Für Mensch & Umwelt

Umwelt Bundesamt

16th International Conference on Chemistry and the Environment

The concept of sustainable chemistry: key drivers for the transition towards sustainable development

Dr. Christopher Blum

Section IV 1.1 / International Chemicals Management

German Environment Agency

Outline

- **A Concept of Sustainable Chemistry**
  - **background, design and definition**
  - **assessment instruments**
- **The International Sustainable Chemistry Collaborative Centre (ISC_3)**

International Sustainable Chemistry Collaborative Centre

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Some milestones…

Twelve Principles for Green Chemistry
(Anastas and Warner, 1998)

Twelve Principles for Green Engineering
(Anastas and Zimmermann, 2003)

General Criteria for Sustainable Chemistry (UBA and OECD, 2004)

Criteria for determining best available techniques

- **IPPC 96/61/EG; EU Council Directive concerning Integrated Pollution Prevention and Control (Annex IV)**
- **IED 2010/75/EU; EU Council Industrial Emissions Directive (Annex III)**

Why and How?

Analysing the landscape

For Sustainable Chemistry exists many descriptions, initiatives and numerous technical and theoretical approaches

Identifying gaps and needs

- Avoid/reduce hazards of Chemicals of Concern (CoC)
- Substitution and alternative solutions
- reduction of emissions and exposure
- save resources & use renewable resources
- Shortage of indicators, SC in education; connection to employment & consumer protection

source: Umweltbundesamt 2010

Drafting, discussing and refining the concept

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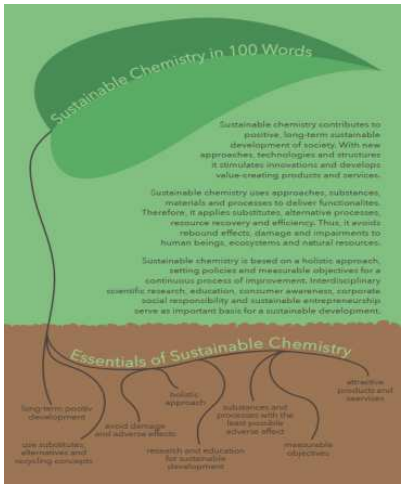
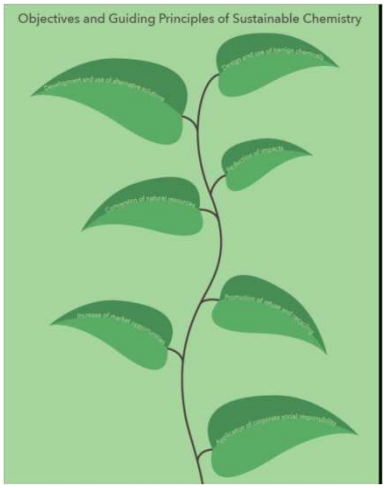


What is it about?

