



FEDERCHIMICA
AISPEC

Associazione nazionale imprese
chimica fine e settori specialistici



SCENT OF FUTURE

Advancing sustainability in fragrance

Milano, 08 May 2025

CLAUDIA DELLERA

Presidente Gruppo aromi e fragranze (Federchimica –Aispec)

Flavour and Fragrance group

Founded in the **60's** under Aschimici the Group evolved in the as today's known **Flavour and Fragrance Group**: one of the 13 Aispec trade associations. It is composed of 45 SMEs and multinational companies.

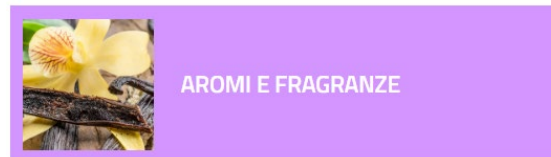
**Part of Italian Chemical Industry:
Federchimica**



**Branched structure:
fine chemicals and specialties**



**Sector group for
Flavour and Fragrance**



IFRA: the voice of the fragrance industry in Europe and globally

The fragrance industry is composed of a **wide range of manufacturers, from few multinational companies to 750 SMEs in Europe**

IFRA emphasizes the importance to build on the sector's initiatives and knowledge to develop **meaningful and proportionate provisions for the fragrance industry**, manageable and enforceable by all operators, **from multinational companies to the hundreds of SMEs operating in the sector**

7

Regular Members
(global companies)

23

National Associations
(organised in four
Regional Committees)

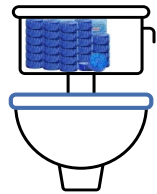
11

Supporting Members (in
countries with no National
Association)

What is a fragrance?

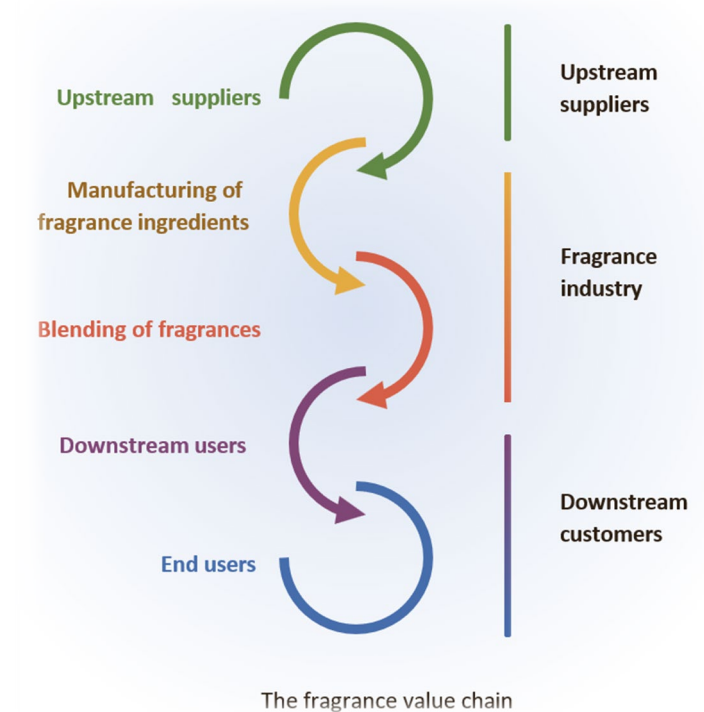
- A fragrance is typically a mixture of around **60 to 80 ingredients** in household products and can go up to **several hundreds** in fine fragrances
- The perfumer's palette is composed of **thousands of substances** – **some of which are natural complex substances**, representing a small contribution by volume in the final product but playing **a major role in society**
- Fragrance is one of the **key driver of consumer purchase**

*Support: Hygiene, Malodour
Control, Cleaning,
Disinfection, Sanitation,
Wellness*



