REACH Activities in the European Space Sector

1. Paavo Heiskanen
2. Tim Becker

1. ESA REACH Officer / MPTB Chairman
2. REACHLaw Ltd

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Agenda

1. Organisation in the Space Sector
2. Obsolescence risk management activities
3. REACH Task Forces
4. Substances in articles
5. Beyond REACH
6. Conclusions and outlook

Annex: Lists of key acronyms

ORGANISATION IN THE SPACE SECTOR

Impacts of REACH on a Space Supply chain

- REACH **directly affects** the entire space sector through **obsolescence** of materials, processes, and technologies at unprecedented scale
- REACH needs to be taken into consideration already in the **design phase** (*Obsolescence risk management and planning*)
- REACH will affect the project **even after manufacturing** (fueling, pyrotechnics, repairs, recurrent models, …)
- **Project duration** also increases uncertainty and risk (one-off satellite payload versus multi-decade launcher programme)
- **Not only a compliance matter**, but risk management in a niche market.

Cross-sectorial management within space community required

European-wide coordination through Materials & Processes Technology Board (MPTB)

REACH is affecting European space industry as a whole. Coordination and information exchange of risk analysis and mitigation is to the benefit of the entire community.

The **MPTB** is a European platform that includes all major **industrial partners** and **space agencies**. Tasks include:

- Legislation: Intelligence of legislative processes (e.g. REACH, RoHS 1 & 2, WFD, et al.) and coordination of actions.
- Obsolescence risk management: Identify in advance critical Materials and Processes (M&P).
  Propose action plans to mitigate obsolescence risk of M&P.
  Reduce programmatic risks and costs by early replacement.
- Data exchange: Share materials test data and avoid test duplication.
- R&D activities: Coordination of R&D activities, monitoring of alerts, analysis of in-orbit anomalies, *etc.*
- Communication & information exchange: Coordination of information via stakeholder workshops, symposia, WGs, training. Development of synergies with other industrial sectors.
- Splinter activities: Chromates Space Task Force (STF), Hydrazine Task Force (HTF), Lead Task Force (LTF), Pb-free transition joint WG; European Space Materials Database (ESMDB) steering board
- Standardisation: Provide inputs to European Space Standards (ECSS) – for example new obsolescence management handbook (ECSS-Q-HB-70-23A)

Space Sector Organisation (ESA PoV)

ESA
CNES
DLR
ASI
Space Agencies

LSIs
EMs
SPs
…
Industry

EDA

EUROSPACE

- Communication to regulators
- Coordination with ASD
- Secretariat for task forces

Observers

- Intelligence, Risk Assessment
- Coordination within industry, action management

MPTB

Member states
European Commission
ECHA
Regulators

EUROSPACE
REACH
CHEM
…
ASD

OBSOLESCENCE RISK MANAGEMENT ACTIVITIES

Risk Management

Risk Management (ECSS-M-ST-80C):

*"Risk management is a **systematic** and **iterative process** for **optimizing resources** … integrated through defined roles and responsibilities into the day–to–day activities in all project domains and **at all project levels**… It is performed in an **integrated, holistic way**, maximizing the overall benefits in areas such as:*

- *design, manufacturing, testing, operation, maintenance, and disposal, together with their interfaces;*
- *control over risk consequences;*
- *management, cost, and schedule."*

Obsolescence Management is Risk Management

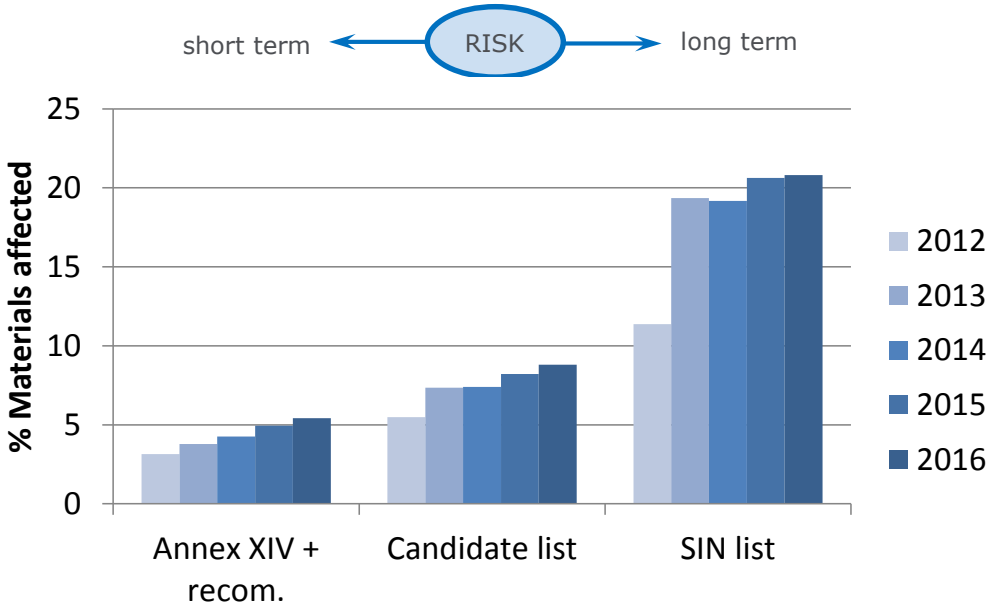
Obsolesence Management (ECSS-Q-HB-70-23A):