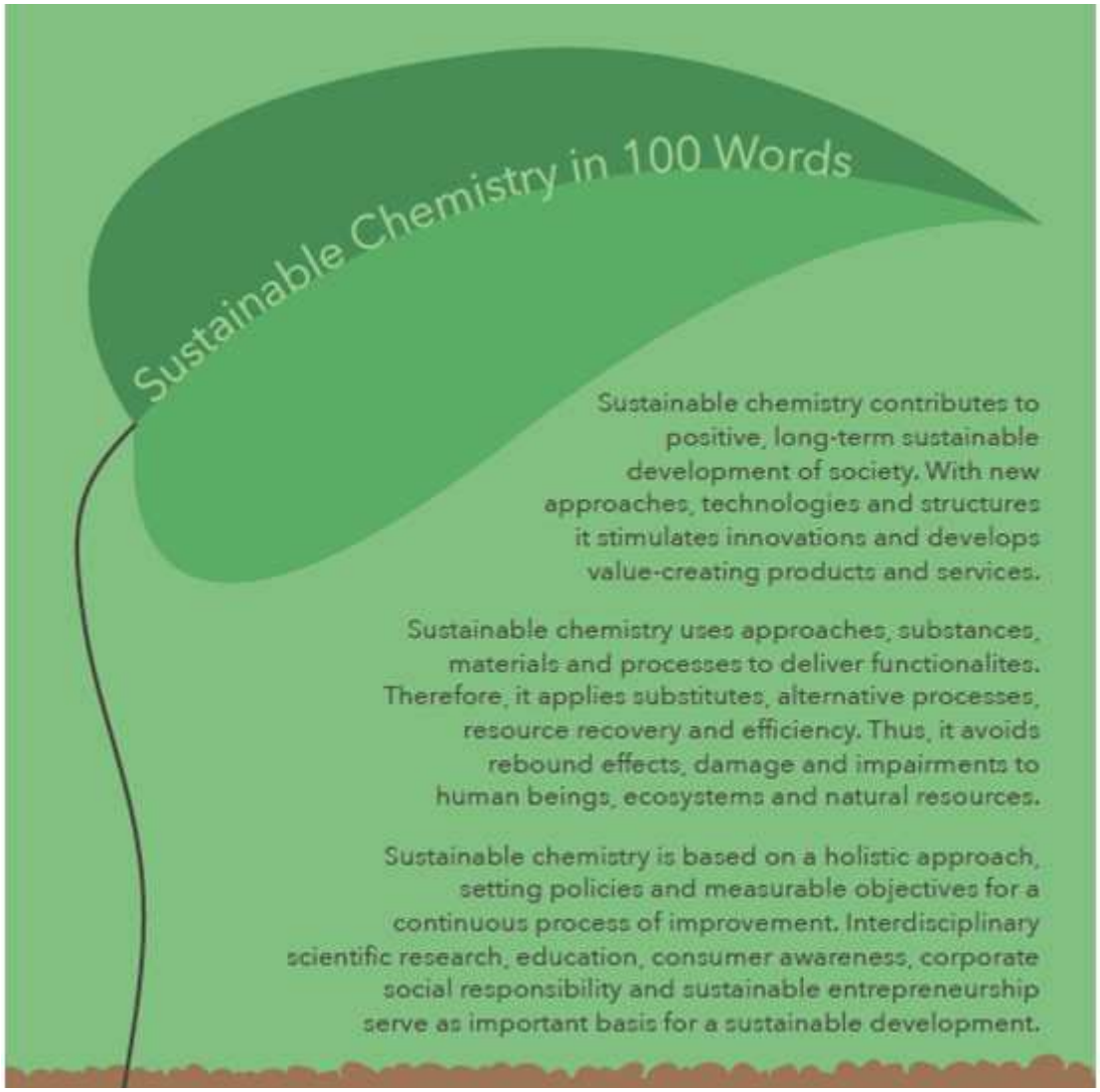
100 words and essentials for SC



Objectives and Guiding Principles

Connection to other elements

100 WORDS FOR SUSTAINABLE CHEMISTRY



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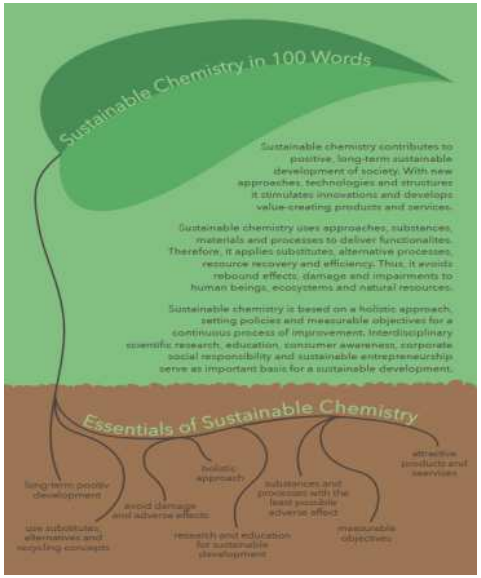
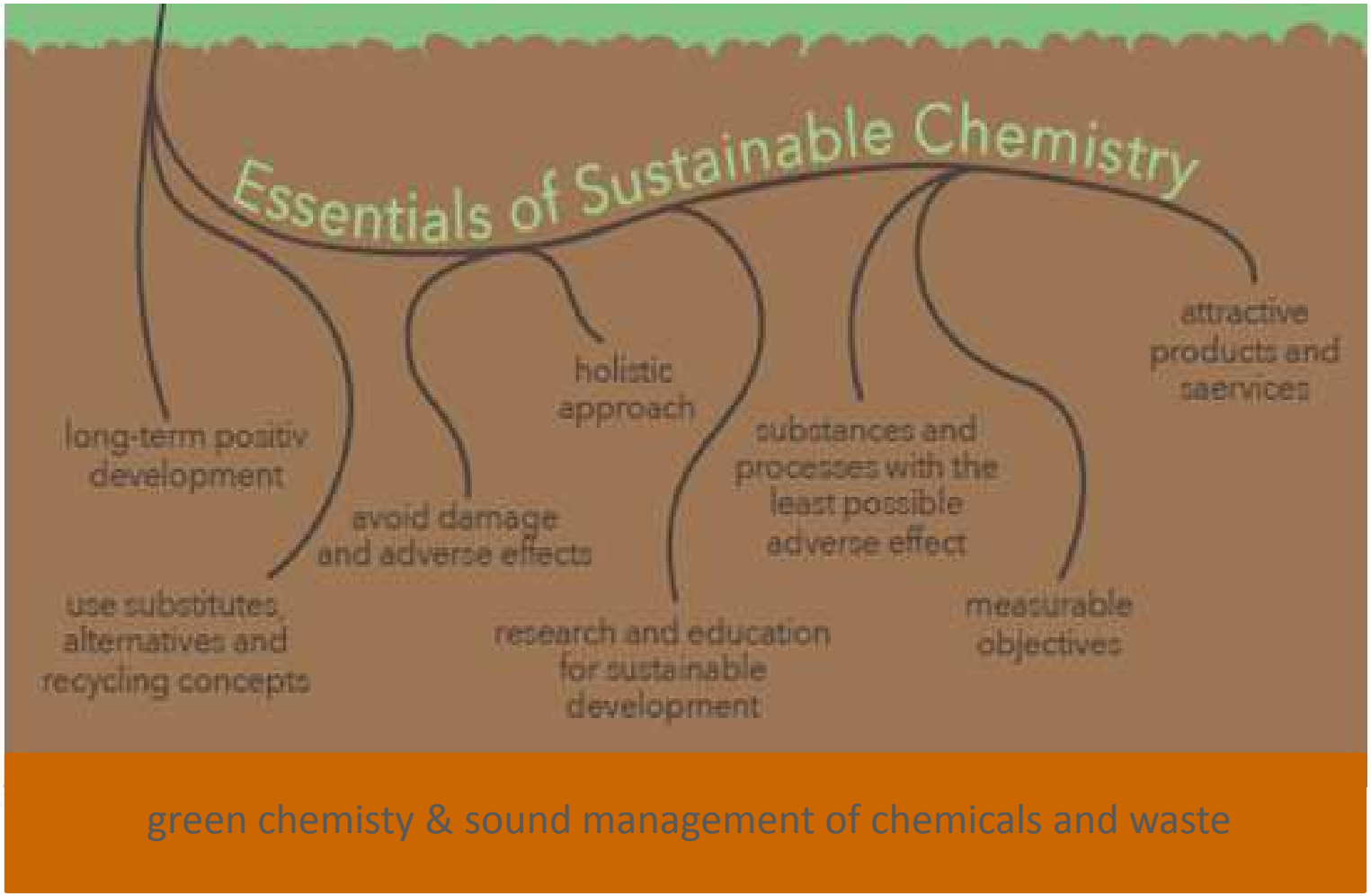
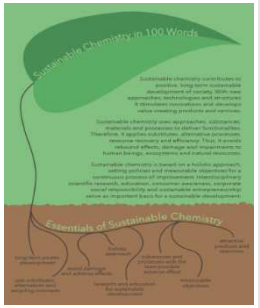
- **supporting a common understanding**