The fragrance industry, at the core of a complex value chain

The fragrance industry is at the **heart of a sophisticated value chain**, supporting jobs for farmers, the chemicals sector, consumer goods manufacturers and retailers



Agenda

Driving
sustainability:
IFRA-IOFI Charter &
industry
engagement

IFRA case-study on
Safe and
Sustainable by
Design

Driving sustainability: IFRA-IOFI Charter & industry engagement

IFRA-IOFI Sustainability Charter

ifra-iofi.org



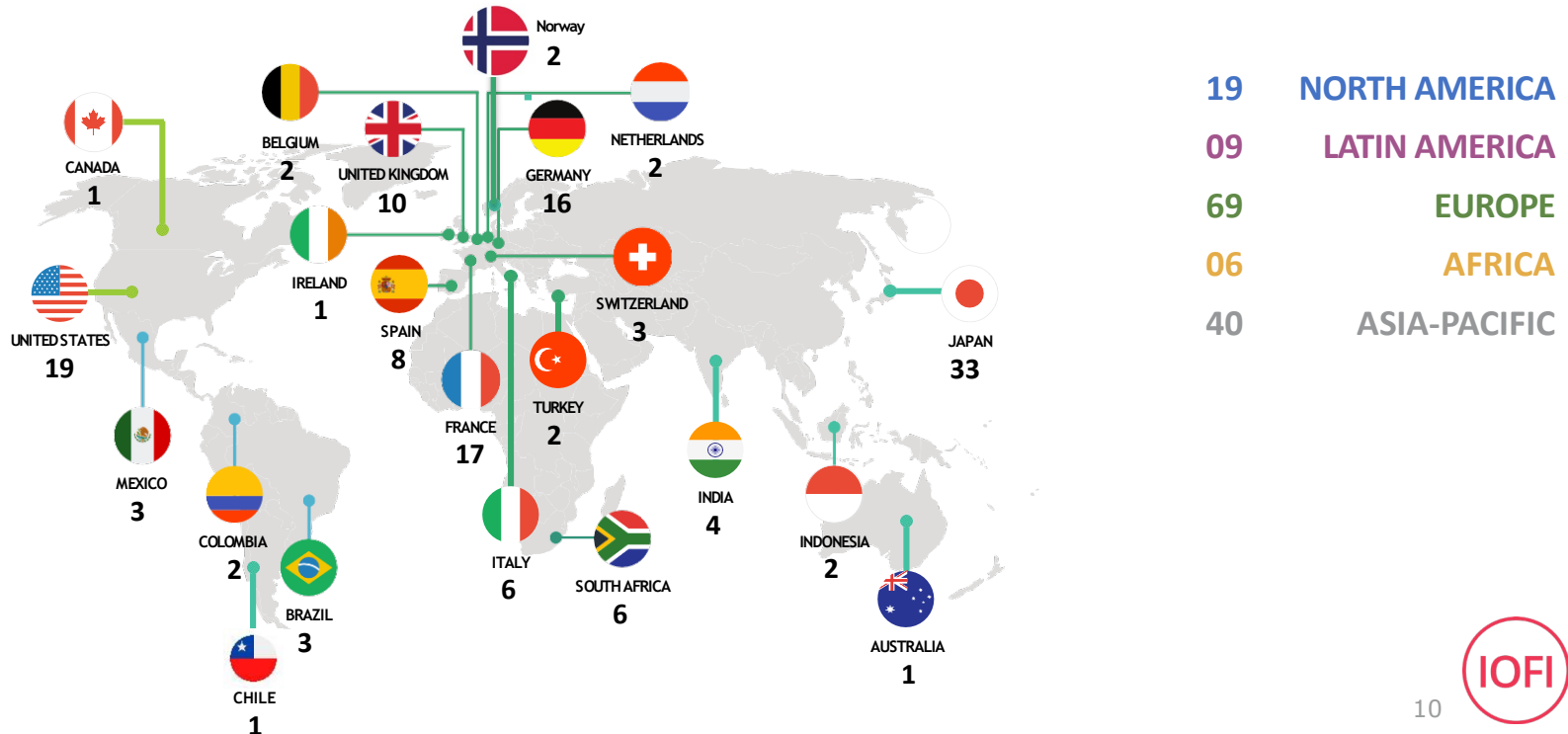
The IFRA-IOFI Sustainability Charter

The **Charter** forms the common framework for **collective industry action**. IFRA members can voluntarily become Charter signatories.