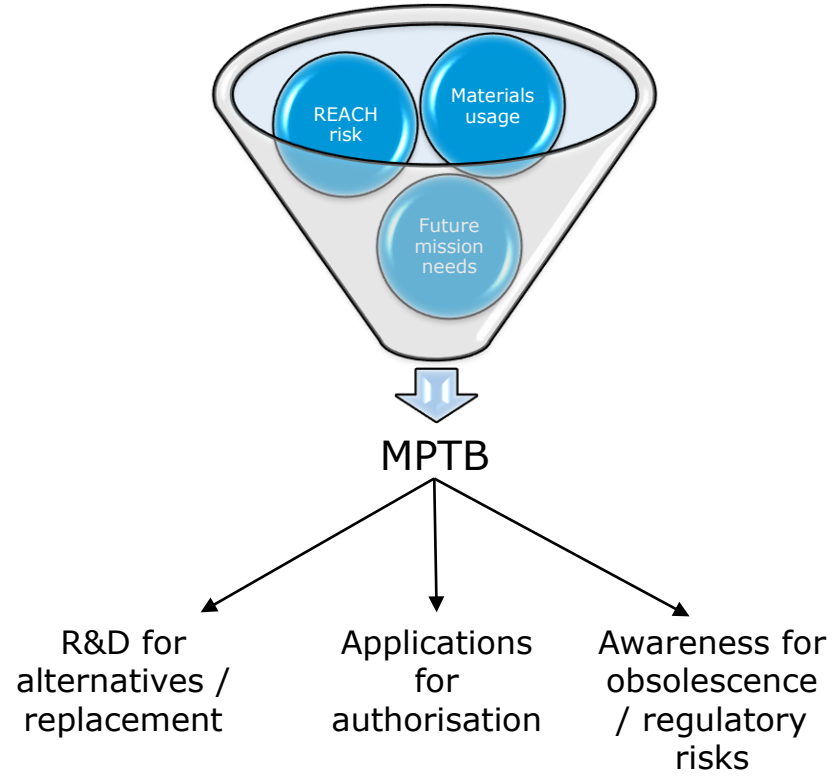
*"Obsolescence management involves **implementing scheduled and coordinated actions** in order to secure the availability of a product during its entire life-cycle, through technical and economical means"*

*"The proactive OM approach consists of tracking any potential cause of obsolescence … applied to **all stages of a product life-cycle**, starting from the design phase … "*

*"The first step of proactive obsolescence management is to establish for each MMPP (Material, Mechanical Part, Process) an **obsolescence risk analysis**."*

Trend of REACH obsolescence risk





Example of a an obsolescence mitigation action

Supplier actions caused a need to substitute a chemical

Affected members of the MPTB organize a working group

The working group decides to evaluate substitutes

Substitution alternatives are mapped:

	Product A	Product B	Product C	Product D
Company A	X	X		
Company B			X	
Company C				X

Working group agrees on the test standards. Agencies provide lab. support

Results are shared within the WG

	Test A	Test B	Test C
Product A	55 %	80 %	95 %
Product B	80 %	80 %	80 %
Product C	60 %	70 %	90 %
Product D	65 %	55 %	85 %

Each participant proceeds to their individual qualifications

Examples of substitution efforts in ESA/ESCC

1. **Ammonium Dichromate (pyrotechnic powder)**

- Replacement studied under Cleanspace funding (TRP, target TRL4)
- Qualification on pyro-valve level left to industry

2. **Chromium Trioxide**

- Used extensively in corrosion protection for aluminum structures
- Several projects and collaborative actions ongoing to evaluate substitute materials (for example Cr(III)O)

3. **Strontium Chromate**

- Replacement assessment ongoing at laboratory testing level

4. **Lead (Pb) metal**

- Joint task force drafting a road map for a Pb-free transition

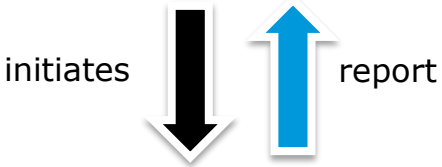
REACH TASK FORCES

REACH Task Forces vs. MPTB

MPTB*

REACH obsolescence risk analysis. Regulatory monitoring. General studies and sector positions

**Materials and Processes Technology Board of the European Space Components Coordination (ESCC MPTB).* The ESCC MPTB is a partnership between the European Space Agency (ESA), national space agencies, and the European space industry represented by ASD-EUROSPACE; it is chaired at present by ESA. The European Defence Agency (EDA) is an observer.



