations are gradually compelling market participants in an increasing number of sectors to take action to extend the lifespan of their products through reuse, repair, and remanufacturing, going far beyond simple waste recycling. Landfilling is rapidly decreasing in favor of all forms of reuse (whether for material or direct use), which generates 200 times more jobs-necessarily local- than landfilling or incineration.[1]



Consumer behavior changes are becoming noticeable, with significant growth prospects in the second-hand market, potentially tripling by 2030.[2]

The CSRD (Corporate Sustainability Reporting Directive) mandates double materiality analysis, highlighting the need to safeguard against the unpredictability of future supply chains while reinforcing customer loyalty. Saturated Western markets (over 90% of households are equipped with major household appliances) demand **the emergence of new value creation opportunities.**

The functional economy could provide some of these answers.

These factors have led to 67% of companies planning to increase their investments in circularity over the next three years,[3] and members of France Supply Chain are no exception.

However, while awareness-raising materials are now widely available and the capacity for «ideation» around circular opportunities is growing every month, **the practical implementation and operation of circular flows across multiple loops at scale remains underdocumented.**

Aware of the significant societal challenges involved and aligned with our Purpose, we at Citwell have chosen to help pave a clearer path toward these critical practices for the future. Having worked with inherently circular actors (maintenance, eco-organizations, etc.) for nearly 15 years and with many groups whose circular practices are emerging on a large scale, **we have chosen to take a participatory and transparent approach due to the systemic nature of the challenge.**

Following the publication in March 2023 of an advocacy document, in collaboration with Soroa and supported by the National Institute for Circular Economy, aimed at policymakers to establish conditions for genuinely fostering circularity in businesses and regions, we continued these efforts with Polytechnique Aix-Marseille. Together, **we explored the different levels of circularity in supply chains.**

Today, we must meet the needs of companies. In this spirit, a natural collaboration emerged with the SupplyChain4Good Lab of France Supply Chain. **The goal is to leverage the networks of our three organizations to identify practical levers for implementing and managing a circular supply chain while building the skills of a diverse group of members.**

As if by design, the first challenge was finding professionals with expertise in both supply chain management and circularity.

In your hands is the result of this collective effort, co-written by multiple contributors, marking only the beginning of this journey. The potential for combining knowledge is enormous, and we are proud to contribute to addressing the questions and needs of your organizations.

Anaïs LEBLANC
Executive Partner Citwell
Workshop's leader

[1] **Source :** ABB Motion global survey, Circularity No Time to Waste, 3,300 industry participants

[2] **Source :** Circular Fashion Federation survey, 2022

[3] **Source :** GAIA 2023 survey

ABOUT CITWELL

A PLAYER COMMITTED TO A SUSTAINABLE AND CIRCULAR ECONOMY SINCE ITS CREATION

Consulting firm specializing in operations and supply chain transformation across the entire value chain, from purchasing and design to customer service.

Citwell was founded in 2004 on the paradigm that companies were creating global value chains, with the challenge of mastering and managing them. **To help them, we have worked with our customers to build high-performance systems that are also lean** (less inventory, less quality waste, etc.).

Over the past 7 years, Citwell has marked a turning point in its own consulting role, by sharing its conviction that the global supply chain, supporting unlimited consumption, was not sustainable and responsible. We then committed ourselves to **a change in behavior, and championed technical projects that would enable a switch to more resilient, sustainable and therefore more regional supply chain models.** Our approach can only be achieved through a collective effort involving the entire economic ecosystem.

Finally, since 2021, aware that traditional linear economic models need to be rethought, we have been engaged in **circular economy work** within our ecosystem and with several of our customers.

Our ambition is to be a strong player in helping territories, companies and institutions to integrate these issues and transform themselves. **We are notably involved in the Convention des Entreprises pour le Climat,** and work with technological players on innovation solutions, such as AI, to serve the circular.

650
Training days of our employees /year

21 M€
Sales figures completed in 2023

6
Offices in France, US and UK

+130
Employees in 2023

20
Years expertise

+500
Customers

OUR COMMITMENTS

THIS WHITE PAPER IS THE RESULT OF THE COMMITMENT OF OUR MEMBERS

Fabrice BLEUBAR
RLogistics Performance and Sustainable Development Manager - Groupement Hospitalier de Territoire Grand Paris Nord Est

Camille DEMARQUILLY
Global Supply Chain Engineering Michelin

Mathilde RINALDI
Supply Chain and Sustainability consultant Citwell

Adeline BRET
Manager et Responsable Conseil Durabilité et RSE Citwell

Jonathan LECLUZE
Circular Supply Chain leader Décathlon

Brieuc LAVILLE
Supply Chain and Sustainability consultant Citwell

Felix PAPIER
Professor and Global Circular Economy Chair, ESSEC Business School

François-Michel LAMBERT
Chairman of SOROA VP of AIFREC

Yann LARIDON
PMO Sustainability France Supply Chain

Dimitri VIVIER
Supply Chain Director Epalia

SUMMARY

INTRODUCTION

A METHODOLOGY BASED ON MULTI-SECTOR COLLABORATIVE WORKSHOPS

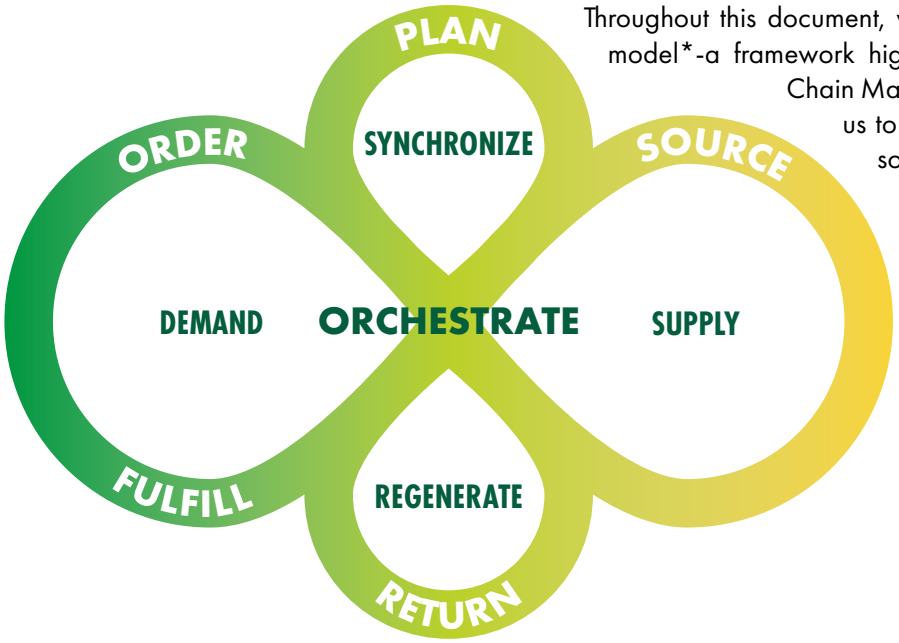
Following a large kickoff workshop in November 2023 that brought together representatives from government agencies, local authorities, academia, and businesses, we at Citwell chose to further embed our work in **a collective intelligence approach.** Together with the teams at the Lab SupplyChain4Good, we organized **a series of collaborative workshops,** all following the same structured format.

During each session, two companies shared their experiences in implementing and managing large-scale circular projects. After each presentation, participants were divided into discussion groups to extract the key principles and lessons learned from the case studies.

These exchanges enabled us to identify insights and guidelines that we believe are relevant beyond the specific examples shared. We have compiled these findings here for broader application.

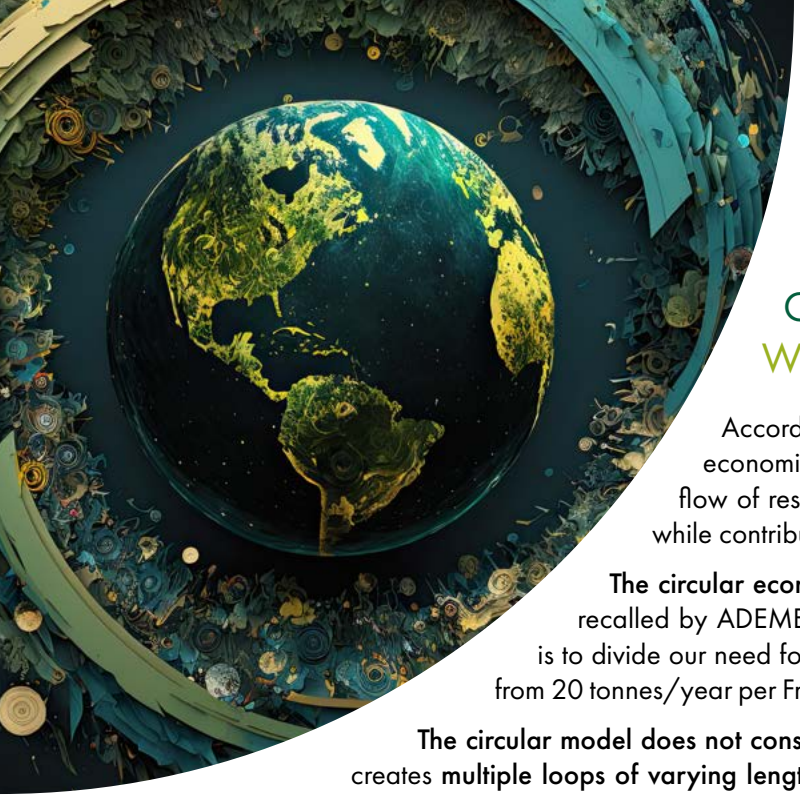
To ensure the richness and diversity of the workshops, the participating companies were carefully selected to represent a variety of sizes, organizational structures, and industries.