IFRA-IOFI Sustainability Charter Signatories

The Charter has been signed by 143 companies, large and small, in the latest update in October 2024. National/regional breakdown by signatory company headquarters



The Second IFRA-IOFI Sustainability Report was launched on June 5, 2023



- The **2023 Report** covers the activities of the new Sustainability Committee, the Sustainability Community, and work on **carbon footprint, deforestation, Green Chemistry, and harmonised definitions**
- Highlights that the **F&F sectors are mature** in their sustainability efforts
- Find out more at www.ifra-iofi.org/report
- 3rd IFRA-IOFI Sustainability Progress report **planned for 2025**

IFRA-IOFI Sustainability Purpose

The IFRA-IOFI Sustainability Charter aims to complement company initiatives



IFRA and IOFI have defined objectives for its joined framework outlined in the Sustainability Charter



IFRA Green Chemistry Compass



The IFRA Green Chemistry Compass –overview

- The promotion of Green Chemistry is included in the IFRA-IOFI Sustainability Charter
- The Compass tool has **four objectives**
 1. **Design a tool** to implement the Fragrance Industry's Sustainability Charter element 2.3.
"We are inspired by Green Chemistry"
 2. **Raise awareness** of the 12 Principles of Green Chemistry and prioritize those Green Chemistry Principles relevant for the fragrance industry and turn them into an actionable tool to enrich the Sustainability Charter toolbox.
 3. The Compass tool provides **direction for scientists** and other industry professionals towards the conscious design of greener, safer and more sustainable chemical choices.
 4. The Compass tool is an **open-source tool, that is inclusive, voluntary, global and open to all interested stakeholders**. It was generated through a global public consultation.
- IFRA team + Industry Representative + Beyond Benign (John Warner) worked on a harmonized framework relevant to our industry of what represents: 'Most preferred', 'Needs improvement', and 'Least preferred'
- **IFRA GCC Tool was published in Perfumer & Flavorist magazine- October 2024 edition.**
- Detailed **guidance free accessible on the IFRA website**



IFRA Green Chemistry Compass released



The IFRA Green Chemistry Compass: A Harmonized Tool to Support the Fragrance Industry's Pivotal Journey Toward Greater Sustainability

Oct 16, 2024 | By MARTINA SANICHIM (IFRA), AMY CANNON (Byond Design), JOERG THEO FISCHER (Syntex), TOMMY PHAM (Mann), THIERRY ROBERT (Firmenich), FRANCESCO SANTORO (BASF), JONATHAN WARR (Lead Author (Takasago)) | From IFRA (International Fragrance Association)



THE IFRA GREEN CHEMISTRY COMPASS IS A HARMONIZED TOOL TO SUPPORT THE FRAGRANCE INDUSTRY'S PIVOTAL JOURNEY TOWARD GREATER SUSTAINABILITY.

Preamble

The terms 'product' and 'ingredient' will be used interchangeably throughout this article. A product is a fragrance raw material which is also a fragrance ingredient. For the purposes of the IFRA Green Chemistry Compass, the term 'product' refers to a fragrance ingredient.



