Repairability and serviceability of household appliances

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Aleksandra Kosciuch, Ursula Teubert

The problem

- Triple challenge for household appliances manufacturers

Smart technologies

energy efficiency

transition to circular economy

Design for repair

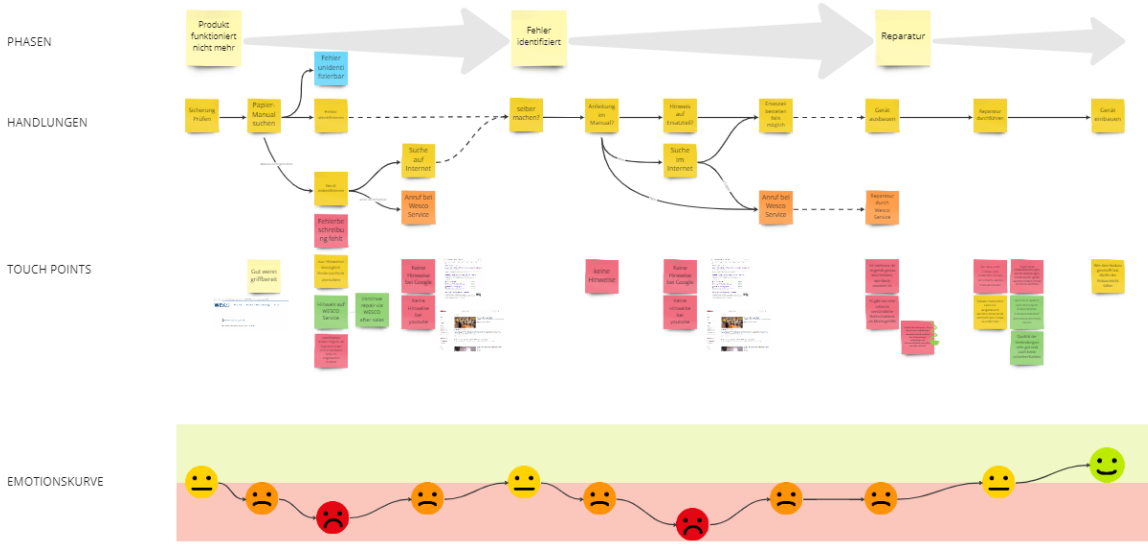
cross-ING repairability check

APPLIED CIRCULAR SUSTAINABILITY

Repairability score

Category	Nr	Criterion description	0	2	5	10	Wesco cooker hood scores	
Product Identification	1.1	Ease of identification	not available	-	Brand and unique model version reference at least point 10*	Brand and unique model version reference at least point 10* and GTIN code integrated in black/white barcode or QR code	2	
	1.2	Accessibility of identification	not available	-	Accessible only after removal of less than 2* connections	Accessible after manual operation without disconnecting components	2	
	1.3	Robustness of identification	not available	All or part of the product identification information is included on removable labels e.g. glued	All product identification information is engraved or printed	-	2	
	1.4	Availability of identification support	not available	Technical support from manufacturer available for product identification for at least 5* years after last production	Technical support from manufacturer available for product identification for at least 10* years after last production	-	5	
	1.5	Accessibility of identification support	not available	Local fee contact available for product identification.	Toll-free or web-based support available for product identification.	-	2	
Failure diagnostic	2.1	Instructions for problem identification - content	not available	Repair instructions include the following elements: - safety measures - (check)list of identified root causes for common failures/misuses	Repair instruction includes the following elements: - safety measures - basic fault diagnostic advice: (check)list of identified root causes for common failures* - test method to check working condition of key functional parts* - limited list of error codes and required repair actions, if applicable	Repair instruction includes the following elements: - safety measures - fault diagnostic advice: (check)list of identified root causes for common failures* and troubleshooting tree - test method to check working condition of priority part - complete list of error codes and required repair actions, if applicable - diagrams of the Printed Circuit Board, if applicable - fault detection software , if applicable	0	
	2.2	Product designed for easy failure detection	not available	Fault detection software and a separate PC (or alike) are required to proceed to failure detection	Coded interface: Cause of failure can be established by means of the control panel/display. Supporting documentation (e.g. error codes) could be required.	Usually intuitive interface: Cause of failure can easily be established due to implemented features in the product (software) design. There is no need for additional supporting documentation or software	0	
	2.3	Availability of failure diagnostic support	not available	Technical support from manufacturer available for failure diagnostic for 5* years after last production	Technical support from manufacturer available for failure diagnostic for at least 10* years after last production	-	5	
	2.4	Accessibility of failure diagnostic support	not available	Local fee contact available for failure diagnostic.	Toll-free or web-based contact available for failure diagnostic allowing customer to identify issues and required repair actions	-	2	
Disassembly and reassembly	3.1	Disassembly instructions - content	not available	Disassembly instructions include the following elements: - exploded diagram (include minimum size*)	Disassembly instructions include the following elements: - exploded diagram (include minimum size*) - list of required tools - list of connectors used	Disassembly instructions include the following elements: - exploded diagram (include minimum size*) list of connectors used - list of required tools - description of recommended disassembly steps to remove priority parts*	0	