We benefited from contributions by diverse stakeholders, including startups (Lizee, Rev Mobilities, LRPI, Valused), SMEs (Epalia), and large industrial groups (Michelin, Orange). The workshops covered a wide range of sectors: automotive, telecommunications, retail, tire manufacturing, and logistical equipment supply.



Throughout this document, we have chosen to reference the SCOR model*-a framework highlighted by the Association for Supply Chain Management (ASCM). This approach allows us to address the mechanics, challenges, and solutions of the circular supply chain while situating our discussion within the context of the various processes traditionally used to manage the value chain.

*Published in March 2024



THEORETICAL REMINDER

CIRCULAR SUPPLY CHAIN - WHAT IS IT?

According to NF ISO 59004*, the circular economy is «an economic system that uses a systems approach to maintain a circular flow of resources by recovering, conserving or increasing their value, while contributing to sustainable development».

The circular economy must respond to the material footprint challenge, as recalled by ADEME in its «Transition(s) 2050» forward-looking work. The aim is to divide our need for virgin raw materials by 2, to reduce our material footprint from 20 tonnes/year per French person to 10 tonnes/year per French person by 2050.

The circular model does not consist of a single loop at the end of a linear chain, but rather creates **multiple loops of varying lengths.** Material recycling, remanufacturing, reuse, eco-design and the economy of functionality are all levers that enable us **to pivot from the linear economy to the circular economy.**

However, our supply chains were built with a view to serving the needs of the linear economy. Production, transport, distribution, customer service... These major themes are today conceived according to the logic of linearity and ultra-specialization. We therefore need to consider the consequences of a shift towards circularity and its many loops on our supply chain management techniques..

How can we design a circular supply chain model with multiple loops? How much impact can a circular pivot have on an organization? Which loops should be implemented? And what are the differences in terms of operational management? What do the players who have implemented it and are still doing so have to say?

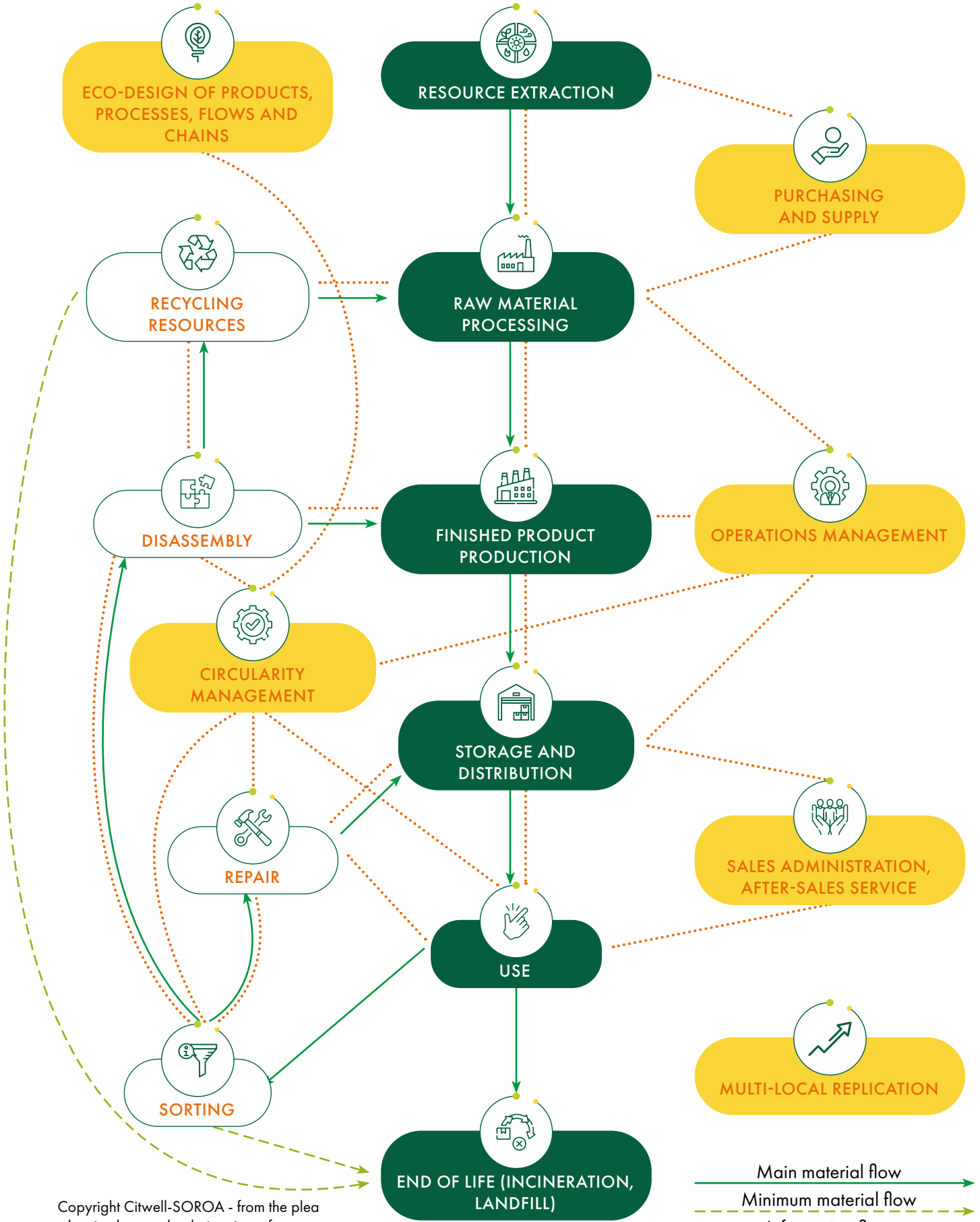
Based on our discussions during the collaborative workshops, we have structured the answers we have obtained into 6 areas:

- BUSINESS MODEL / VALUE SHARING
- ORGANIZATION
- SIZING MULTI-LOCATION
- CIRCULARITY MANAGEMENT
- FORECAST & LOAD
- DATA, CONTINUOUS IMPROVEMENT & OPERATIONAL MANAGEMENT

THEORETICAL REMINDER

CIRCULAR SUPPLY CHAIN THEORY CIRCULAR SUPPLY CHAIN DIAGRAM

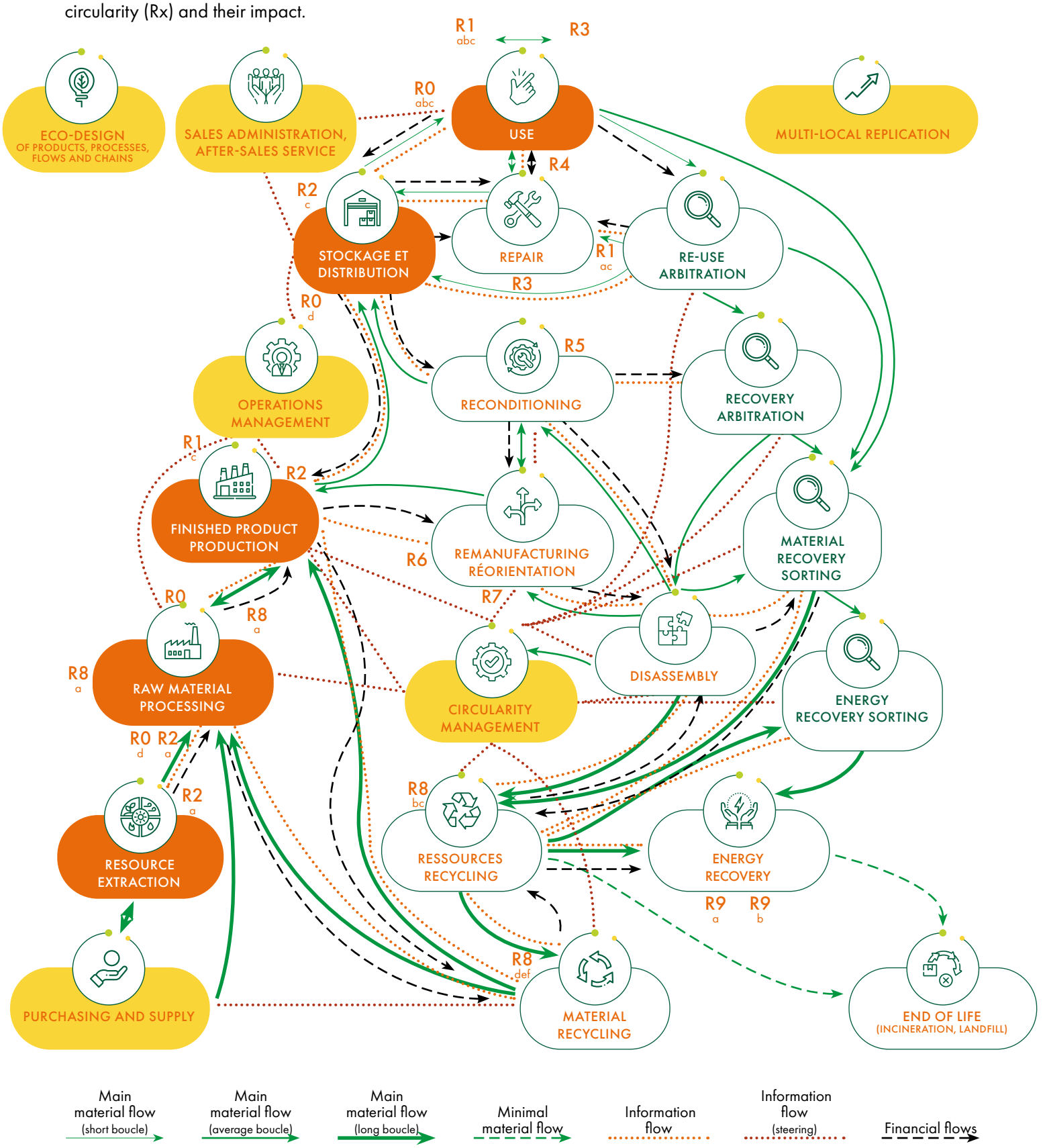
The circular supply chain has given rise to new practices to be deployed, as shown in this diagram.