2024 Leaders	
AMBIENT SCENT	
IBERCHEM SA	
SOLVAY	
FINE FRAGRANCE	
DEBIA DO	
HANGZHOU GRASCENT CO. LTD	
IBERCHEM SA	
IFF INTERNATIONAL FLAVORS & FRAGRANCES	
LECO CORPORATION	
GULCICEK KIMYA VE TICARET AS	
YAGLAR SANAYI VE TICARET AS	
HOME CARE	
GULCICEK KIMYA VE TICARET AS	
YAGLAR SANAYI VE TICARET AS	
TEATE PLC	
INGREDIENTS	
AGUMARA REGINA	
AUSOCHEMICALS	
BASF SE	



What is Green Chemistry?

“The utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture, and application of chemical products.”

- Environmental and health benefit
- Economically profitable
- Effective



$$\text{RISK} = \downarrow \text{HAZARD} \times \downarrow \text{EXPOSURE}$$

Anastas, P. T.; Warner, J. C. *Green Chemistry: Theory and Practice*.
Oxford University Press: 1998.

TechNavio. *Global Green Chemicals Market 2019-2023*, 2019.

IFRA case-study on Safe and Sustainable by Design

The SSbD framework, a two-phased approach

1-(Re)Design Phase

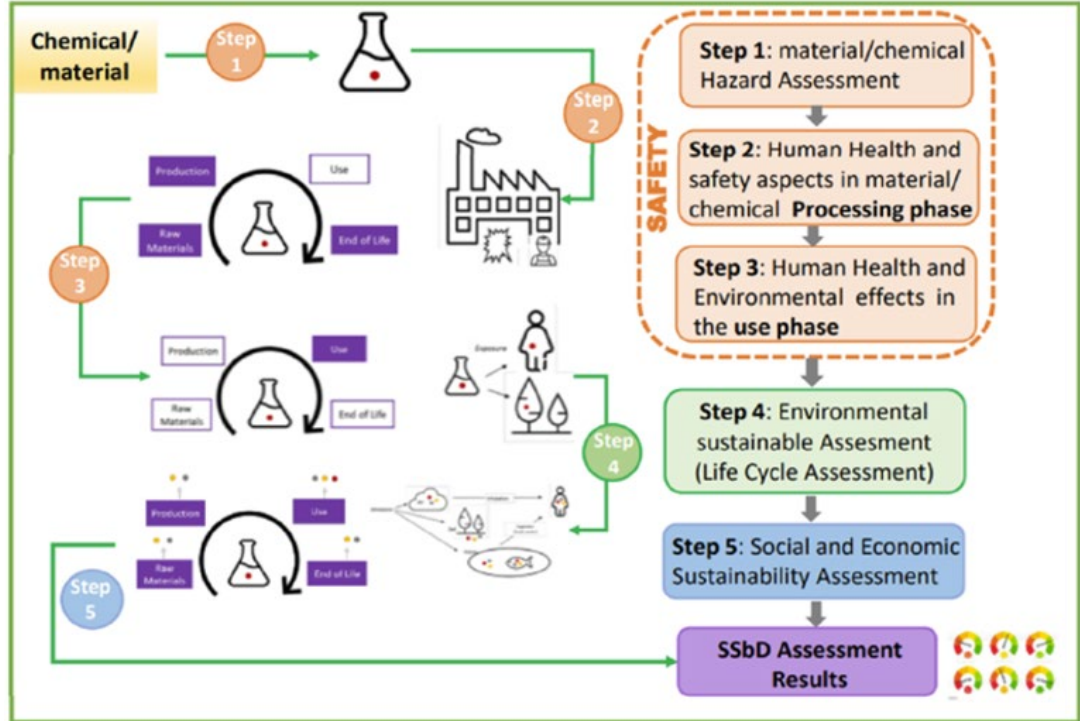
Design guiding principles are proposed to support the design of chemical and materials

- Green chemistry
- Green Engineering
- Sustainable Chemistry
- Safe by design

List of SSbD principles recommended by the JRC SSbD framework

SSbD1	Material efficiency
SSbD2	Minimize the use of hazardous chemicals/materials
SSbD3	Design for energy efficiency
SSbD4	Use renewable sources
SSbD5	Prevent and avoid hazardous emissions
SSbD6	Reduce exposure to hazardous substances
SSbD7	Design for end of life
SSbD8	Consider the whole Life Cycle

