

# Seated in Uncertainty:

## Dealing with substances of concern in office chair design.

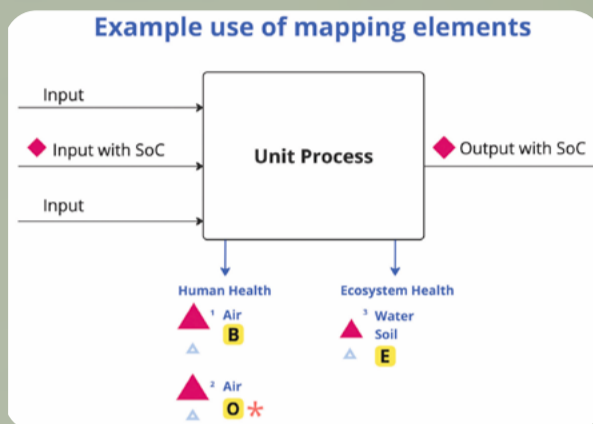
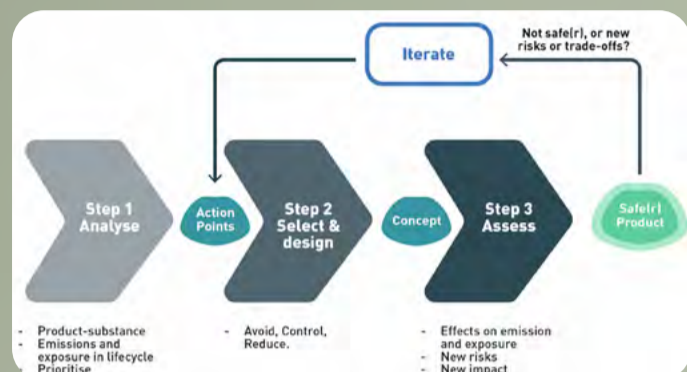
*A Safe & Circular by Design approach to office chairs.*

### Context: The practical application of the Safe and Circular by Design tool.

The Safe and Circular by Design framework was developed to address chemical safety and circularity together, yet it has not been applied within the office task chair industry. This project provides the first end-to-end worked case.

### Method: Safe and Circular by Design applied

The SCbD methodology is applied through the MAPSSS assessment tool, using TCPP in polyurethane foam as the case substance. Step 1 maps exposure hotspots across 23 lifecycle stages. Step 2 translates the risk map into three SCbD strategies, each developed into a chair concept: Avoid, Reduce and Control.



Avoid		
Avoid	Alternative value proposition or function	Waterproofing weaving techniques
Substitute	With substances or materials known to be safe	Natural rubber for flooring
Phase out	With less harmful substances or materials	Non ozone depleting refrigerants
	Re-evaluate essentiality	No PFAS in non-essential uses

Reduce		
Reduce content (Lower volumes - lower exposure)	Reduce content of the SoC in the product or limit use to certain components	Reduced amount of refrigerant
Increase useful life / Keep in use longer (To avoid accumulation at end of life)	Durability	Increase quality
	Maintenance and repair	Reinforcing cable sleeves
	Alternative business models	Reusable food packaging
Inform / customize	To protect vulnerable groups	Risk information
	To avoid mechanisms that aggravate emissions	Washing information on label

Control		
Contain / isolate	Prevent emissions or exposure by isolating the SoC in the product.	Hermetic cooling systems
	Reduce production/manufacturing processes	Controlled chambers in manufacturing
Control collection / recovery	Separate collection	Collection of refrigerant
	Monitor materials to avoid SoC	Monitoring flooring waste
	SoC can be easily separated	Design for disassembly
	Maintain control over the product	Maintain in fluence in case unforeseen negative effects arise

### Outcomes:



- **Avoid** :Eliminate the substance. TPE-E webbing replaces PU foam.Product-as-a-Service.
- **Reduce**: Minimise and isolate.Zoned foam in a replaceable cassette. Lease with cassette exchange.
- **Control**: Seal exposure pathways. Foam encapsulated in TPU and PP. Lease with closed-loop refurbishment.

### Contribution: What this case demonstrates

The three concepts are not ranked alternatives but a deliberate spectrum, showing how SCbD strategies produce materially and commercially different products from the same starting brief. The case provides a worked example of MAPSSS applied end-to-end to a complex B2B product, and a template for designers facing similar substance-product trade-offs in furniture and beyond.