- **stimulating the transition process**

ESSENTIAL ELEMENTS OF SC





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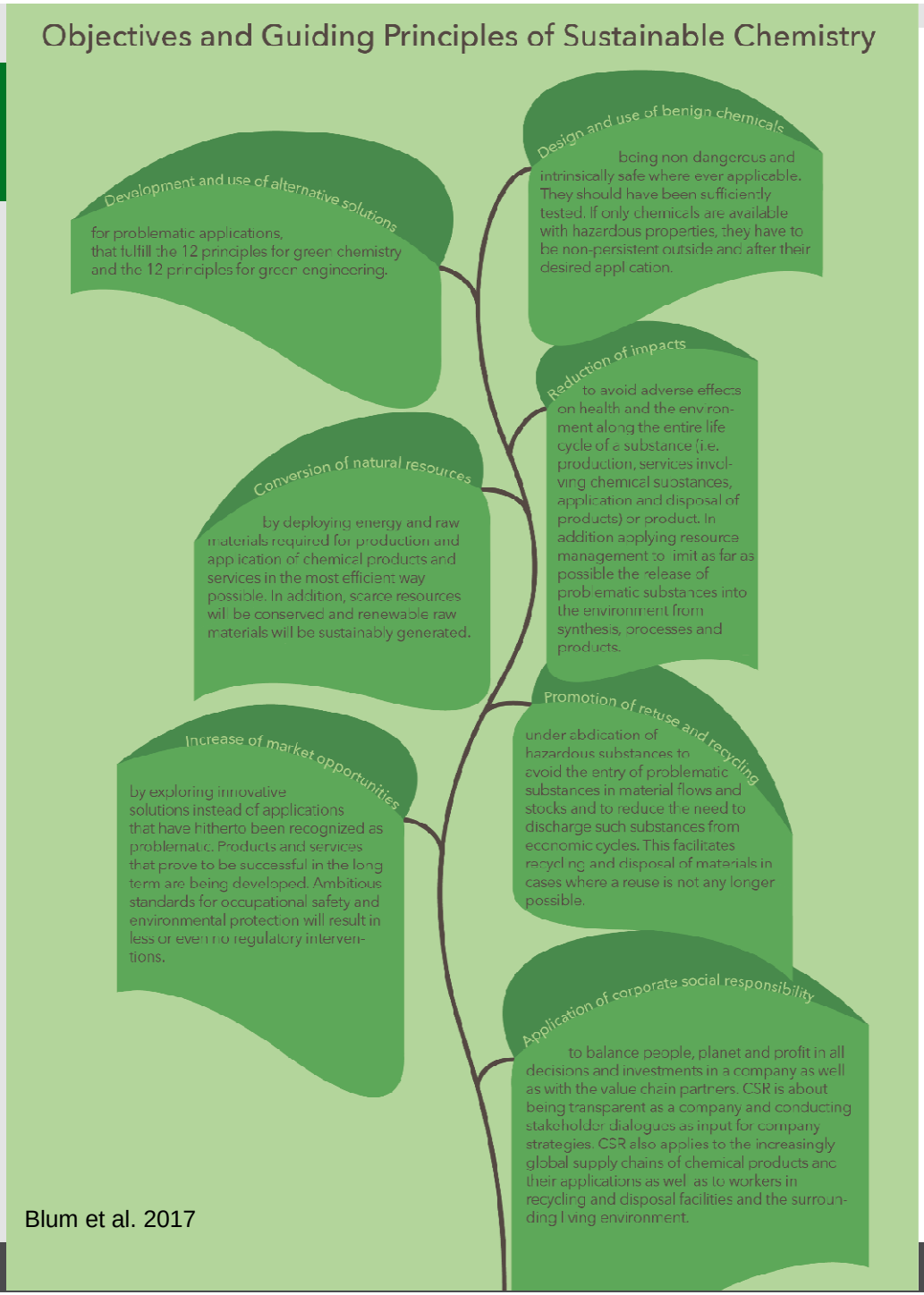

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- Design and use of benign chemicals
- Development and use of alternative solutions
- Reduction of impacts
- Conservation of natural resources
- Promotion of reuse and recycling
- Increase of market opportunities
- Application of Corporate Social Responsibility