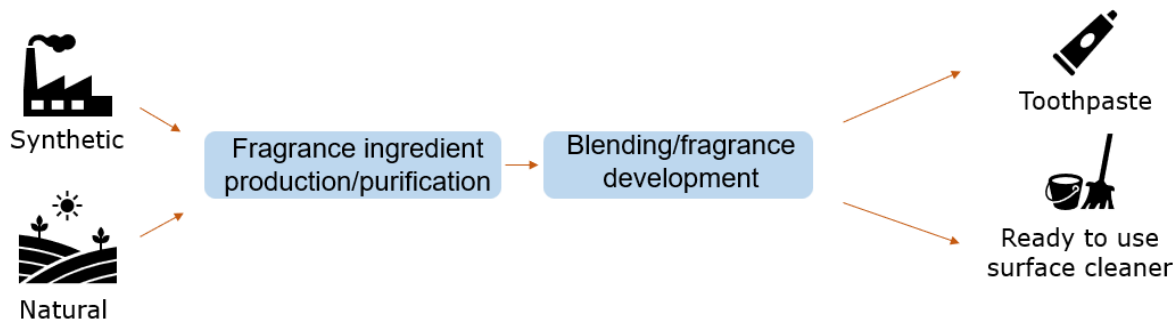
2- Safety and sustainability assessment



IFRA SSbD case-study on a fragrance ingredient, methyl salicylate



- **Objective:** Assess the **suitability & feasibility** of the SSbD framework for the fragrance industry
- **Approach:**
 - **Conducted a case-study** on the widely used and well-known fragrance ingredient Methyl Salicylate (REACH registered $\geq 1,000$ tonnes/year)
 - Tested the thorough **safety and sustainability assessment** of the SSbD framework by comparing different sources and uses of the ingredient



Results of the case study

Step / Dimension	Aspects	SSbD level	
		Synthetic MeS	Natural MeS
Step 1: Hazard properties	H1/H2/H3	1	
Step 2: Human health and safety aspects	Production risk exposure assessment: products and chemicals	2	3
	Processing risk exposure assessment : formulation	4	
Step 3: Human health and environmental aspects (use phase)	Human health and environment	4	
Step 4: Environmental sustainability	E1/E2/E3/E4	Reference	0

Steps 1-3: Hazard and Safety Assessment of the Chemical



Step 1 – Hazard Assessment of Methyl Salicylate

Criteria	Meaning	Rating
H1	Most harmful substances	Level 0
H2	Substance of concern	Level 1
H3	Other hazards	Level 2
/	No hazard	Level 3

The level rating correspond to the worst SSbD score

Methyl salicylate hazard statement	Hazard category	SSbD associated criteria
H302	Acute tox 4	H3
H361d	Repr 2	H2
H412	Aquatic chronic 3	H2
H317	Skin sens 1B	H2
H318	Eye damage 1	H3



Level 1

Continue
assessment

H2
Substances of concern
Substitute as far as possible
Redesign
Control emissions/exposure
Seek alternatives
Track through life cycle

According to its classification, **methyl salicylate passes the H1 criterion** «most harmful substances» but **does not pass the H2 criterion** and is then considered as a «**substance of concern**».

Therefore, according to **SSbD evaluation**, methyl salicylate is in **level 1** of SSbD classification and thus passes the **cut-off point** (level 0).