	3.2	Product designed for ease of disassembly	Product cannot be disassembled and reassembled	Reduced ease of disassembly: >10% slower than an reference value* for complete* product disassembly OR Reduced ease of disassembly: average eDIM for partial disassembly represents >30% of eDIM for total disassembly	Average ease of disassembly: does not deviate more than 10% of reference value* for complete* product disassembly OR Average ease of disassembly: average eDIM for partial disassembly represents between (15%-30%) of eDIM for total disassembly	Increased ease of disassembly: >10% faster than an reference value* for complete* product disassembly OR Increased ease of disassembly: average eDIM for partial disassembly represents	7	
	3.3	Required tools for disassembly	not available	Priority part(s) can be replaced using specialized commercially available tools (from specific list Annex B*)	Priority part(s) can be replaced using only common general purpose tools (from specific list Annex A*)	Priority part(s) can be replaced with one tool*	10	
	3.4	Availability of technical support for disassembly and reassembly	not available	Technical support from manufacturer available for disassembly and reassembly for at least 5* years after last production	Technical support from manufacturer available for disassembly and reassembly for at least 10* years after last production	-	5	for pro-repairers. For end users 0
	3.5	Accessibility of technical support for disassembly and reassembly	not available	Local fee contact available for disassembly and reassembly.	Toll-free or web-based contact available for disassembly and reassembly allowing customer to access and repair / replace failed part through assisted disassembly and reassembly	-	2	
Spare part replacement	4.1	Information for spare parts	not available	-	Information related to spare parts include the following elements: - Information on spare parts supply (address , webshop)	Information related to spare parts include the following elements: - Information on spare parts supply (address , webshop) - Spare part register including unique reference numbers of available spare parts	0	
	4.2	Information for 3D printing of spare parts	not available	Information to allow customer to print spare part is available when relevant (for "simple" parts such as switches or product casing)	-	-	0	
	4.3	Modular design of the product	not available	At least 50% (by count) priority parts* can be replaced individually	At least 75% (by count) priority parts*can be replaced individually	All priority parts* can be replaced individually	10	
	4.4	Standardized design	not available	A number of priority parts* are standardized	All priority parts* are standardized	-	2	
	4.5	Supply of spare parts - content	not available	Compatible spare parts for priority parts* are limited available for this product 50%* (by count)	Compatible spare parts for priority parts* are widely available for this product 100%* (by count)	-	5	
	4.6	Supply of spare parts - availability	not available	Mid-term availability of spare parts availability for at least 5* years after last production	Long-term availability of spare parts for at least 10* years after last production	-	5	
	4.7	Supply of spare parts - cost	not available	Average consumer price of available spare parts is between 10% and 20%* of catalogue price of the product (20% included)	Average consumer price of available parts is between 5 and 10%* of catalogue price (10% included)	Average consumer price of available parts is less or equal to 5%* of catalogue price		
Restoring to working condition	5.1	Instructions for reconditioning of product	not available	-	Repair instruction includes procedure to reset to default / factory settings and restore product to working condition, as appropriate	-	0	
	5.2	Product designed for ease of restoring to working condition after repair	not available	Product resetting can be done without intervention with an external / specialized device	-	-	0	
	5.3	Technical support for reconditioning - accessibility	not available	Local fee contact available for reconditioning.	Toll-free or web-based contact available for reconditioning.	-	2	
						Sum:	68	/164