Connecting SC with SAICM

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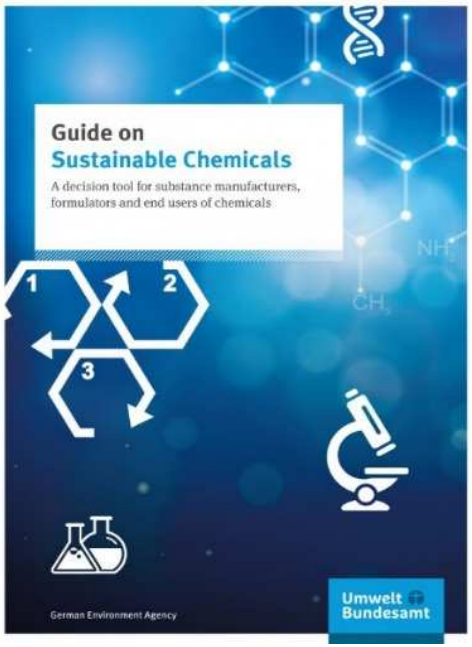
2020 goal:

"By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment".

GUIDE ON SUSTAINABLE CHEMICALS

IT-TOOL SUBSELECT



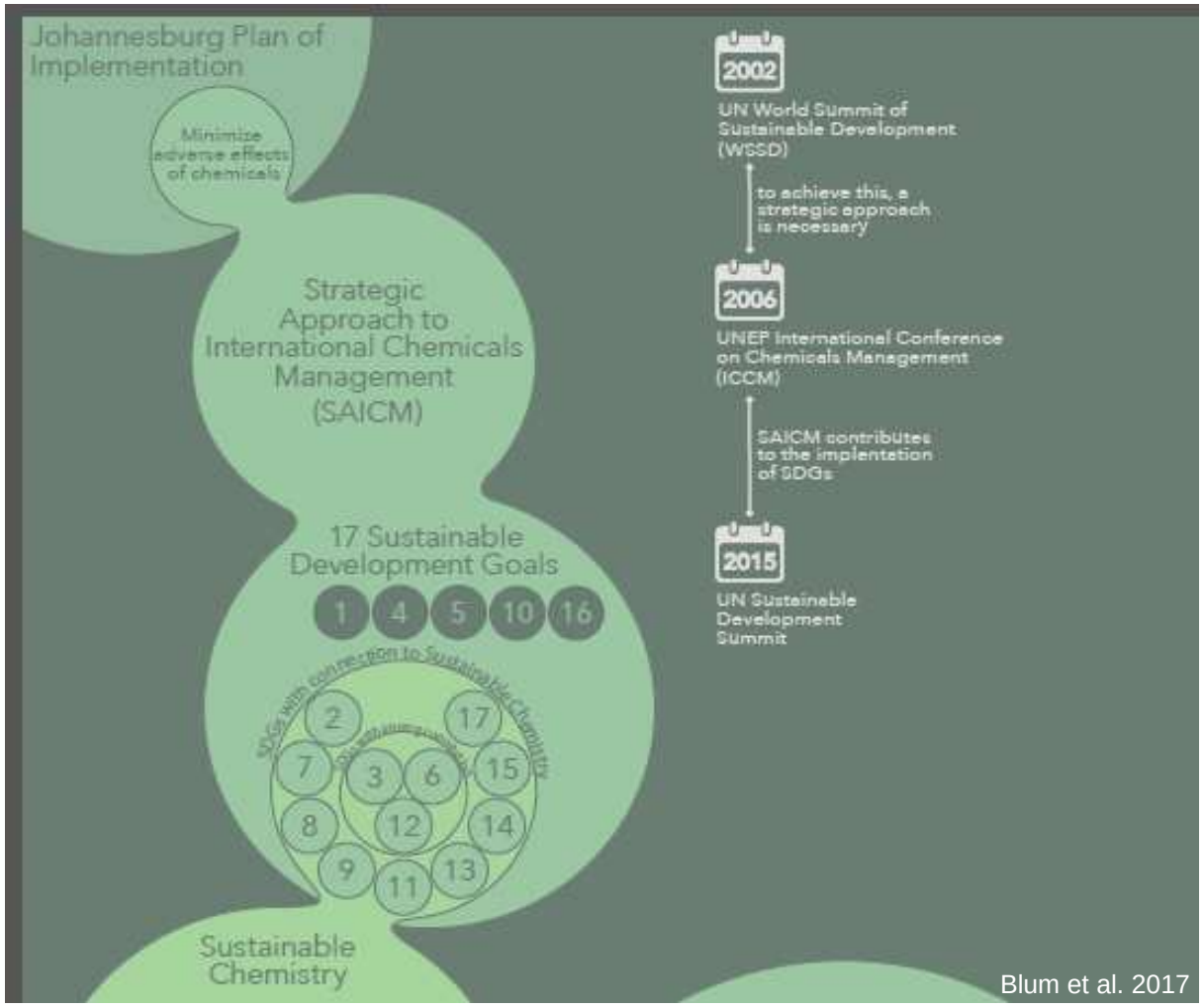
Source: Umweltbundesamt 2016

FIGURE 2: OPTIONS TO ACT DEPENDING ON THE RESULTS OF THE EVALUATION

CRITERIA	RED	YELLOW	GREEN	WHITE
Substance on list	Substitution			
Dangerous PC Properties	Substitution Risik management			
Human toxicity / Dangerous for the environment (Mobility)	**Use-specific criteria** Priority "red" > Substitution Priority "yellow" > Substitution or risik management		NO ACTION NEED	GATHER INFORMATION
Greenhouse potential	Substitution, Design increasing material efficiency			
Resource use	Substitution, Design increasing energy efficiency			
Origin of raw materials	Request standards from supplier or change sourcing			

https://www.umweltbundesamt.de/publikationen/guide-on-sustainable-chemicals?anfrage=Kennummer&Suchwort=4169