Step 2 – Human Health safety assessment during production

Production of synthetic MeS

	Sodium phenolate	Sodium salicylate	Salicylic acid	Methyl salicylate
SSbD level	2	3	2	2

Formulation using MeS

	Formulation
SSbD level	4

Production of natural MeS

	Gaultheria culture	Natural methyl salicylate
SSbD level	2	4

Cumulated SSbD score	SSbD level
8	4 Negligible risk
6 - 7	3 Low risk
4 - 5	2 Medium risk
2 - 3	1 High risk
0 - 1	0 Very high risk

- According to the **evaluation of human health and safety aspects** during the **production process** of methyl salicylate, the **natural version** shows a **lower risk of exposure** than **synthetic version** for **workers**. Risks associated to synthetic MeS are all along the value chain, while it only comes from the use of pesticide for natural methyl salicylate
- Even if some **contributing scenarios' score exceed the threshold** for **MeS based formulation**, the process still achieves the **highest SSbD level** on workers exposure.

Step 3 – Human health and environmental safety assessment in final application

Safe level :
RCR = 1

Risk characterization ratio (RCR)	SSbD score	Criteria evaluation
> 1,5 (above safe level +50%)	0	Fail the criteria
1,01 - 1,49 (between safe level and safe level +50%)	1	
0,75 – 1 (between safe level and safe level -25%)	2	
0,5 - 0,75 (between safe level -25% and safe level -50%)	3	Pass the criteria
< 0,5 (below safe level -50%)	4	



Adapted from scoring used in JRC case study and SSbD framework

Consumer use as surface cleaner

Contributing scenario	Total RCR	SSbD score
ERC 8a (environment)	Confidential	4
PC 35 (consumer)	Confidential	4

Consumer use as toothpaste

Contributing scenario	Total RCR	SSbD score
ERC 8a (environment)	Confidential	4
PC 39 (consumer)	0,262*	4

* Hypotheses in Appendix 3

- Due to the **low concentration of methyl salicylate** in both final products, the **human health** and **environmental risks** for the use phase fall **under 50% of the safe level**, and therefore reach the highest **SSbD score/level of 4** and **pass the criteria**.

Conclusions on Steps 1-3

- **Hazard assessment: methyl salicylate is a REACH registered substance** in the highest tonnage band ($\geq 1\,000$ tonnes per annum), most of the data necessary to complete Step 1 were readily available → **For fragrance ingredients that are not REACH registered or registered in a lower tonnage band or for substances without a harmonized classification:** the completion of Step 1 is anticipated to be more challenging.
- **Safety at production process:** This risk assessment is **not necessarily representative of the average production process** for both synthetic and natural methyl salicylate (because of the **lack of quantitative data**). The production risk assessment depends on **who/where/how** the substance in scope is produced.
- **Safety at end use:** most information were available in the extended SDS, limited additional information were necessary to complete the assessment.

Step 4: Environmental sustainability (LCA)



Summary on Step 4 contributing impact categories

Impact category	Toothpaste		Surface cleaner	
	Synthetic MeS	Natural MeS	Synthetic MeS	Natural MeS
	Percentage contribution		Percentage contribution	
Climate change	21%	7%	31%	7%
Ozone depletion	0%	0%	0%	0%
Ionising radiation	0%	0%	0%	0%
Photochemical ozone formation	3%	2%	5%	2%
Particulate matter	5%	4%	6%	5%
Human toxicity, non-cancer	2%	5%	3%	5%
Human toxicity, cancer	1%	1%	1%	1%
Acidification	4%	5%	6%	5%
Eutrophication, freshwater	3%	3%	3%	3%
Eutrophication, marine	1%	5%	1%	5%
Eutrophication, terrestrial	1%	3%	2%	3%
Ecotoxicity, freshwater	2%	23%	3%	23%
Land use	0%	34%	0%	35%
Water use	33%	2%	2%	0%
Resource use, fossils	14%	3%	20%	3%
Resource use, minerals and metals	9%	2%	15%	2%
Total percentage contribution for the impact categories selected	80%	72%	72%	71%

Conclusions on Step 4 – Sourcing of Methyl Salicylate

Natural MeS



Derived from plant resources (no fossil carbon depletion, marketing argument)



- **Low production yield** (<2%)
- **Information about the crop** can be difficult to obtain, but it is a **determining factor**
→ nature and quantity of fertilizers (kg/ha), land use, pesticides, mechanization, valorization of co-products, i.e. fruits...