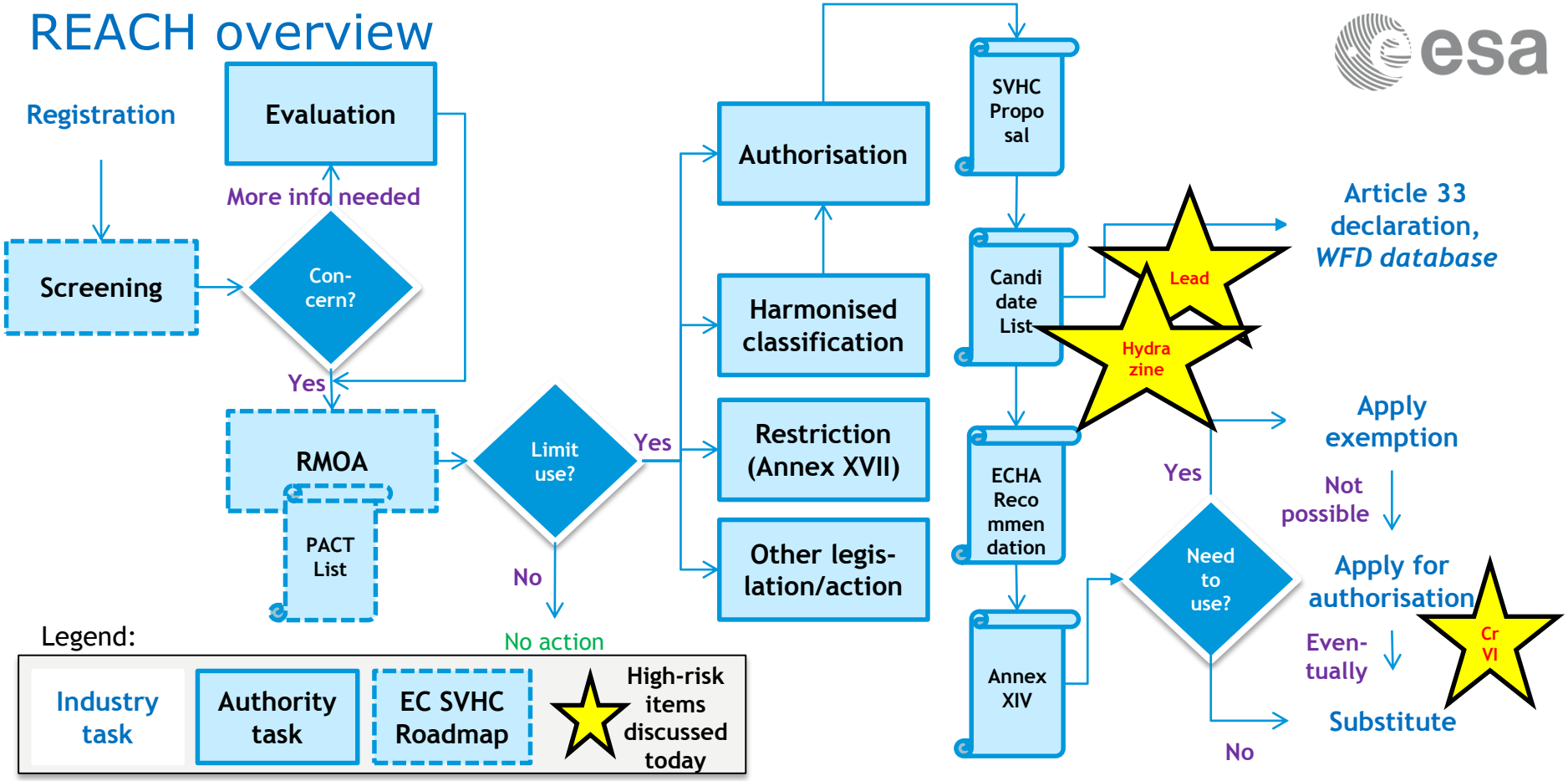
Space Task Forces

REACH dossier development. Substitution roadmaps

Hydrazine	Chromates	Lead Metal	Pb-free
"HTF" (2011-)	"STF" (2013-)	"LTF" (2018-)	transition joint WG (2019-)

See also: https://eurospace.org/working-groups

REACH overview



Hydrazine TF (2011-): Overview

- HTF Participants

Companies	Agencies
Airbus DS ArianeGroup GmbH Arianespace AVIO S.p.A GHC Nammo Westcott Ltd. OHB System AG SSTL TAS	ASI, CNES, DLR, ESA
	Trade association
	Eurospace
	Consultant
	REACHLaw

- Objective(s) – *general*

Joint response to candidate listing of hydrazine, to ensure adequate regulatory treatment and legal certainty regarding future use

Similar assessment for other liquid propellants

- Deliverables (to date)
  - Hydrazine use and supply chain mapping for the European Space Sector (2011)
  - Authorisation Exemption Study and Eurospace Position Paper, especially considering "use as fuels in closed systems" (REACH Art. 56(4)(d) 2nd alt.) presented to the EC for legal clarification (2012)
  - Information exchange with other impacted sectors (precious metals, nuclear)
  - Internal report on RMOA elements (2016)
  - Up-to-date sector volume data for registration update (2016, 2019)
- Current priorities
  - Awaiting EC legal clarification on exemption position
  - Monitor regulatory evolutions (possible prioritization by ECHA, new OEL)
  - Use and supply chain mapping and exemption study for other liquid propellants (MMH, UDMH, NTO)

Chromates STF (2013-): Overview

- STF Participants

Companies	Agencies
Airbus DS APP BV ArianeGroup GmbH AVIO S.p.A Europropulsion OHB System AG RUAG Space AB TAS	CNES, ESA
	Trade association
	Eurospace
	Consultant
	REACHLaw