User journey



→ Understand the complete repairability value chain

ING

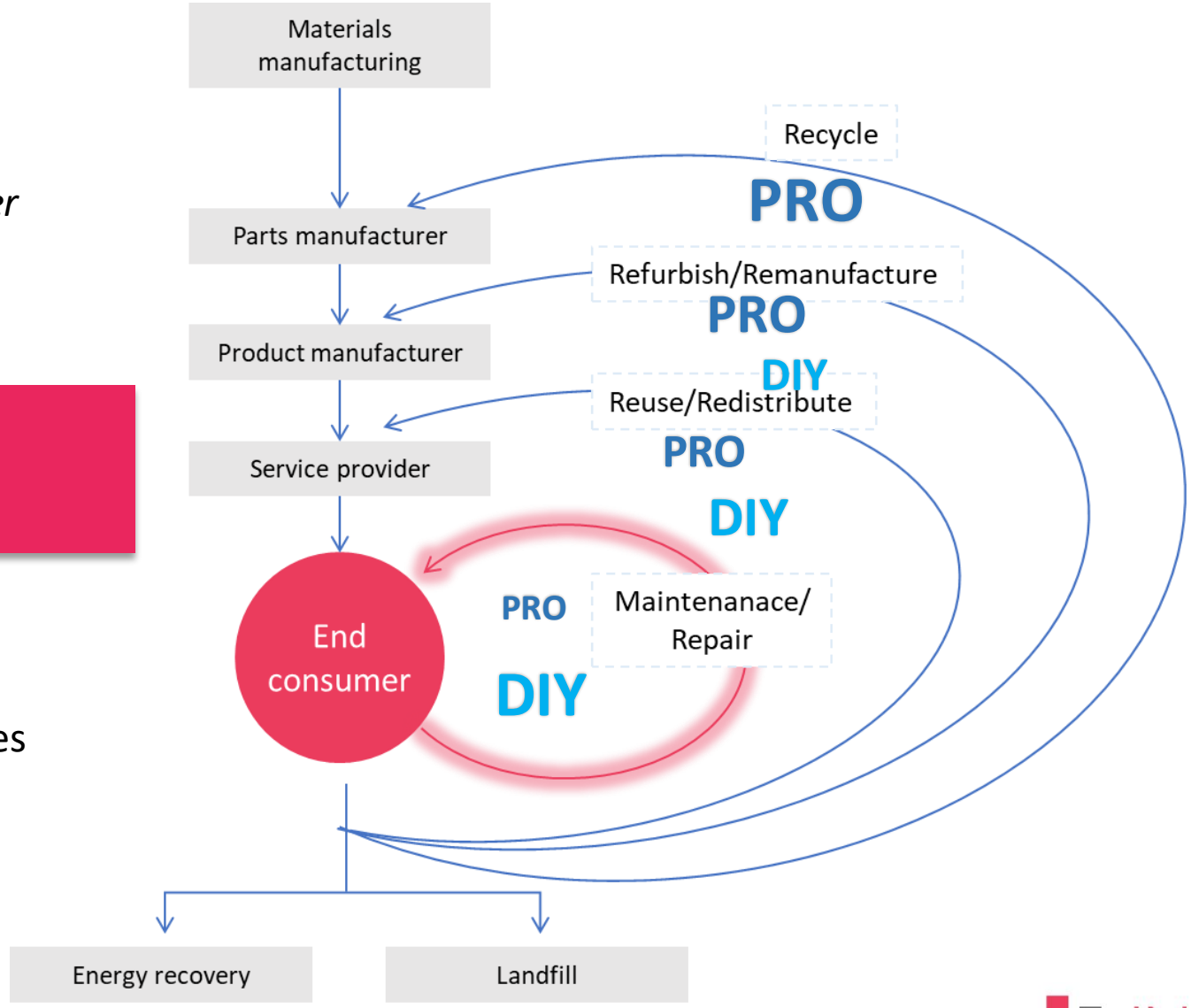
Transition to circular: closing the technical cycle

~90% of PRO service interventions tackle lack of customers' awereness of basic maintanance (e.g. filter cleaning).

Seeing PRO and DIY approaches as complementary

Customer centricity

- integrate DIY customer experience into innovation and quality management processes



Learnings from cross-ING‘s repairability checks + academic study

1. **High product quality** => good basis for a circular product

2. Think of **professional and DIY repair** as one
   - Customer centric innovation management
   - Opportunity for pilot of re-manufacturing

3. Use **open source IP management for electronics soft & hardware**
   - To make electronic hardware completely reusable and repairable
   - **To boost strandardization of electronic hardware**

APPLIED CIRCULAR SUSTAINABILITY

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cross-ING
CC-Nachhaltigkeit

cross-ING next steps: prepare for European innovation project

APPLIED CIRCULAR SUSTAINABILITY

XXXIV ISPIM INNOVATION CONFERENCE
Innovation and Circular Economy
4-7 June 2023 - Ljubljana, Slovenia

academic study &

eu grants access

Check on possible grants with ETHZ EU grants access manager

Objective: an European innovation collaboration/consortium on circularity of household appliances

Thank you

Aleksandra Kosciuch
a.kosciuch@cross-ing.ch

Ursula Teubert
u.teubert@cross-ing.ch