Connecting SC with SDG



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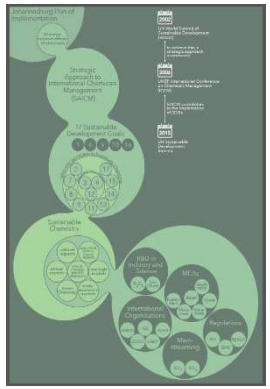

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SDG indicators for the 2020 goal

Quelle:
https://sustainabledevelopment.un.org/sdgs

12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement

12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment

INDICATOR SET PSC

PARAMETERS OF SUSTAINABLE CHEMISTRY

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Core Criteria	Indicator
i	GHG-emissions
ii	Raw materials expenditure
ii	Raw materials intensity
ii	Proportion of materially used renewable raw materials
ii	Energy expenditure
ii	Energy intensity
ii	Water deman (total)
ii	Proportion of recycled water
ii	Pollutant emissions (air)
ii	Pollutant emissions (water)
ii	Amount of waste
ii	Content of hazardous waste
iii	Sustainability information at product labels
iii	Content of hazardous substances
iv	Occupational accidents
iv	Occupational diseases
v	Economic advantages through sustainable measures
v	Intensity of investment in environmental and resource protection
v	Market presence
v	Proportion of audited suppliers and contractors
vi	Certification (ISO, EMAS)
vi	Apprenticeship and in-service training
vi	Proportion of employed women
-	Other advantages