- Objective(s) – *general*

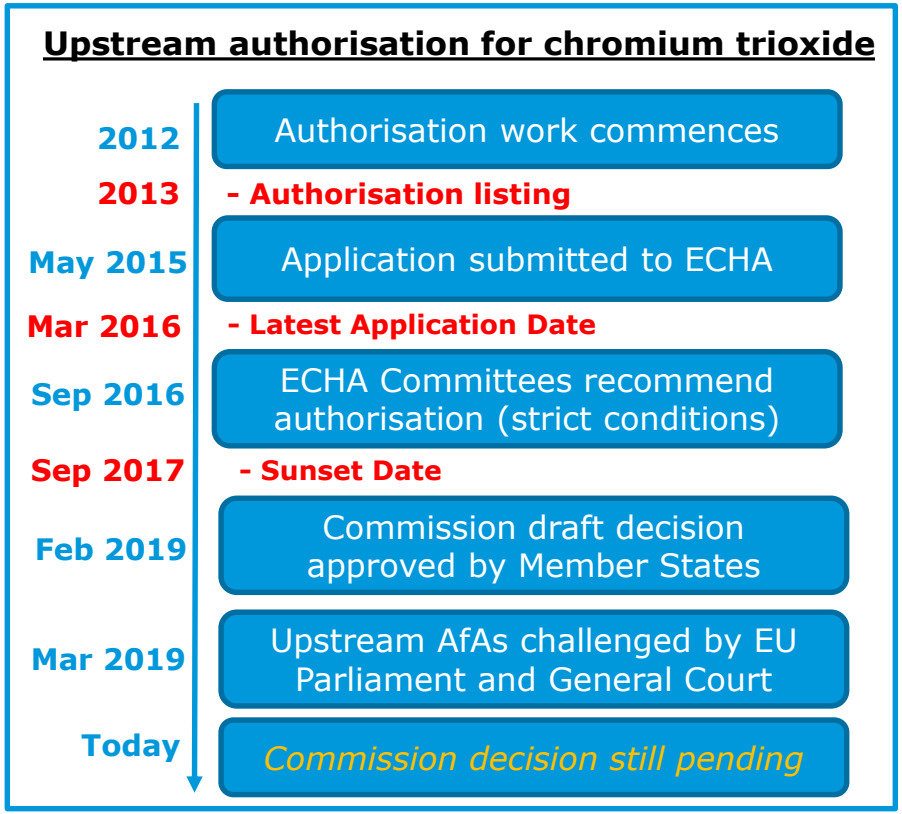
Support joint REACH authorisation and compliance for chromates in the European Space Industry

- Deliverables (to date)
  - Chromates use and supply chain mapping for the European Space Sector
  - 1st REACH Space Stakeholder Day (ESA HQ, 2013)
  - Joint Space Sector AoA and SEA for "Alodine 1200" – summary fed a supportive comment into the ECHA public consultation on **CTACSub** AfA (2015)
  - Sector recommendations for compliance with CTACSub AfA (and future authorisation)
  - Strong coordinated advocacy efforts to ensure viable decision from the EC (Q4/2018)
- Current priorities
  - **Initial (upstream) AfA**: CTACSub decision monitoring and developing support scenarios for Space industry DUs for decision compliance and REACH Article 66 notifications
  - **Renewal applications**: (1) Determine need and (2) AfA strategy (*to be confirmed: individual, joint Space DU/STF and/or joint Aerospace DU*)

Chromates STF (2013-): Upstream authorisation

A case of concern ..

1. Companies in the Space Sector and their subcontractors rely - and have been actively supporting (through STF and third party exchanges) - the upstream Application for Authorisation (AfA) for uses of chromium trioxide by the CTACSub Consortium (*Lanxess et al.*)
2. Today, the European Commission decision on the AfA is still pending, in spite of timely industry activities: soon 2 years after the Sunset Date and total process > 7 years (see timeline with milestones →)
3. High level of uncertainty about continued use and way forward in the industry, while substitution work is ongoing



Lead TF (March 2018-): Overview

- LTF Participants

Companies	Agencies
Airbus DS ArianeGroup ESR Technology Ltd. RUAG Space Tesat-Spacecom GmbH & Co. KG TAS	CNES, DLR, ESA
	Trade association
	Eurospace
	Consultant
	REACHLaw

- Objective(s) – *general*

1. Joint response to REACH candidate list proposal for Pb metal, to ensure adequate regulatory treatment and coherence with RoHS2 Art. 2 exclusions

2. New dimension now: OEL update under the Chemical Agents Directive – help ensure that the new values will be feasible and proportionate

- Deliverables (to date)
  - Eurospace contribution to ECHA public consultation prior to candidate listing (20 April 2018)
  - Input to cross-sector activities to map the essentiality of lead (Q4/2018)

- Current priorities
  - Monitor regulatory evolutions (possible prioritization by ECHA, new OEL) – stay ready for further input development, incl. as part of cross-sector activities
  - Prepare for ECHA public consultations: *ongoing call for evidence re lead and its compounds (- 30 June)*
  - Related activity: ***Joint WG on Pb-free transition*** (created 2019) to ensure a successful industry-wide transition to a Pb-free technology in the European Space Sector given Regulatory and Market pressures. The first phase of the work should be the formation of a *"Roadmap and Plan for Pb-free transition"*

Joint WG on Pb-free transition (2019-): Overview

- Pb-free WG Participants

Companies	Agencies
Airbus DS **ArianeGroup** **RUAG** **Tesat** **TAS**	**CNES** **ESA CTB and MPTB Chairmen as Observers**
	Facilitator
	REACHLaw

- Objective(s) – *general*

Ensure a successful industry-wide transition to a Pb-free technology in the European Space Sector given Regulatory and Market pressures

- Deliverables (to date)
  - Gathering of participants
  - Outline of mission, composition, objectives and schedule
  - Kick-Off Meeting on 4 April 2019
- Current priorities
  - Mapping of issues ongoing
  - The first phase of the work should be the formation of a *"Roadmap and Plan for Pb-free transition"* – 1st version to be presented no later than Q4/2019.