THEORETICAL REMINDER

CIRCULAR SUPPLY CHAIN THEORY CIRCULAR SUPPLY CHAIN PYRAMID

In reality, the flows to be orchestrated depend on the type of loop being operated, slightly modifying the processes required. This was the subject of a study by the Aix-Marseille team, which detailed the flows according to the type of circularity (Rx) and their impact.



Source : Citwell-SOROA-CretLog Université Aix Marseille, from the article «Structuration de la Supply Chain Circulaire et positionnement vis-à-vis des filières REP». Article written for the 1st Interdisciplinary Congress on the Circular Economy, for AIFREC. P. Pujo, F. Ounnar, A. Leblanc, F.-M. Lambert

THEORETICAL REMINDER

CIRCULAR SUPPLY CHAIN THEORY - THE 9 STRATEGIES

The circular economy encompasses 9 strategies involving different loop lengths and specific operational impacts for organizations. The aim of our work is **to support the scaling-up of the most virtuous models,** and we have therefore not focused on long loops.

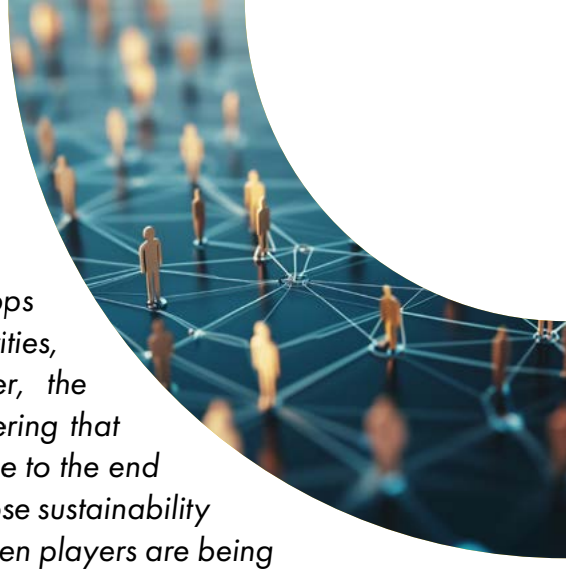
Product & life cycle design	SHORT CURLS Smarter production and use of products	R0 = Refuse	Consume less or without committing additional material resources
		R1 = Rethink	Make product use more intensive
		R2 = Reduce	Use less material or increase product efficiency
Production & use	MEDIUM CURLS Extending the life of products and components	R3 = Reuse, re-employ	Second-hand and rental market
		R4 = Repair	Extending lifetime for the same consumer
		R5 = Reconditioning	Extending lifetime for another consumer
		R6 = Remanufacturing	Remanufacture components for a new, identical product
		R7 = Redefine, Upcylcer	Reuse components for a different product
	LONG CURLS Optimized use of materials	R8 = Recycling materials	Downcycling, recycling, upcycling
		R9 = Energy recovery	Incinerate, but store / use energy

Circularity strong

Circularity low

Source : Lifecycle & stages on the R-ladder (Reike et al, 2018)

MODELS AND VALUE SHARING



The value chain players involved in the development of circular loops are the same as those who take part in the linear system: public authorities, financiers, suppliers, customers, repairers, consumers... However, the circular approach calls for a rethinking of economic logic, considering that a product has value throughout its life - not just up to the point of sale to the end customer - and that it can therefore be part of one or more loops whose sustainability must be maximized. As a result, new models for sharing value between players are being invented, becoming a lever for sustaining operations and achieving impact objectives.

A DYNAMIC DETERMINATION OF VALUE, BASED ON USAGE

Circulars create residual value for products after their initial use. Users have several opportunities, depending on their position in the product's life cycle: in the context of their own use, they can create value by intensifying use through sharing, or by extending the product's lifespan through repair. Then, it can capture part of the residual value of products after consumption, by reinjecting them into downstream circular loops (e.g. trade-in). If he positions himself after initial use, he can pay less for a product, material or service than for the price of new / initial consumption.

For the company, it's another way of capturing value: **the challenge is to extend the life of products** by responding to a demand that is no longer based on new acquisition value, but on use value. For example, nobody thinks about the price of a new shared bike, as opposed to the price of a subscription (a Vélib is used up to 19 times a day!). **In rental or second-hand models, grading the price of products according to their condition helps to accentuate circularity and avoid too few cycles.** In this way, it is possible to increase margins by multiplying successive uses when circularity is at its strongest (Decathlon publicly cites the example of 7 to 9 times the margin of new products). Obviously, **on products with a low new face value, the room for manoeuvre is limited,** and other mechanisms need to be invented (subscription to the use of a large bouquet of products rather than to single products, for example).

The key point for the organization is to define acceptable pricing for customers. In some markets, these logics are centuries old and commonly accepted by the sector (l'Argus automobile). They are now spreading to most other industries, where there is as yet no strong point of reference. The value of a product is therefore even more dynamic than on the shelf, since it depends on the accessibility of the new equivalent, the availability of use, the criticality of the service rendered, and the public incentive policies in place (repair bonus). The impact of this dynamic pricing on the market and forecasts is a great challenge for circular marketing teams.

Moreover, **the environmental value of products is also maximized by the circular system:** the environmental impact of products is reduced, enabling both companies involved in circular loops and consumers to post a better balance sheet. **The technical challenge lies in perfecting environmental impact reporting,** so as to highlight this positive impact in terms of carbon footprint, material footprint, preservation of biodiversity and reduced pollution.

EXAMPLES OF THE ECONOMY OF USE

Orange, Mob-Ion, Michelin have publicly stated that the difference in costs between new and renovated is enormous:

80 %	80 %	80 %
in € sales	in CO_2e	in material requirement

MORE FRAGMENTED PLAYERS AND EXPERTISE THAN IN THE CIRCULAR, AND A FINANCIAL EQUATION THAT'S HARD TO BALANCE

To operate a circular loop - and a fortiori to interweave several of them - new know-how (or know-how that has been forgotten with the development of the linear economy) is required, and must be orchestrated with a range of internal and external players. Here are a few examples, in addition to the classic linear players:

- RETURNS LOGISTICS & POOLING
- USED PRODUCT COLLECTION AND INITIAL SORTING
- DIAGNOSTICS & SORTING
- RENOVATION REPAIR CONVERSION
- REMARKETING & PRICING
- INDIVIDUALIZED PERFORMANCE MONITORING

For the **«channel leader»**[1], who can only very rarely operate alone, **the value-sharing mechanism must be the key to encouraging the commitment of all these players and thus, ultimately, maximizing the circularity of its products and services.** This is how impact objectives (financial, but also robustness, resilience and environmental) will be achieved.

All the more so as operating a circular loop often relies - to date - on operations that are less «lean» than linear ones, and therefore more costly:

Managing returns, repairs and refurbishments requires more sophisticated logistics, with reverse flows that are often costly to set up, and maintaining quality as an operational challenge.

Predicting specific needs for reconditioned or second-hand products remains difficult, limiting forecast accuracy and inventory management, and therefore capital commitment.

Every penny counts, so every player has to be interested in earning pennies for the chain as a whole. That's the big challenge. **Maintaining a high level of value is intrinsically linked to always keeping the value of the product and/or material as high as possible,** in all stages of use, reworking and re-commissioning.

