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No	Company			Experience	
	Field	Size[1]	Description	Relevant	Further
3	Automotive Supplier	165k	Site Manager	26 years	ZF-Production System, Winner of German Sustainability Award, Cradle-to-Cradle certified, ISO 14000

[1]k = 1,000

Similarities and Differences - Overlaps and Deviations in Terms of Objectives, Methods and Underlying Philosophy

In practice, CE is accompanied by LM and they merge into each other. If waste is avoided in the LM context or products become better, then there is also a positive effect in the sense of CE. However, the direct overlaps are rather manageable. In development or construction, for example, the 0-error strategy must be extended to ensure failure-free operation in the first product life in order to offer enough potential for R-strategies. If, on the other hand, the failure of components is part of the product development strategy, then CE fails.

5S is an important structural element for processes in the company, as is the 0-error principle. However, both require many systems, departments and stakeholders to come together. Overproduction was not a problem in the past, but thanks to LM it is now an important target variable in companies and the most important in LM. Keeping old parts in stock is a problem in the context of LM, but necessary to ensure CE. In particular, stocks of products that are no longer in demand are problematic. The art is to use these stocks as raw materials in subsequent products. However, particularly fast-moving technology such as mobile phones are not very suitable for repair or refurb due to rapid progress. The market for 5-year-old mobile phones is non-existent. Small batch sizes or even one-piece-flow are easy to implement in remanufacturing or refurb, as automation is rather uneconomical. Poka-Yoke should be further developed and connections should be made detachable. Positive connections are practically inseparable and therefore problematic for R-strategy approaches. In the background, companies need to deal with the topic of Design for R early on in product development.

A sensible metric would be the ratio of used material to new material. In this context, material must also be used that is designed for durability. Wear components must be identified and designed to be replaceable. Holistic and common KPIs are important to avoid fragmentation of different stakeholders.

CE focuses on reuse and promotes the use of ecological materials that, for example, favor or even make traceability possible. However, especially with regard to returns, there can also be an increase in transport-related CO2 emissions or wear and tear, which is why a holistic view of the entire product life cycle is important.

CE clearly prioritizes environmental aspects such as lower energy consumption. The balance area can be easily defined and can also be considered holistically. For example, electricity from the roof can be worthwhile, even if it is not always available. However, CE-compliant material is considered more expensive than standard line products. Therefore, a favorable design and a corresponding balancing are important to avoid disposable products and to exploit CE potential. LM runs according to the customer cycle, but returns for reuse are not plannable and therefore not taktbar. Basic materials should always be recyclable, and even if products initially seem more expensive, the added value of a second or even third product life can offset the additional costs. LM is strongly anchored in processes and, depending on the process management, can also work against CE.

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Synergy Effects and Target Conflicts - Interactions and Results in the Joint Implementation of CE and LM

A direct conflict arises when LM experts lose internal business to CE experts. Another problem is that the return of components to the series is not always legally possible. The aftermarket offers possibilities to mix old and new products, but installation in the series for new cars is not permitted, although enough components would be durable and would not be distinguishable for the customer or even on the test bench.

The 0-error strategy, used correctly, can create products that are long-term usable and recyclable. Planned obsolescence must then be strictly avoided. Design for R should be considered here. The clip on ballpoint pens often breaks off, but the pen basically still writes and the defect is easy to solve if spare parts are available. Alternatively, the clamping mechanism could be designed so that it does not break at all.

Conflicts always arise where competing products or their concepts meet. For example, bottles should be made of thin plastic to be cheap, whereas reusable bottles are made of thick plastic or glass; which allows multiple use and recyclability. In doubt, the customer does not even realize that products are used multiple times.

In order to prevent conflicts, a holistic approach is necessary that includes Design for R and also Cradle to Cradle. If a higher quality material is used right from the start, it will be easier to bring parts back into the cycle in the second or third life.

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Further Thoughts on Strategies, Methods and Tools

A clean discussion about CE is only possible with a precise nomenclature (DIN91472 for classification). The distinction between Repair or Remanufacture is not always clear, especially for the customer. Basically, however, customers want products that are at least as good as new and they clearly reject reductions in performance or service life. Sufficient refurbish or repair has become rare, although an OEM in particular offers important background knowledge for dimensioning and has a feedback loop into development or technical design. Chako Chako offers further potential in the context of CE, but the effort and benefit must be in proportion.