Core Criteria

i. Climate

ii. Environment, Energy and Resources

iii. Product Design

iv. Health

v. Economic Advantages

vi. Transparency, education, social standards, dialog, international cooperation

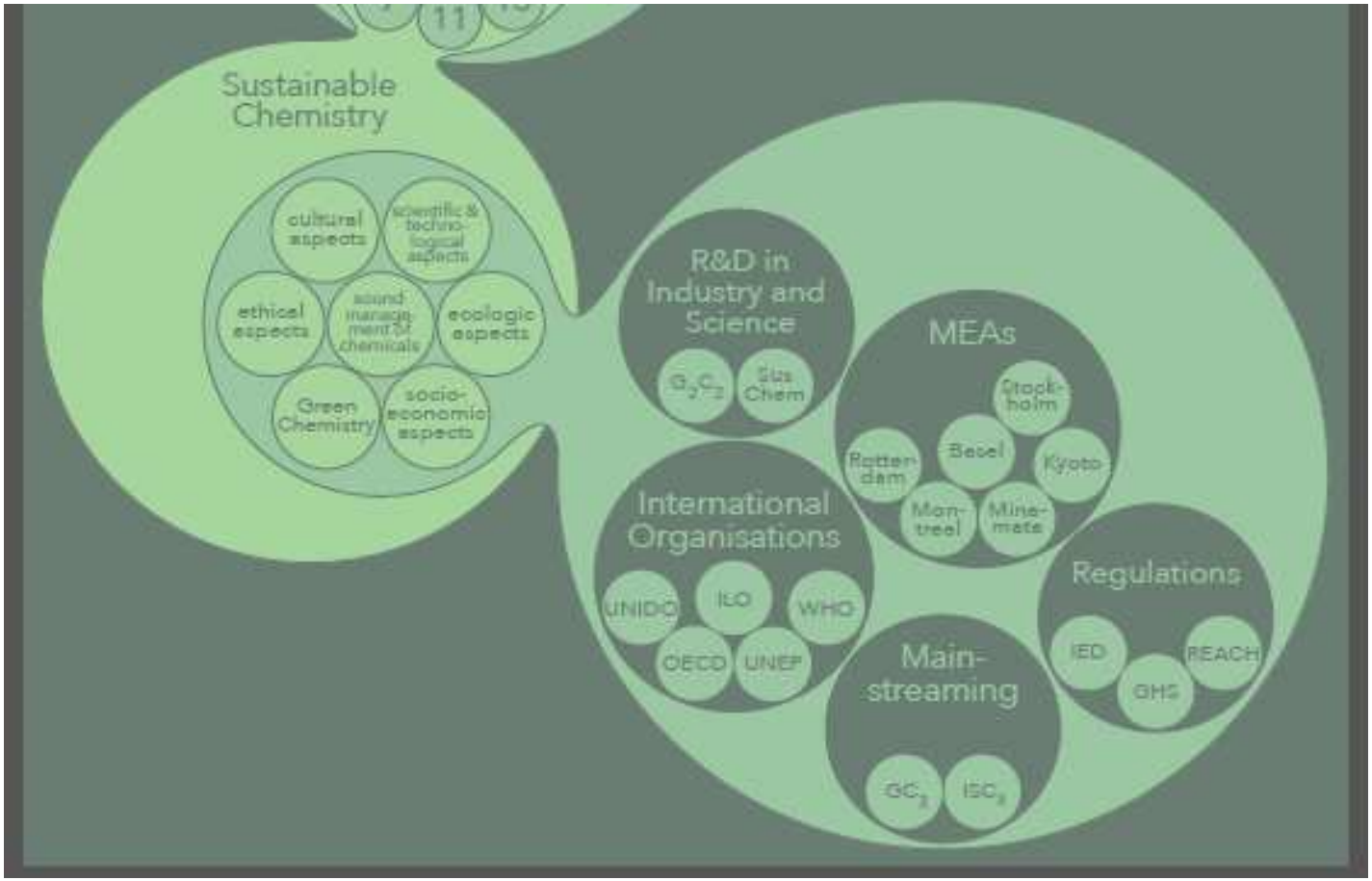
INDICATOR SET PSC

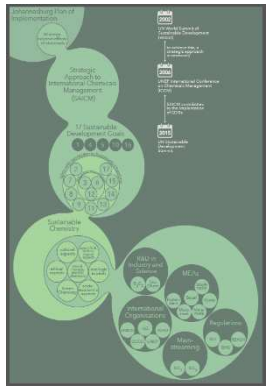
Bonding of Packages

Indicator	unit	before	after	Difference [absolut]	Difference [%]
GHG Emissions (savings throughout the supply chain)	CO2-Equ.	67.201	44.465	-22.736	34,0
Amount of material (clue for all lines)	kg per year	14000	9800	4200	30,0
Raw material intensity	g clue per g package	0,00064	0,00039	0,00025	39,1
Energy demand of the process	kWh per year	15163	7127	8036	53,0
(Fresh)water demand (total)	m³	0	0	0	0
Emissions to air			n.n.		?
Emissions to water			n.n.		?
Amount of waste	kg per year	14000	9800	4200	30,0
Content of dangerous waste	kg per year				?
Hazardous substances content		No classification	No classification		✓
Arbeitsunfälle	amount			0	0
Economic Advantages	€/a	68134	50451	17683	26,0

Source: Umweltbundesamt 2016

Connecting Sustainable Chemistry





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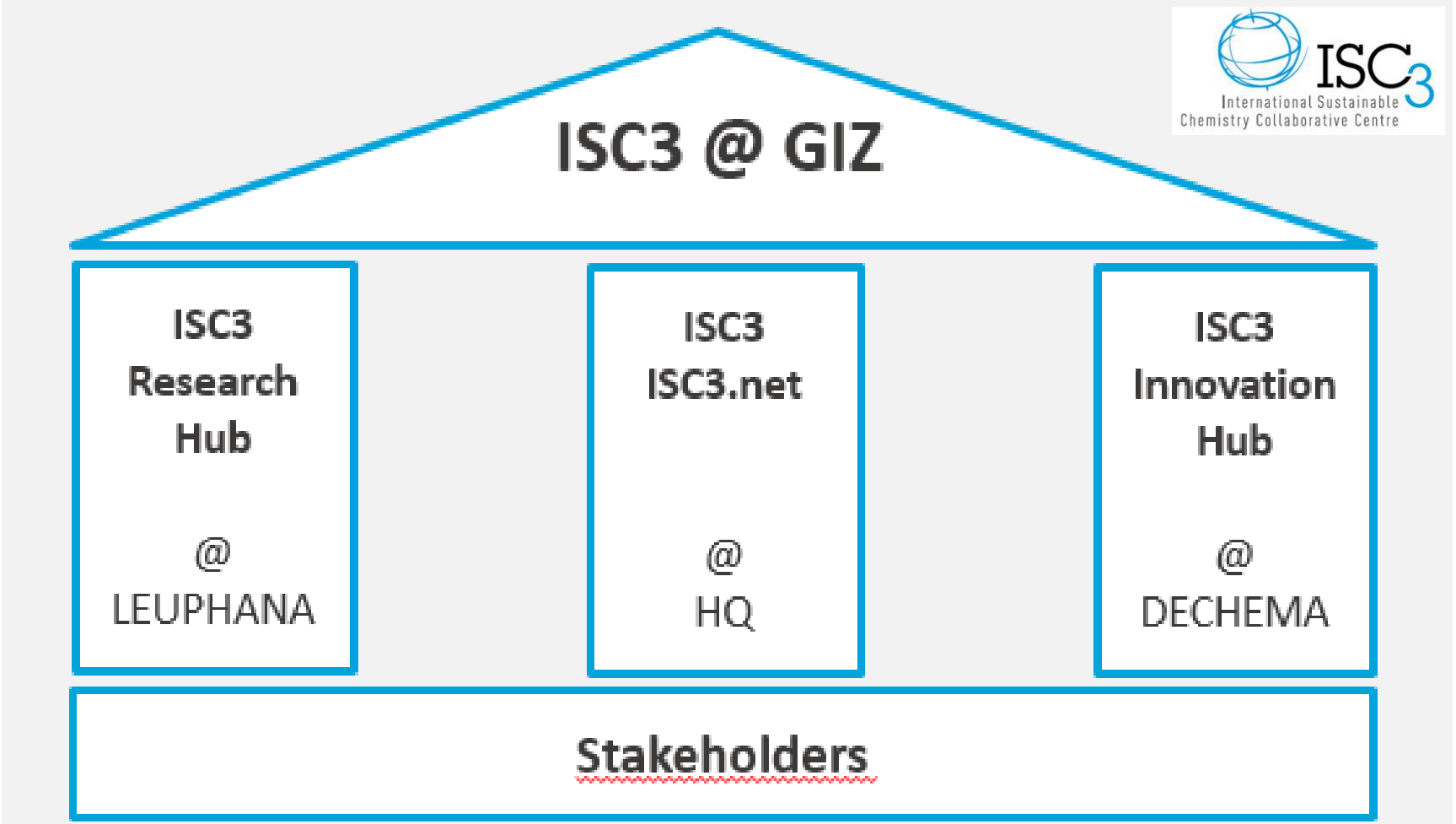
ISCnet International Sustainable Chemistry Network