[1] The member of the value chain who assumes a leadership role, sets the vision for the sector and attempts to coordinate the chain so that mutually beneficial objectives are achieved. This is often the strongest brand in the network, either as a marketer (Michelin, Orange), or as a powerful distributor (Boulanger), or through its contribution of an innovation that creates a new market (RevMobilities, Valused).

EXAMPLES OF VALUE-SHARING STRATEGIES TO MAXIMIZE CIRCULARITY

In this way, value-sharing mechanisms emerge, with the various players responding to the key challenges of the different loops or business models.

KEY ISSUE	EXAMPLES OF MECHANICS USED	FIELD EXAMPLES
Encouraging life extension and demand growth	Reduce the price for the customer (rental according to duration, used according to condition, etc.).	RevMobilités or Michelin generate new business for intermediaries (garages installing electrical retrofits on vehicles for Rev Mobilités, retreading for Michelin's service providers) and transfer the full cost of the service to them, earning a return solely on the supply of materials and components.
	Ensure that the service provider's margin is higher by reconditioning (labor costs) than by supplying a new device (purchase/routing costs).	
	Attracting intermediaries with access to customers by creating the conditions for them to recoup a large part of the margin	
High cost of spare parts or reconditioning	In addition to valuing positive externalities, enable the service provider to offer rework / reconditioning solutions that avoid the need for new spare parts or speed up operations: he makes more margin by reprocessing than by buying the spare part, or does so more quickly with optimized operations (very valid for product «bodywork»).	Orange's box reconditioning service provider, instead of polishing covers (time-consuming and not always of the highest quality) or buying them back (expensive with little margin for him), has suggested affixing a sticker to the covers of current boxes... and redesigning future boxes so as not to find the problem again.
	Including the reconditioning service provider in the redesign process (possibly with a life-cycle incentive) will encourage the emergence of ideas focused on product maintenance and durability.	
Valuing positive externalities	Calculate and publish TCO2 and T materials avoided by age / number of uses	Epalia organizes a «deposit» system on its pallet pool management, invoiced by the marketer (channel leader) to distributors at the same time as the goods, and reimbursed when Epalia (trusted third party) recovers the empty pallets.
	Calculate local employment hours used by age / number of uses	
Ensure the availability of products for reuse	Offer free pickup of full truckloads	
	Set up a mechanism linked to a deposit on the product to be returned	

DIMENSIONING AND MULTI-LOCATION

Implementing a circular value chain - as in a linear economy - requires the design of a logistics strategy, during which it is essential to pay close attention to the profitability of the model. The difference may lie in a greater lack of precise information, with more constraints and uncertainties to take into account.

SIZING YOUR LOGISTICS NETWORK: THE CIRCULAR MASTER PLAN

When designing a circular master plan, we need to take into account **the type of circularity** (rental, repair, second-hand, etc.), **the chosen business model, volume, target markets and territories.** Based on these criteria, we will determine, as in a conventional master plan, the size of the production and renovation, storage and distribution capacities required....

EOn the other hand, **the particularity brought about by the flyer is an increase in the risks and uncertainties weighing on the business plan,** particularly and above all linked to sources of supply that are often more dispersed and skills that are underdeveloped. The ease of collection and processing, and the value of products in relation to their weight, will have a direct impact on the scenario: should we centralize at one point (e.g. continental), or **deploy on a «multi-local» basis?** When the product is heavy and inexpensive, the skills accessible, the regulations non-blocking, etc., we prefer to bring the logistical and operational facilities that support them as close as possible to the end market. This creates X regions that are virtually autonomous in terms of their circular flows: we speak of multi-locality.

Example of the key information to be gathered to draw up a circular master plan:

Types of information	Examples
Costs	Transport, operation, m^2
Skills	Techniques and job pool
Delivery time	Customer promise
Risk	Market, regulations if new country
CSR	CO_2 transport
Products	Typology and massing
Transport	Frequency and distance

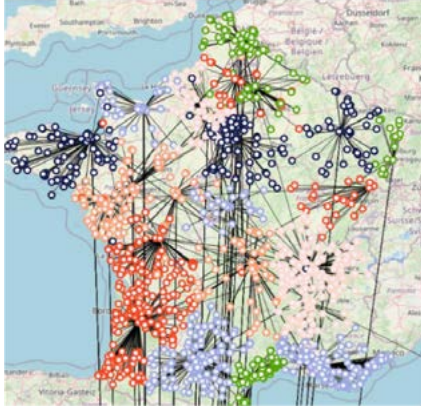
EXAMPLES DOF TRADE-OFFS WHEN SIZING CIRCULAR LOOPS

Short loops represent a major strategic lever for optimizing transport costs at Epalia (pallet reuse). For example, a pallet recovered in Rouen will be directly reused on the Rouen market. Although they are not closed to longer loops in the event of a shortage of certain references (rebalancing), priority is given to short circuits to maximize logistical efficiency and reduce costs.

Michelin, on the other hand, has taken the gamble of integrating its 5 retreading plants into specialized circular loops, by sector (trucks, aviation), method (retreading and tread) and product type (Michelin and competitor tires) that serve virtually all of Europe, if not the world.

The need for flexibility and adaptability is often greater in circular organizations in the making than in well-oiled linear organizations, as incoming and outgoing volumes change enormously from one year to the next: everyone told us that the exercise of thinking «should I create a new point in my network, and how do I mesh the tour?» is very frequently carried out.

Finally, as we saw earlier, value is often shared on a circular basis... which means that data must also be shared! **Relying on your partners and your eco-system is essential** when it comes to drawing up scenarios of available resources, skills and demand...



Example of multi-location collection with some rebalancing

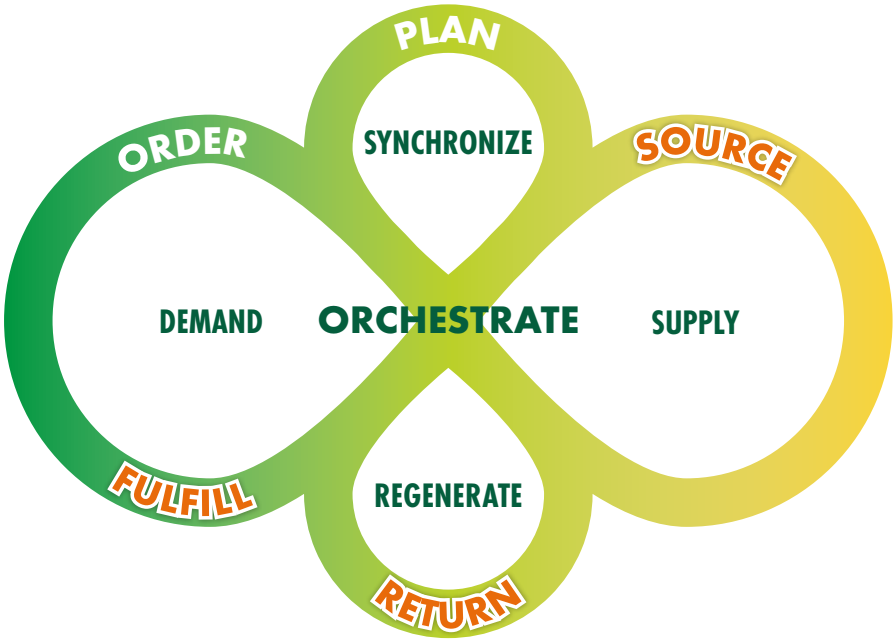
MULTI-LOCATION: STILL THE RIGHT SOLUTION?

As mentioned above, multi-locality is not necessarily the optimal model for the design of circular master plans, and the advantages of massification must also be weighed up:

	MASSIFICATION	MULTI-LOCALITY
Skills required	**Less investment** in HR for specific skills. **Less complex** implementation project management.	Opportunity to draw on **local, culturally-appropriate skills. The overall number of FTEs for specific activities will be higher.**
Tools and processes required Investments	Centralized operations enable **higher levels of mechanization and industrialization.**	Some investments may not be possible and may require **subcontracting.**
Frequencies and distances of transport flows	Massification has a major impact on transport, which can **worsen the carbon footprint.** Cost trends over the next few years are **uncertain.**	The carbon footprint is **minimized** thanks to small logistical loops (valid if the treatment process is not itself highly carbon-intensive).
Local rules on circularity	With the exception of recycling, local laws must be taken **into account for transport only** (as for linear transport).	Local laws concerning product processing must be known and applied. They can create risks, but also significant **opportunities for financing and market creation.**

To rationalize these decisions and serve as a basis for studying implementation opportunities, **the important thing is to identify the profitability thresholds guaranteeing the interest of local development,** which will change as the project evolves. Internal or external synergies can help to reach these thresholds, but also bring additional management and coordination complexities: mass transport, saturating your own capacities or those of your partner for a centralized model can lead to tax or customs complexities at border crossings.