SUBSTANCES IN ARTICLES

REACH Article 33 declaration

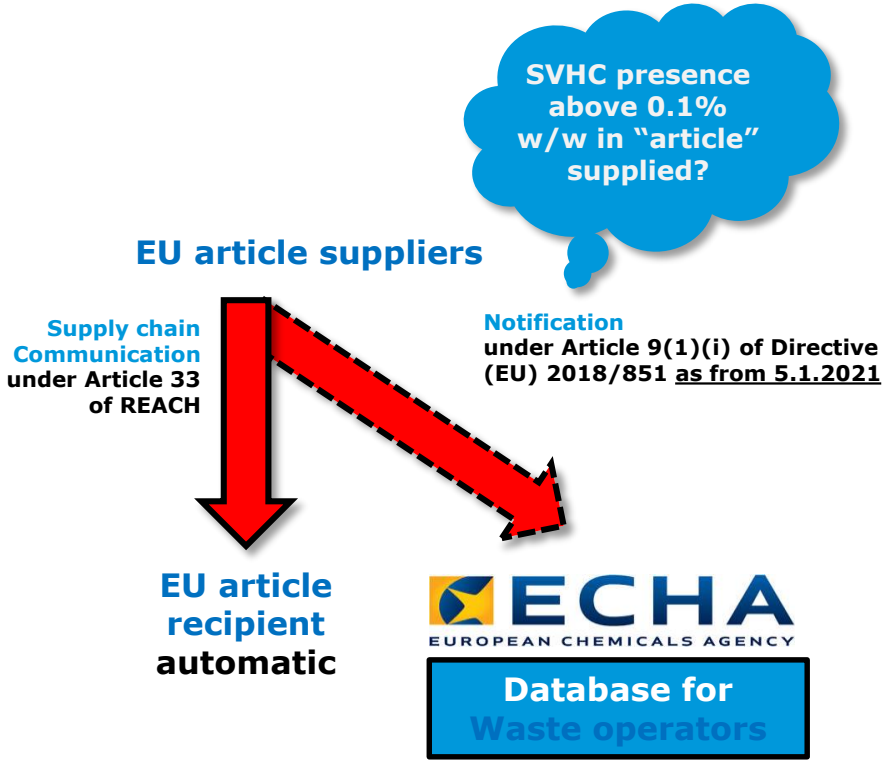
REACH Article 33 very challenging for producers of very complex space objects – still many open questions

Developments further adding to the challenge

- CJEU judgment "Once an article – always an article" (C-106/14, Sept 2015) + subsequent ECHA SiA Guidance update (June 2017)
- New ECHA database under Art. 9 of Directive (EU) 2018/851 (Waste Framework Directive "WFD" revision)

MPTB-level activities to support compliance

- Article 33 "Minimum Declaration" template
- Article 33 best practice survey (2018)
- Discussion / clarifications on specific questions
- WFD database: Elaborate Space Sector special case; comments on database plans



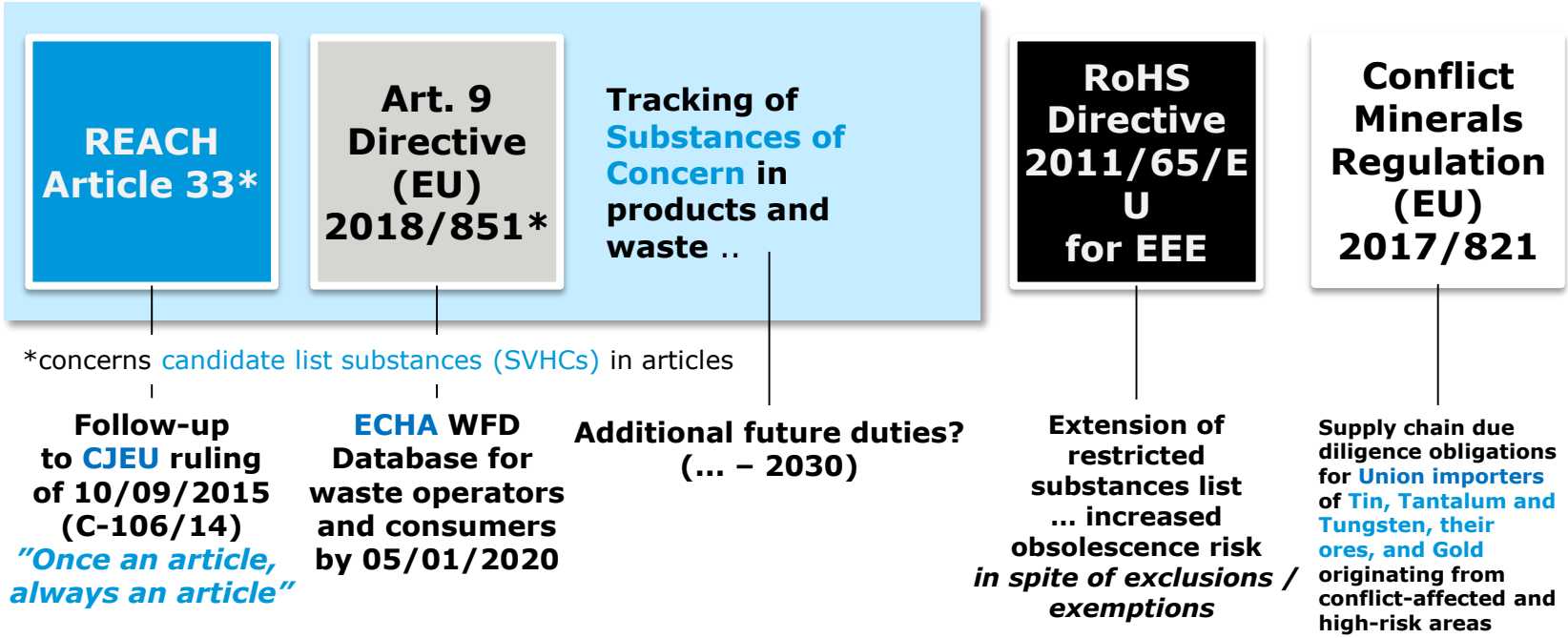
Waste Framework Directive revision

New ECHA Database on articles under Waste Framework Directive (Article 9 of Directive (EU) 2018/851) - Joint communications via Eurospace (October 2018):