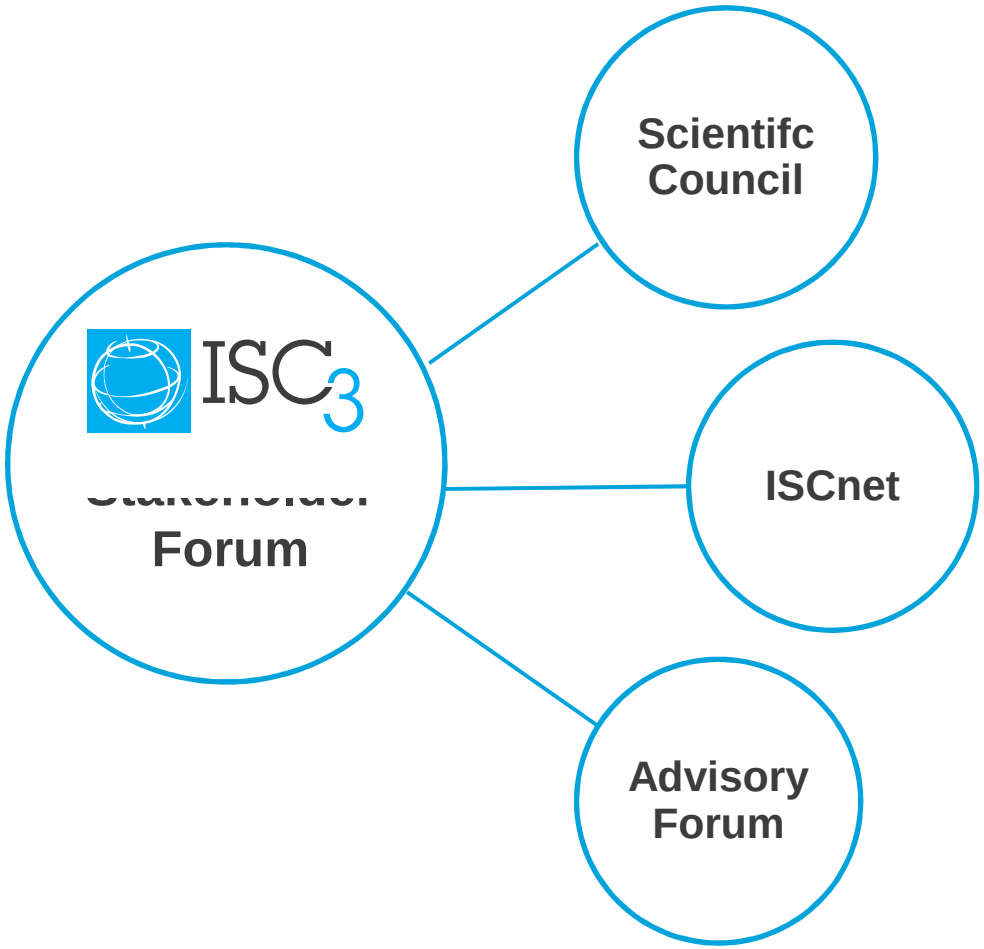
Shaping transformation towards Sustainable Chemistry:

- Collaboration across sectors and actors
- Dissemination of information and knowledge
- Supporting implementation
- New system thinking and approaches
- Initiation of research and innovation
- Identification of new business models

ISC_3 – Structure



ISC_3 – Stakeholder Concept



Scientifc Council

- ✓ Up to 10 Experts
- ✓ 2 Meetings per Year
- ✓ Chem. Mana. + SC
- ✓ Advice on research and innovation activities

Advisory Forum

- Up to 20 Delegates
- 2 Meetings per Year
- Stakeholders SC, other sectors
- Advice and consultation on strategy + work programme