SCOR PROCESSES TO BE SIZED



When it comes to multi-locality, **setting up local-to-local logistics flows is often the most advantageous in both economic and environmental terms.**

CIRCULARITY STEERING

Managing a circular supply chain presents us with a major challenge: we need to adapt our toolbox to manage the complexity and multiplicity of players and flows. In addition to «costs - quality - deadlines - CO_2», we need to manage usage to reduce our material footprint. Performance is no longer measured solely in financial terms, but must also include a more advanced environmental and social dimension. This is the heart of the Orchestrate dimension of the SCOR reference framework.

NEW INDICATORS

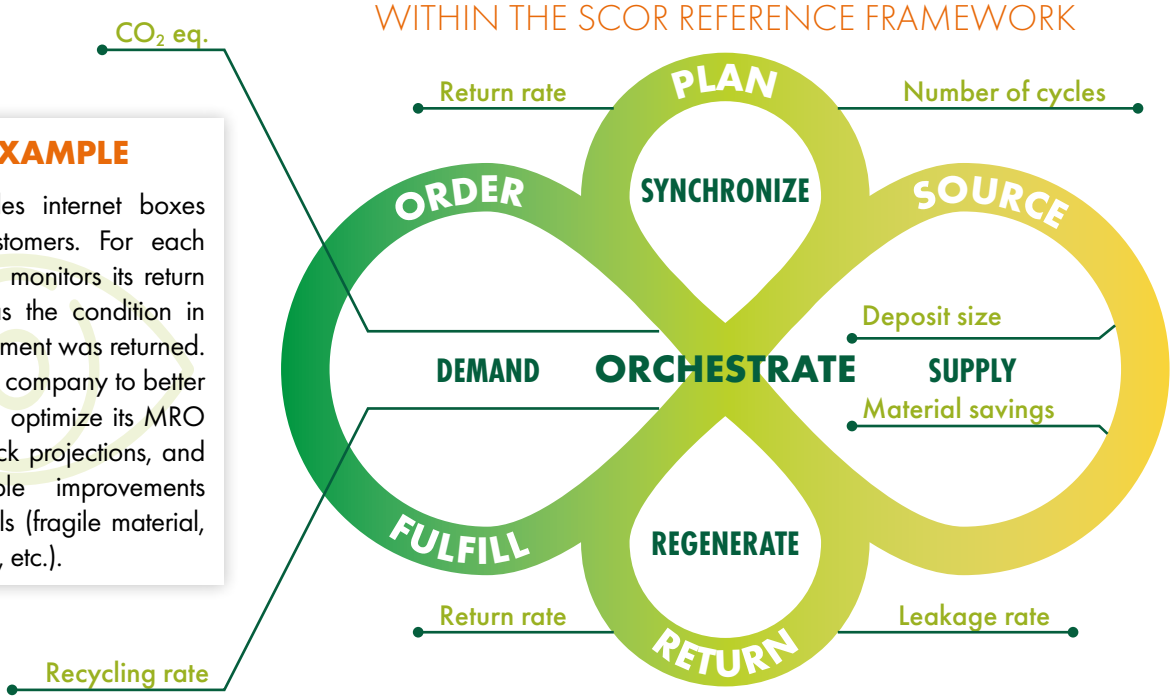
Managing a circular supply chain means managing a new type of flow. New operational indicators are emerging, based on intensity of use:

- We control **the number of cycles** of a product (e.g. the number of different users of an Internet box) in business models based on the economy of functionality or rental.
- **The return rate** has taken on new operational importance, as it no longer simply measures customer satisfaction. It now reflects the efficiency of the circular flow, and the ability **to support future operations.** By contrast, **the leakage rate is also monitored.**
- In addition to quantifying them, as the product matures it becomes interesting to qualify these returns using **the return quality indicator** (Gold grade/Silver grade...), both for continuous improvement and for later remarketing.
- **The cost of upgrading is crucial to the sustainability of operations,** and should be compared with possible pricings.
- Depending on the industry and the business model, we will also be able to control **the size of the resource pool,** which will reflect the material/semi-finished/product capital on which the company can draw, with a positive impact both financially and environmentally.
- **Impact indicators** - increasingly used in linear supply chains too - are an interesting way of measuring the positive consequences of implementing circularity. **These include CO_2 emissions (CO_2eq), material savings, material footprint and recycling rates,** in addition to the classic Service / Inventory / Cost indicators.

ORANGE EXAMPLE

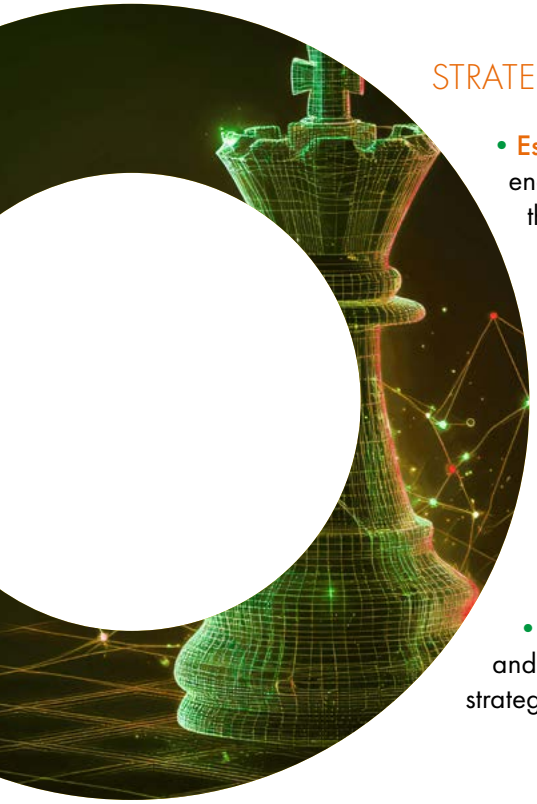
Orange provides internet boxes for private customers. For each model, Orange monitors its return rate, as well as the condition in which the equipment was returned. This enables the company to better understand and optimize its MRO costs, make stock projections, and identify possible improvements for future models (fragile material, unsuitable color, etc.).

POSITIONING WITHIN THE SCOR REFERENCE FRAMEWORK



NEW LEVERS FOR ACTION

Circularity requires us to manage supply as well as demand, which in turn leads to the emergence of new levers of action, depending on the horizon, that circular supply chain professionals need to know how to orchestrate. Here is a non-exhaustive list based on testimonials, along with a few rituals and governance practices designed to activate them:



STRATEGIC HORIZON

- **Establishing cooperative ventures and value-sharing** with external reconditioners enables us to leverage their capabilities and create synergies on part of the resources they capture.
- **Changing the service and collection offer** to bring it closer to the end consumer maximizes the return rate, as it ensures greater convenience (e.g. home collection).
- **Creating the conditions for identifying the quality of a return** before it leaves the place of use makes it possible to orientate it without physically accessing it, and to anticipate loads. This is a fully-fledged process that needs to be set up as close as possible to the point of consumption - in-store, for example.
- **The implementation of a deposit system** (or equivalent) has the effect of minimizing the leakage rate. This requires a strategic orientation that impacts all players in the value chain, from upstream to downstream.
- Finally, **the development of eco-design** maximizes usage time and reparability, and thus the profitability of the circular model. This is a lever to be considered in product strategy.

TACTICAL HORIZON

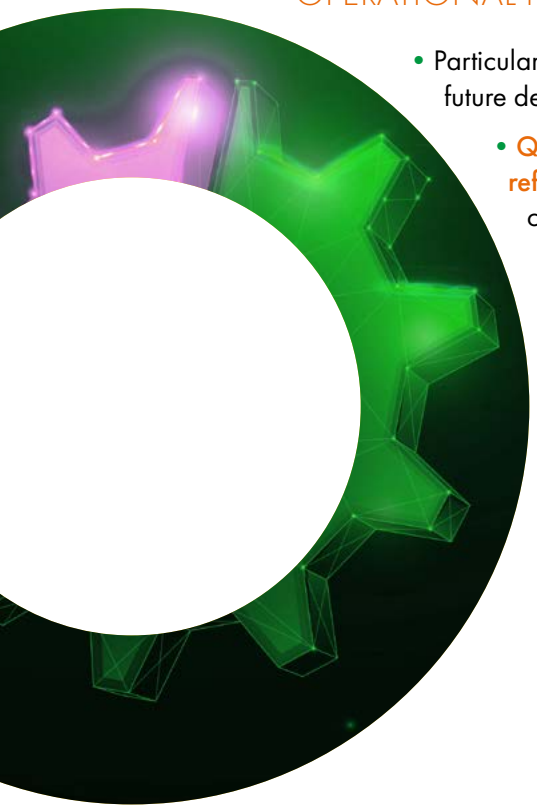
- **To encourage or slow down the return of products** to customers and partners (deposit management), marketing orchestrates incentive campaigns.
- **Restricting supply,** and conversely expanding it, have a direct impact on deposit requirements.
- **Controlling the number of «no return» uses** (without repair or maintenance) in order to focus continuous improvement on them is a very strong key to profitability in the use economy.
- **Decreasing pricing according** to the age or number of rotations of the product guarantees its attractiveness throughout its life, and therefore the durability of the deposit.