1. Exclusion position for launched hardware – submitted to EC DG ENV for legal clarification (*pending today*)
2. Contribution to ECHA call for input on its draft database scenario – follow-up on 7 June 2019
3. Response to EC public consultation on the interface between chemicals, product and waste legislation - call for sector-specific tracking solutions

Launched items not resulting in waste on EU territory

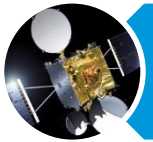
Evolving regulations for substances in articles



BEYOND REACH

Beyond REACH

An increasing number of regulatory developments exceeding REACH demand the attention of the Space Sector stakeholders. Some key areas to be followed:



Substances in articles

Occupational Exposure Limits

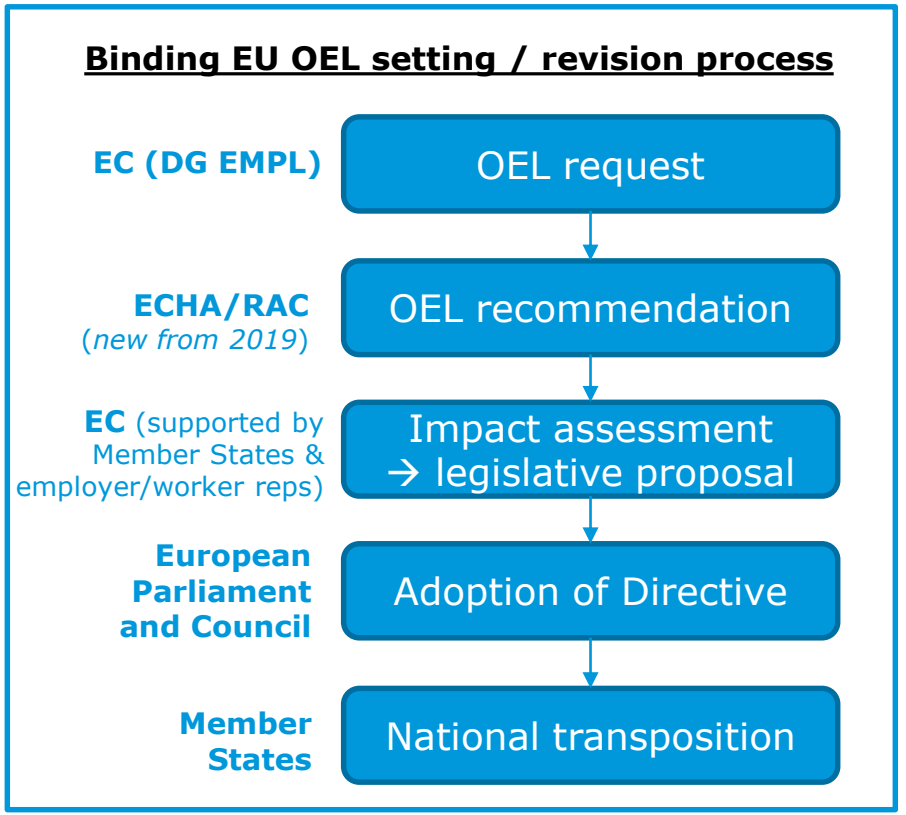
"Brexit" implications

Occupational Exposure Limits (OELs)

Binding OELs under EU workplace legislation have been "re-discovered" as a substance-specific tool to set minimum standards for worker protection:

1. Council Directive 98/24/EC (Chemical Agents Directive, "CAD") – *ongoing revision of limit values for lead and its compounds and new for diisocyanates*
2. Directive 2004/37/EC of the European Parliament and of the Council (Carcinogens and Mutagens Directive – "CMD") – *CMD revision for new/revised OELs for 25 substances ongoing (3 "waves"; 1st wave incl. e.g. Cr(VI) and hydrazine adopted through Directive (EU) 2017/2398); possible extension: Reprotoxic substances*

- Industry to ensure in consultations that the new limit values will be economically and technically feasible
- Interface with REACH authorisation and restrictions remains subject to policy debates



“Brexit” implications

- The UK is (?) leaving the EU (“Brexit”) – both sides are still aiming for orderly withdrawal; to this end EU27 leaders agreed to delay Brexit until 31 October 2019
- For the Space industry - just like other sectors - Brexit poses challenges for both **supply chain stability** and **compliance** with EU REACH and “UK REACH” post Brexit - Article 33 and Authorisation requirements most impacting for Space
- **REACH Article 33 requirements** will remain in place under a UK REACH – use of the “consolidated method” described in the ‘ASD Sectoral Guidance for Substances in Articles under REACH’ will continue to be permissible (HSE advice)
- **Authorisation**: REACH Article 66 notifications will be carried over with the rest of REACH into UK law. In addition, the UK REACH envisages transitional measures to minimize the cost to industry and disruption to supply chains for UK market access with regard to the transitioning from the EU to the UK regime.