ISC3
International Sustainable Chemistry Collaborative Centre

ISCnet
International Sustainable Chemistry Network

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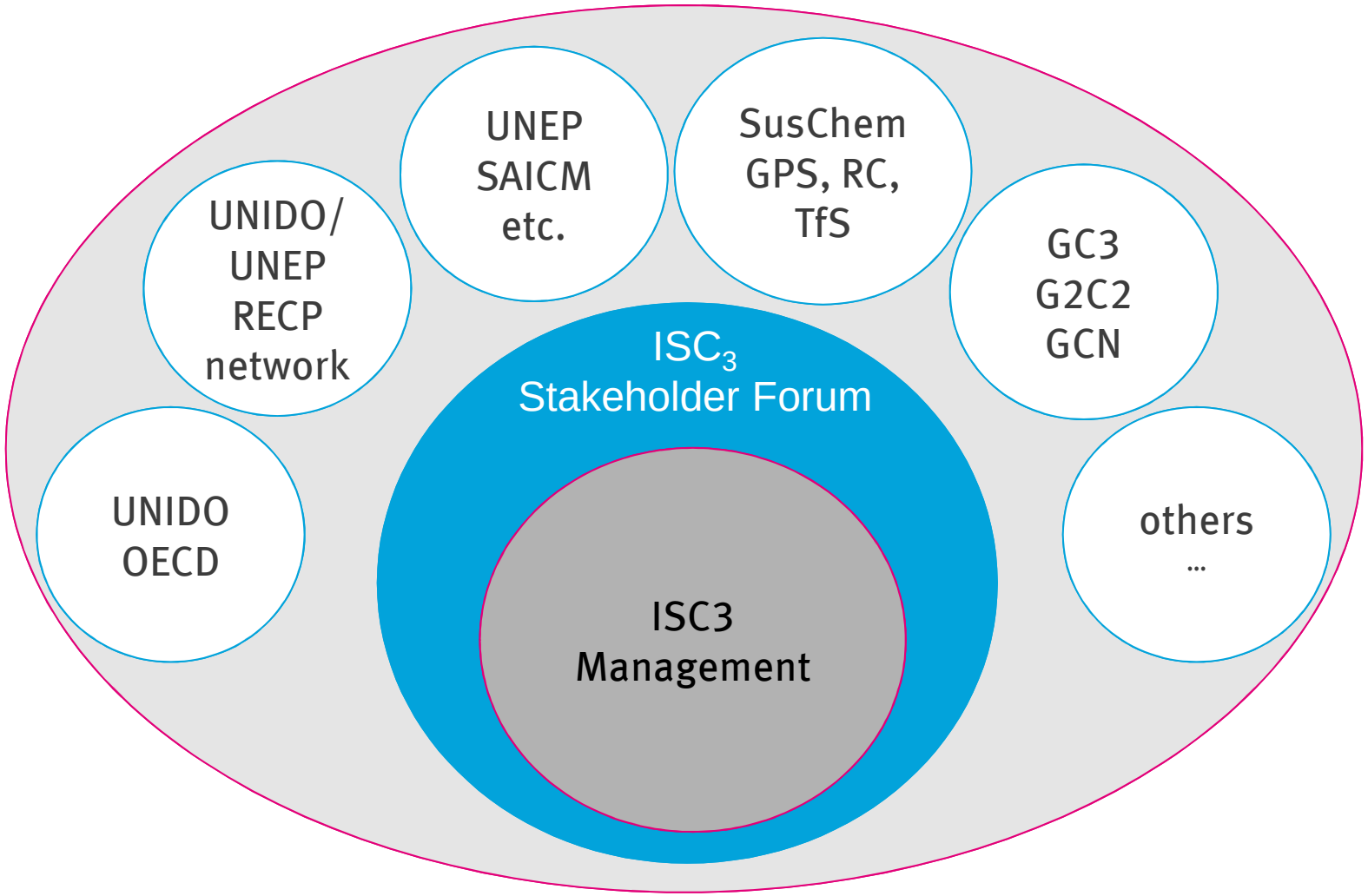
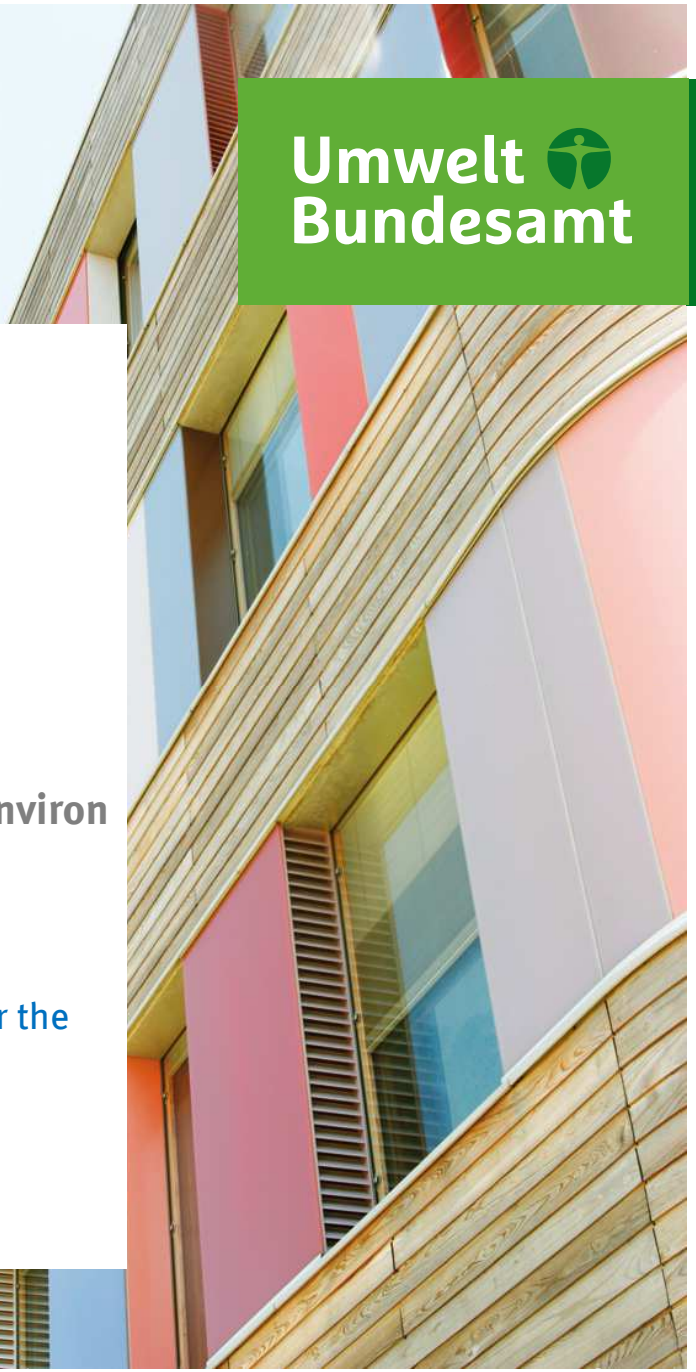


Some Intended Activities

- Week of Sustainable Chemistry
- Brokering (search and find)
- Knowledge Navigator, Innovation Platform




- Atlas Sustainable Chemistry
- International postgradual study programme
- Summer School on SC in International Cooperation



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Thank you for your attention!

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