RITUALS AND CIRCULAR GOVERNANCE ON THE TACTICAL HORIZON

> Waste management: monthly ritual for estimating the waste of materials and products used/repaired/maintained - upstream of the S&OP cycle

> Circular S&OP (CF Forecasting and expenses, II.)

OPERATIONAL HORIZON



- Particularly in B2C, it's useful **to create forecasting algorithms** to ensure that we can meet future demand.
- **Qualifying returns and classifying their origins as early as possible in the refurbishment process** enables us to orientate evolutions and minimize refurbishment costs. Not every product needs to go through every stage of the refurbishment process, so it's important to qualify as early as possible to avoid unnecessary action.
- **Setting a threshold for the number of used products** in a region that triggers a collection operation optimizes return logistics costs.
- **Disposal of dormant stock** through second-hand outlets / off-takers / associations

RITUALS AND CIRCULAR GOVERNANCE ON THE OPERATIONAL HORIZON

Weekly and monthly rituals to measure the Supply Chain performance (on all axes) of circular items compared with new items, so that action can be taken, including in relation to the external ecosystem.

TWO EXAMPLES OF GUIDANCE INDICATORS

Valused, a distributor of Circular Economy Automotive Parts (CEAP), has built **a partnership with auto rebuilders to help them better understand market demand.** Valused shares demand information and forecasts with auto rebuilders, enabling them to better orient their business. It's a win-win partnership: Valused can respond to demand, and deconstructors focus their efforts on parts they can sell.

Valused also uses its product sourcing, production and customer data **to construct an environmental score, a savings indicator (€) and a CO_2eq indicator for each product.** This gives them a competitive edge over other suppliers on the shelf, and directs consumers towards their greener solutions.

INDICATORS BUILT BY VALUSED

POSITIVE IMPACT OF THIS ORDER

-98 kg CO_2e

75€ saved

A B C D E

Score of reconditioned

A B C D E

Score of new

CO_2e

↘ -377 kg

compared to new

↘ -583 €

compared to new

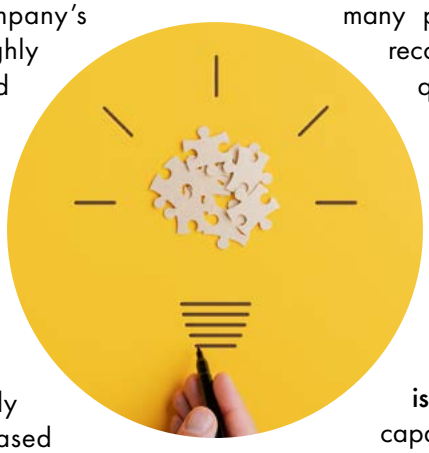
FORECAST AND LOAD

One of the keys to managing a circular supply chain is, of course, planning (S&OP, PDP). However, rethinking the «load-capacity» analysis according to the logic and needs of circularity requires a paradigm shift.

NEW PARAMETERS TO CONTROL

New dimensions have been added to the planning equation, notably that of the deposit, which designates the resources available for transformation to meet the business model.

- The level of deposit depends in whole or in part on product returns and maintenance requirements, which are rarely totally under the company's control - except in the case of highly mature service operations and preventive maintenance. **Closed or semi-closed loop evolution** (return flows) and multidirectional, uncertain flows have a direct impact on the calculation of the deposit. It is therefore essential to build **relevant demand and returns forecasting tools,** based on business logic - and therefore constantly evolving. Returns forecasts will be based on the installed base, i.e. the number of active products at the customer's premises.



- Capacity management remains traditional, with positions constrained by machines (test benches) and many positions constrained by skills (sorting, reconditioning, etc.) - hence the systematic quest for versatility.
- **The projection of product stocks** (used & ready for re-use) **is a result of the previous data.** It can have a major impact on business, both in terms of capital mobilization and space saturation, preventing operations.
- Barring an emerging market, **demand is therefore doubly constrained:** by the capacity and projected availability of the resources «to be transformed».
- ... to all horizons
- ... at all nomenclature levels where circularity is applied

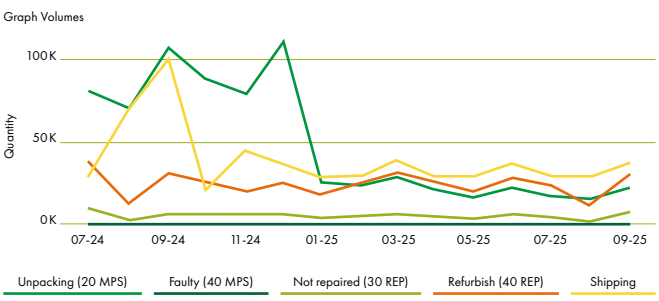
EXAMPLE OF A DEPOSIT FORECASTING LOGIC

Anticipation of the deposit is always based on a law of return, which describes the behavior of customers over time from the time a product (new or already in use) is put on the market: X% return after one year, Y% after 2 years, and so on.

In the case of captive products (e.g. Epalia or Decathlon rental), this law of return may suffice. In the case of a competitive reconditioning market (e.g. Michelin), we can also apply **a capture rate to this projected deposit.** In both cases, **strong interaction with marketing is essential.**

Finally, the quality of returns and the success rate of reconditioning (according to quality/age, etc.) can complete the estimate of future resources available to the market.

VOLUME	2024								
Flux	07	08	09	10	11	12	01	02	03
Unpacking (20 MPS)	79843	70251	106599	88687	78751	109070	25457	24113	28323
Faulty (40 MPS)	0	0	0	0	0	0	0	0	0
Not repaired (30 REP)	8823	2890697	6975	5697	5202	5614	4202	5603	7004
Refurbish (40 REP)	37862	12240	30600	24480	22032	24480	18360	24480	30600
Shipping	28968	70584	100164	22236	44268	36516	28560	29376	36720



AN EXAMPLE OF NEW GOVERNANCE: CIRCULAR S&OP

Close coordination between numerous players is required to meet new data needs (collection of usage information from customers to refine return laws, work on capacity with each partner) **and the multiplication of levers that can be activated.** As in linear Supply Chain, the Sales & Operations Planning or S&OP process is used to ensure that the management team is aligned several months in advance on the responses to be made to the changing situation, and anticipates feasibility.

A new stage is added to the usual processes: **the collection review.** The same players are mobilized as in a linear S&OP, with the addition of tactical resource planners who are responsible for collection management and related issues. They can even exploit CRM systems to estimate individualized product return rates for each major customer.

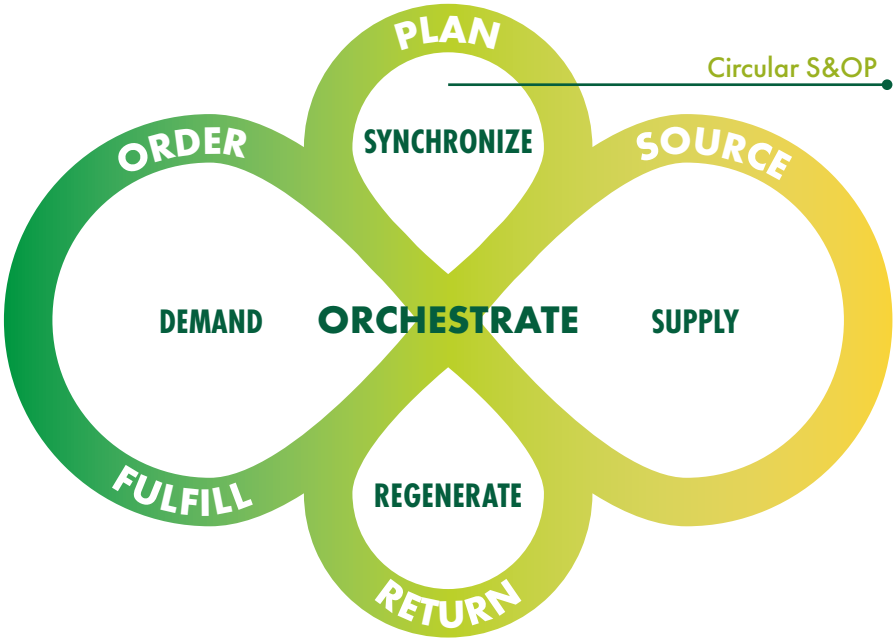
Circular S&OP is still a relatively large-scale process. Low-tech systems (such as Excel) can meet the need for scenario simulation, at least initially. However, as S&OP matures and becomes more geographically widespread, flows and grading will add a level of complexity that will require more specialized and automated tools.

It's interesting to note that when a linear supply chain and a circular supply chain are superimposed, two distinct instances of S&OP coexist. This is because the two models are too different to be managed in the same way.

While circular S&OP is centralized, the same may not be true of PDP, which is carried out at multi-location level.