REACH into LCA and vice versa

Project title: *"REACH into Life Cycle Assessment (LCA) - Integration of REACH and Critical Raw Materials (CRMs) into the LCA Methodology"*

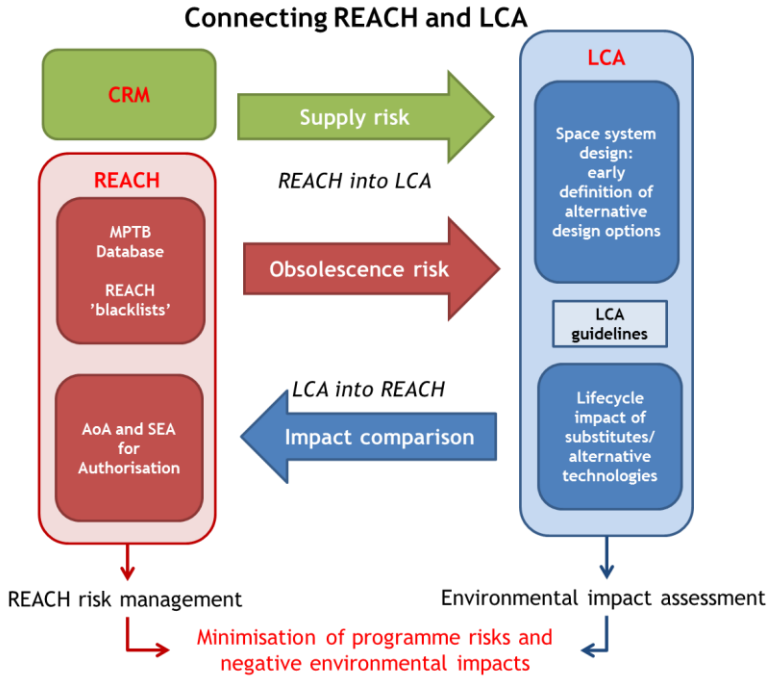
Contractors: Deloitte (Prime) & REACHLaw (Subcontractor)

Timeline: 2017 - 2019

Background: There is a lack of information in *early* design phases of potential risks for the project of supply chain disruption due to this regulation, not allowing for an early definition of alternative design options.

Objective: Analyse REACH and LCA processes to identify key synergies

1. **REACH → LCA: Develop and validate an adaptation of the LCA methodology to identify, flag and classify the REACH obsolescence risks (and CRM use) through the complete life cycle of space products at (pre-)design stage**
2. **LCA → REACH**: Establish how LCA can support REACH risk management efforts (e.g. REACH authorisation) and demonstrate through one specific case study



CONCLUSIONS AND OUTLOOK

Trends on REACH in the Space Sector

- Sector has become more proactive – start early (in regulatory process, at pre-design stage, …)
- Joint efforts looking more and more beyond REACH → issues multiplication due to regulatory evolutions and political developments, esp. for substances in articles
- Benefits of increased collaboration & communication on regulatory issues within the Space Sector and beyond (aerospace & defence at large, automotive, …)

- Continued need for legal certainty and predictability given the long lifecycles in the Space Sector; **key *pending* issues**:
  1. EC legal clarification on Eurospace *Hydrazine* REACH exemption position (2012)
  2. EC decision on *CTACSub AfA* (submitted in 2015) & determination of follow-up needs
  3. EC legal clarification on Eurospace *WFD* exclusion position (October 2018)

Summary of current activities and priorities

Task Forces	• **STF**: EC decision on CTACSub AfA & determination of follow-up needs • **HTF**: Re-activation and re-scoping to include other liquid propellants • **LTF**: Respond to regulatory initiatives, collaborate with other sectors • **Pb-free WG**: Create a roadmap for Pb-free transition
"Business as usual" (MPTB)	• Continued routine obsolescence risk assessment; update of obsolescence risk assessment for propellants & explosives (first done in 2014) • Promote **joint substitution activities** if suitable alternatives are identified • Deepen **collaboration**, increase member engagement & communication
Beyond REACH	• **WFD**: Elaborate Space Sector special case; comments on database plans • **Miscellaneous** (e.g. OELs, RoHS2, Conflict Minerals Regulation, Brexit): Monitoring and response where needed

Future events and reference material

3rd Annual REACH Workshop

16 October 2019, ESA HQ, Paris – https://indico.esa.int/event/315

- ECHA Annex XIV authorisation list
- ECHA Candidate list for authorisation
- ASD-Eurospace - REACH Section
- ECSS-Q-HB-70-23A – Materials, mechanical parts and processes obsolescence management handbook (20 November 2017)

QUESTIONS?

THANK YOU FOR YOUR ATTENTION!

ANNEX: LISTS OF KEY ACRONYMS

List of key acronyms: Space-related

Abbreviation	Explanation
ASI	Agenzia Spaziale Italiana
CNES	Centre National d'Études Spatiales
CTB	Component Technology Board
DLR	Deutsches Zentrum für Luft- und Raumfahrt
ECSS	European Cooperation for Space Standardization
EM	Equipment Manufacturer
ESA	European Space Agency
ESCC	European Space Components Coordination
ESMDB	European Space Materials Database
ESTEC	European Space Research and Technology Centre (at ESA)
HTF	Hydrazine Task Force
LSI	Large System Integrator
LTF	Lead Task Force
M&P / MMPP	Materials and Processes / Material, Mechanical Part, Process
MPTB	Materials & Processes Technology Board (previously M&P WG)
SP	Service Provider
STF	Chromate Space Task Force