What are the main issues related to natural MeS ?



Synthetic MeS



Optimized process with high yields



Energy consumption and reagents synthesis

What are the main issues related to synthetic MeS ?

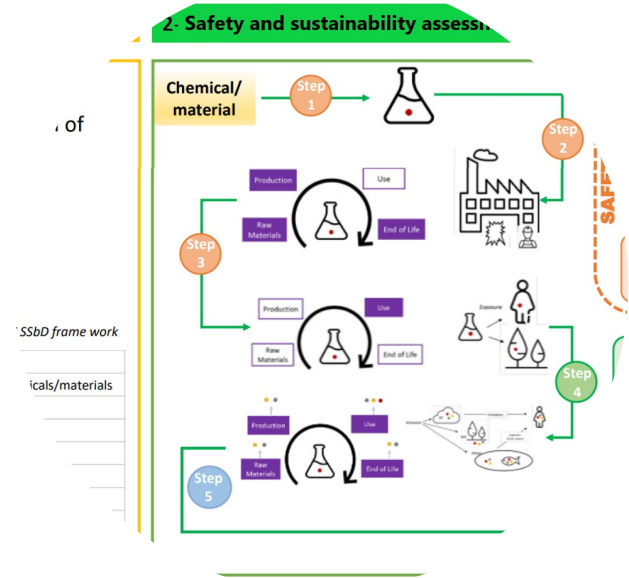


Methyl salicylate's impact on the cradle to grave perimeter is mainly due to its **production**.
Natural methyl salicylate has an impact **significantly higher** than the synthetic one, on all impact categories.
Traceability and issues of **agricultural cultivation** are a major focus of attention.

Overall conclusions on Step 4

- **Data sharing and access to information** through the value chain are the two main issues for Step 4 resulting in a time-consuming data collection phase.
- **The purpose of the comparison to a reference and the choice of the reference is questionable.** Comparison also raises some issues when data quality is heterogeneous.
- The completion of Step 4 is expected to be challenging for the fragrance industry due to the anticipated lack of information on perfume composition and the **lack of information access (confidentiality / traceability)**.
- The case study has only been applied to one single ingredient but a fragrance is typically a mixture of 60-80 ingredients so the **workload required** for the assessment of a fragrance mixture would be significantly higher.

Overall conclusions on IFRA's case-study



Overall key learnings on the fragrance SSbD case study

Holistic Perspective	SSbD provides a broader view on safety and sustainability, identifying gaps and areas for improvement
Practical applications	SSbD can be useful for analyzing and improving different aspects within the life cycle of a chemical, e.g. production processes, sustainable sourcing, or assessing safe uses
Value chain focus	SSbD can highlight 'hot topics' to be addressed along the value chain
Stimulates discussion	SSbD encourages dialogue on data quality and methodological approaches in safety and sustainability

Key challenges in the fragrance SSbD case study

Data challenges	Significant data gaps, low-quality data, and confidentiality concerns from suppliers hinder data sharing
Lack of expertise	Insufficient expertise in both safety and sustainability within the industry
Single score limitations	Single score oversimplification. Deeper understanding required of the ingredient's specific characteristics
Unclear reference	Uncertainty around selecting the appropriate reference for sustainability assessments
Workload complexity	Focus of the case-study on one ingredient , while typical fragrances contain 60-80 ingredients , leading to increased assessment complexity
Guidance gaps	Lack of guidance in the SSbD framework for implementation

"A formula is like a sentence, and thousands of beautiful ones exist. Like a writer, when a perfumer puts emotion into his work, the result makes your heart skip a beat."

Alberto Morillas

Credits to :