EXAMPLE OF A MONTHLY PROCESS

POSITIONING WITHIN THE SCOR REFERENCE FRAMEWORK



OPERATIONAL MANAGEMENT - DATA - CONTINUOUS IMPROVEMENT

In the same way as for a linear supply chain, factual data are necessary to control economic profitability and formulate appropriate responses to contingencies. And perhaps even more so! In the circular sector, every penny counts: exploiting the slightest opportunity is a major challenge if we are to remain competitive with an ultra-optimized linear economy. This means thinking about traceability and control.

THE CHALLENGE OF TRACEABILITY

The first reflex of any Supply Chain Manager: «circularity = traceability». There's no denying it, it's a central point in the monitoring process. Good traceability enables you to identify opportunities to optimize your flows and sources, and also to maximize your profitability: for example, having a precise view of the cost and duration of each operation carried out on a product enables you to rechallenge and consider other loops if necessary, or to adapt your prices.

Depending on the field and the product, different monitoring grids are possible.

- Tracking at the finest level - the unit product (translated into a «Product Unique ID») - generates maximum opportunities for improvement thanks to the precise data obtained: duration of use, reconditioning, breakdown typologies, attractiveness of the unit product, positioning of a price that is as adjusted as possible... In a pay-per-use model, each unit is often even equipped with remote tracking (number of uses, duration, settings, etc.).
- However, for each opportunity for improvement, this implies that all the intermediaries involved are equipped with the physical and IT means to record and process this information in order to extract value... and use the same* (for example, if each distributor creates its own model, repairers will specialize by network).

Aggregate monitoring, which is easier to set up, can often provide almost as much value, depending on the sector.

At Lizee, specialized in the rental of retail products, **each unique item has its own unique identifier** (PUID). This fine-tuned control is interesting from an operational point of view, as it enables - among other things! **This enables the organization to identify the impact of price adjustments, as well as recurring defects or potential dormant stocks.**

Michelin, which is also obliged to trace all retreaded tires (as well as new ones, incidentally), given the safety and transparency requirements in the tire sector, can use this information **to generate alerts for its own customers or their contacts when abnormal usage values are identified** - this triggers a root cause search which may incriminate the tire, the pilot, the aircraft, the runway... depending on the case!

However, Epalia, a logistician specializing in pallet reuse, has taken **the gamble of managing its pallet stock on a high mesh** (according to type and quality). Indeed, tracking a low-tech product like pallets in a single mesh represents a cost that is incompatible with the market. However, this does not prevent Epalia from forecasting its rotations thanks to aggregated analyses.

[1] For more information, follow the work of GS1 and PAACT.

MORE OPERATIONAL AND CRITICAL DATA

The new flows and new operations brought about by circularity make it possible to collect a great deal of information, depending on the objectives to be achieved:

- **On product use:** number and duration of uses, number of rentals, changes in condition over time, etc.
- **On collection and distribution logistics:** «filling» of collection points / filling rate of inbound trucks, weight and kilometers traveled per route, etc.
- **Inventory management:** regular inventories of often multi-reference (or multi PUID) locations, identification of dormant stock, etc.
- **On remanufacturing/reconditioning/repair:** frequency of certain failures or defects, duration and man-time spent on primary and secondary sorting, diagnostics, % failure at each stage, compliance with standards, etc.
- **On the material efficiency of one or more loops:** rate of conservation of use, quantity of material re-injected into circular operations, etc.

Each of these types of information requires specific methods and tools for collecting, making reliable (and time-consuming!) and using this information. This may involve «on the floor» tools for scanning and tracing repackaging stages, as well as automatic weighing or transmission between partners.

The challenge for the circular Supply Chain Manager is to determine the criticality of each piece of information, so as to limit investment to that which is essential.

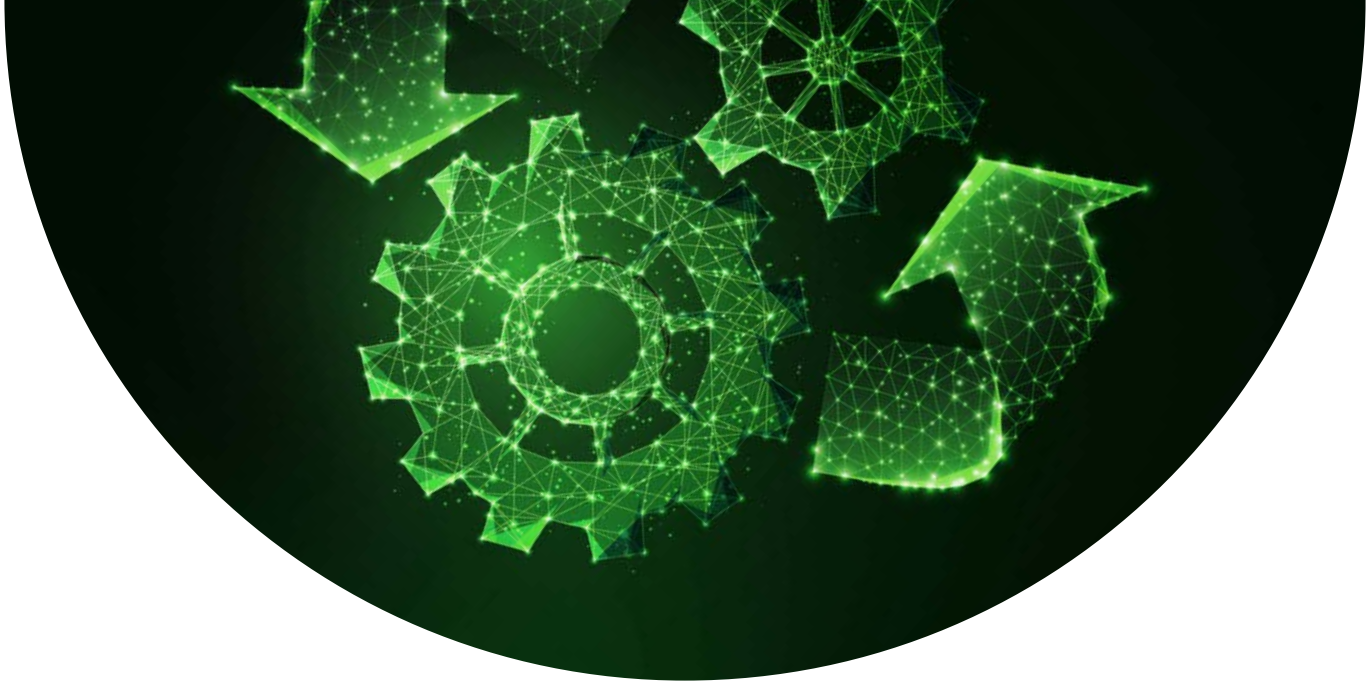
OPERATIONAL EXCELLENCE AND CONTINUOUS IMPROVEMENT AT THE HEART OF OPERATIONS

Having a huge amount of data is a very important source of value for both cost optimization and value generation, both of which are crucial. But you need to know how to exploit it.

The continuous improvement of a circular enterprise therefore depends in part on its ability to exploit advanced data. Without this, sustainable profitability is impossible. With maturity, AI can become an interesting support for operational exploitation in the case of PUID management and the collection of very large amounts of data.

However, as in the case of linear products, **operational excellence is achieved in the field:** each player in the loop must aim to find a way of minimizing material use and overall cost (while ensuring that there are no local losses - cf. value sharing).

It's on the basis of an operational idea that a link can identify a new source of deposits at a neighbor's site, can equip itself to sort a new type of product, or create automated test benches. Let's take the Orange example again: without a well-established system of continuous improvement in the field, ideas to replace the cleaning and polishing of hoods with a faster alternative that involves fewer failures would never have emerged.



THE EVOLUTION OF DIGITAL TOOLS

To guarantee efficient operational management of circular loops, it is essential **to rethink certain tools in order to adapt them to the circular model.** We have already mentioned S&OP and planning in general, which will inevitably see the tools supporting it evolve to manage the deposit.

Similarly, WMSs need to be designed to manage the traceability decided upon (PUID, family, grading...), but also often more extensive upstream sorting processes than on the shelf (e.g. receipt of products from «bulk» collection, which then need to be qualified).

The «production» site needs a tool to monitor the efficiency of the various remanufacturing / reconditioning / refurbishment stages, to control spare parts, but also to guide the work of operators and ensure quality monitoring. This may represent the functional coverage of a tool dedicated to maintenance (CMMS), or of an MES dedicated to circulars. RMS* or ARMS are also sometimes used.

Artificial intelligence can help to better anticipate return flows by analyzing all available data (e.g. customer history data, technical data, forecasts, installed base, etc.).

Last but not least, to establish an effective operational excellence dynamic, it is crucial **to share reliable data, both internally and externally.** To achieve this, it is essential to be transparent and to share information with other players in the circular sector. A solid partnership can thus be established between the various players in these loops **to harmonize and make reliable the data exchanged** (e.g. Continuous improvement for eco-design: involve the reconditioning service provider and suppliers).

*Please note that this acronym has many different definitions, not limited to (Advanced) Return Management System.