List of key acronyms: Regulations and public bodies

Regulation	Explanation
CLP	Classification, Labelling and Packaging of substances and mixtures (Reg. (EC) N0 1272/2008)
F-GAS	Fluorinated Greenhouse Gases (Reg. (EU) No 517/2014)
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Reg. (EC) 1907/2006)
RoHS	Restriction of Hazardous Substances ("RoHS 2" Directive 2011/65/EU)
WFD	Waste Framework Directive (Directive 2008/98/EC on waste)
Public body	**Explanation**
CJEU	Court of Justice of the European Union
EC	European Commission
ECHA	European Chemicals Agency
EEA	European Economic Area (EU MS + Norway, Iceland, Liechtenstein)
EP	European Parliament
HSE	Health and Safety Executive (UK)
MS	Member State
RAC	Committee for Risk Assessment (at ECHA)
SEAC	Committee for Socio-Economic Analysis (at ECHA)

List of key acronyms: REACH / Chem

Abbreviation	Explanation
AfA	Application for Authorisation
AoA	Analysis of Alternatives
CCST	Miscellaneous Chromium VI Compounds for Surface Treatment REACH Authorization Consortium
CSR	Chemical Safety Report
CTACSub	CTAC Submission Consortium relating to uses of chromium trioxide
DU	Downstream user of a substance or mixture
EEE	Electrical and Electronic Equipment
GCCA	Global Chromates Consortium for Aerospace
PACT	Public Activities Coordination Tool
RMO(A)	Risk/Regulatory Management Option (Analysis)
SDS	Safety Data Sheet
SEA	Socio-Economic Analysis
SiA	Substances in Articles
SVHC	Substances of Very High Concern (as defined in REACH Article 57)

See also "ECHA-term" database with REACH terms and definitions, available at https://echa-term.echa.europa.eu

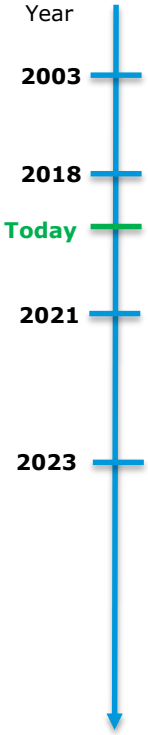
List of key acronyms: Substances

Abbreviation	Explanation	CAS number	EC number
BPA	Bisphenol A	80-05-7	201-245-8
CrO_3	Chromium trioxide	1333-82-0	215-607-8
Cr(III)O	Chromium (III) oxide	1308-38-9	215-160-9
Cr(VI)	Hexavalent chromium	*various*	*various*
GaAs	Gallium Arsenide	1303-00-0	215-114-8
InP	Indium Phosphide	22398-80-7	244-959-5
MMH	MonoMethyl Hydrazine	60-34-4	200-471-4
NMP	N-Methyl-2-Pyrrolidone	872-50-4	212-828-1
NTO	Dinitrogen Tetraoxide	10544-72-6	234-126-4
Pb	Lead metal	7439-92-1	231-100-4
UDMH	Unsymmetrical DiMethyl Hydrazine	57-14-7	200-316-0

Note: This does not represent an exhaustive list of substances for which the Space Sector is affected by REACH.

ADDITIONAL SLIDES

Lead metal: Tightening regulatory landscape



Directive 2002/95/EC (RoHS 1) ban above 0.1% in Electrical and Electronic Equipment, subject to some exemptions / exclusions (e.g. equipment designed to be sent into space)

Regulation (EC) No 1907/2006 (REACH) Candidate List inclusion on 27 June 2018 triggers supply chain communication obligation under REACH Article 33 for EU/EEA suppliers of articles (still) containing Lead Metal above 0.1% - Not a Ban !!!

Directive (EU) 2018/851 (on waste): Notification obligation for EU/EEA Article Suppliers to the *European Chemicals Agency (ECHA)* for its new database from 5 January 2021

Directive 98/24/EC (Chemical Agents Directive): Expected entry into force by mid-2023 of updated binding Occupational Exposure Limit and Biological Limit Value to comply with

A possible future inclusion in the REACH Authorisation List (Annex XIV) would impose a "sunset date" with authorisation requirement for the use of Pb Metal as a substance (e.g. for soldering), to be fulfilled by the downstream user or its upstream supplier.

Possible further future obligations to track substances of concern in products and waste

WFD database: Wide scope triggering the duty

The information obligation under REACH Article 33 and (from 5/1/2021 under Directive (EU) 2018/851) applies *when* the article/object is *supplied*…

- Including legacy designs (incl. spare parts) and products in (long-term) storage supplied after candidate listing
- As part of complex objects consisting of up to millions of component articles and following complex global supply chains, whenever at least one component article contains a listed SVHC above 0.1% w/w (*"Once an article - Always an article"*)
- Regardless of intellectual property constraints / confidentiality / export control
- Regardless of volume supplied, part size and exposure
- Immediately to non-consumers with the inclusion of the substance in the candidate list (no implementation time foreseen in REACH Article 33)

WDF database: Legal text of Article 9

'Article 9
Prevention of waste

1. Member States shall take measures to prevent waste generation. Those measures shall, at least:

[...]

(i) promote the reduction of the content of hazardous substances in materials and products, without prejudice to harmonised legal requirements concerning those materials and products laid down at Union level, and ensure that any supplier of an article as defined in point 33 of Article 3 of Regulation (EC) No 1907/2006 of the European Parliament and of the Council provides the information pursuant to Article 33(1) of that Regulation to the European Chemicals Agency as from 5 January 2021;

2. The European Chemicals Agency shall establish a database for the data to be submitted to it pursuant to point (i) of paragraph 1 by 5 January 2020 and maintain it. The European Chemicals Agency shall provide access to that database to waste treatment operators. It shall also provide access to that database to consumers upon request.