ORGANIZATION

Implementing and managing a circular supply chain calls for organizational and management changes: we need to move away from a standardization reflex and adapt to managing the complexity and multiplicity of players and flows, while creating the conditions to maximize the efficiency of each loop smaller than the linear business.

THE ECOSYSTEM AND THE FIELD AT THE HEART OF THE ORGANIZATION

Even more so than in mature, linear organizations honed by years of experience and mastery of repetitive operations, albeit battered by crises, **the organization of circular flow management requires constant learning and adaptation.**

Efficient circularity in terms of material and CO_2 preservation involves several interlocking loops, and therefore **the management of a diverse ecosystem, both internal and external, of suppliers** (recovered materials), **subcontractors** (skills, capabilities) **and customers** (who may also be suppliers), as well as design offices to identify product and service evolution needs, different for each loop.

This network is a real strength that requires a different mindset, skills and postures: operational leadership routines, annual rituals & value sharing... Development no longer applies only to suppliers. Of course, this requires an investment of time on the part of the organization.

However, the heart of efficiency lies in the field, both internally and externally, **and in coordination between the various stakeholders:** realities will differ from one locality to another, and the teams involved will have to adapt to this. This implies a certain decentralization of monitoring and decision-making. The skills and profiles needed to manage it must therefore be data-driven, agile and have the capacity to operate in a non-standard way over a more or less long period of time.

MANY REFLEXES CAN BE TRANSPOSED FROM THE LINEAR SECTOR

The Circular Supply Chain cannot exist without Supply Chain reflexes, with their key concepts of cross-functionality, exchanges, traceability and adaptation to its interlocutors.

The best reflexes must be retained: deal with issues on the basis of factual data, volume balances to ensure minimum profitability/sustainability at each location, regular performance reviews... The issues are the same as in linear supply chain, except that they must be thought through for all loops and on the basis of new KPIs. On paper, one loop may appear to be loss-making in economic terms, but in fact it provides a «free» source of income for the next loop.

What differentiates Supply Chain from Logistics is **the orchestration of decisions and movements, across different planning horizons and throughout the chain.** Circulars are no exception: planning remains the strategic driver of circulars.

EXAMPLE OF MANAGING A REPACKAGING SERVICE PROVIDER

Service provider management (repackaging, etc.) is not necessarily different from mature 3PL management, with multi-factor progress plans (on the 3Ps) and value sharing in the event of improvement.

What's changing is the number of service providers to manage, and the fact that in a world where skills are in short supply, we need to «seduce» service providers and keep them for the long term, so we need to move straight to mature pilots.

2 KEY QUESTIONS: DEDICATED AND DECENTRALIZED ORGANIZATION?

SHARING WITH SHELF SPACE OR DEDICATED ORGANIZATION?

For companies that are not natively circular, the question arises of pooling supply chain skills (logistics, distribution, planning, production, etc.) between the circular activity and the existing organization.

Most examples of large-scale circular operations show that, while circular supply chain teams are «recruited» from linear teams, in general they belong to an entity / BU dedicated to circular activity, which has its own rituals, tools, eco-system and specific objectives. This is the case, for example, at Michelin, Renault, Boulanger, Decathlon...

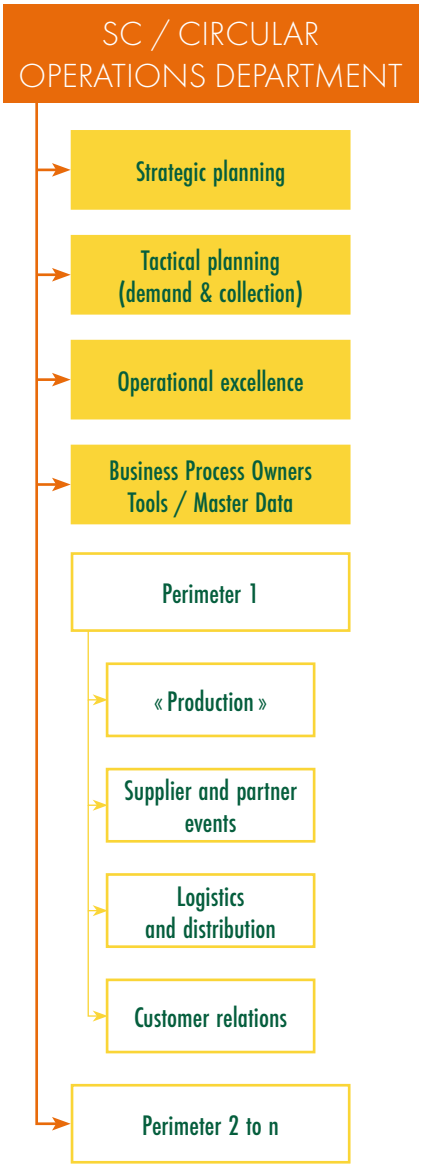
However, the pooling of space (logistics, production) and transport flows must be systematically studied. This is particularly relevant at the start-up stage of a circular business, reducing costs - but constraining flows in relation to potential customer needs. As business grows, dedicated sites are often created.

CENTRALIZED OR LOCALIZED?

As mentioned in the sizing section, **multi-locality is a must, whether on a regional, national or continental scale.** As in the «usual» organizations with a large geographical footprint, some activities can be centralized and the rest delegated to the various localities.

The difference lies in the fact that decision-making is generally delegated to a greater extent than in the linear sector, as soon as multiple loops have to be operated (this is not the case for a single loop, such as rental). Over and above the execution of operations - which must necessarily be outsourced - the local team must define and manage its internal and external eco-system, adapting to its available resources, creating versatility and orchestrating with different levels of customers.

However, the testimonies showed that several services remain centralized: strategic & tactical planning (S&OP) and the forecasting processes that go with it (demand & supply), operational excellence -attached centrally but located on site close to the operators- so that all multi-locations can benefit from the best operational practices identified (sorting, testing, repairs...).



CONCLUSION - GETTING STARTED

The challenges for companies embarking on the implementation of circular loops are not unfamiliar to supply chain managers: master planning for centralization or decentralization, operational excellence, and planning. However, it is in the details that linear reflexes must evolve, relying more heavily on cross-functional cooperation and the willingness to question established models.

WHERE TO BEGIN?

These new processes must be approached gradually; a «big bang» implementation is not realistic, especially when it comes to building the partner ecosystem. Most often, it is recommended to start with a project on a limited scope, ideally focusing on a closed loop. This approach allows the involvement of relevant partners for the specific domain, precise management oversight, and control over levers such as supply and quality (e.g., avoiding grading systems). It also enables organizations to take their first steps in value-sharing practices, which may feel unfamiliar to leadership.

A key consideration here is that **this initial loop must address a genuine business** concern to secure high-level sponsorship from the outset and foster the evolution of strategic thinking at the highest levels. Simply complying with obligations like the AGEC law by implementing material recycling, for example, will not suffice to strengthen the model's resilience or prepare for scaling. Such efforts are unlikely to be seen as central to the company's future. Instead, the focus should be on market expansion ambitions or ensuring the availability of critical materials. **By prioritizing these areas, measurable results can be highlighted and naturally drive further steps at the executive committee level.**

In parallel, **thorough work on product and service redesign is essential:** a product not designed for multiple life cycles cannot support scaling. However, this aspect is not yet the primary focus of this collaborative effort.

Finally, we must keep in mind the ultimate goal of this work, aptly summarized by Anne James of Schneider Electric: «The circular supply chain must become the supply chain. As long as it is treated as separate from the linear supply chain, scaling efforts remain insufficient.»

MARCH 2023
Advocacy for a Circular Supply Chain - Definition and Promotion of the Concept by Citwell and Soroa

NOV. 2023 OCT. 2024
Practical Workshops within France Supply Chain Led by Citwell

DEC. 2024
Publication of the First Guide for the Implementation and Management of Circular Supply Chains

2025
Continuation of Work and Expanded Knowledge Sharing within the LAB SupplyChain4Good

Testifying in 2025

"The Supply Chain plays a crucial role in this transition to circularity. As key players and decision-makers in the value chain, you will need to adapt or rethink your processes, organizations, and tools through even greater collaboration with your partners and industry. Our professions must evolve, and in doing so, they will become even more exciting."

Adeline Bret
Manager, Head of Sustainability and CSR Consulting Citwell

"Many manufacturers and economic players would like to switch to the circular economy, but don't have all the information and skills they need to make this pivot. The scaling-up and performance of new business models are essentially hampered by supply chain issues, and this publication provides an initial response."

Camille Demarquilly
Corporate Director, Supply Chain Center of Excellence MICHELIN

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contact@francesupplychain.org
www.francesupplychain.org

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Citwell
Accelerators of transformation

Anaïs LEBLANC
Executive Partner -
Workshops Leader Citwell
anais.leblanc@citwell.com
06 48 22 35 66

Citwell
Accelerators of transformation

Adeline BRET
Manager, Head of Sustainability
and CSR Consulting Citwell
adeline.bret@citwell.com
06 84 95 85 04